

# Concluding Panel Discussion: Sustained Economic Growth and Central Banking

## Introductory Remarks

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### I. Introduction

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The focus of this concluding panel is “Sustained Economic Growth and Central Banking.” As an organizer of this conference, I will explain the issues we have in mind in this regard.

### II. Price Stability as a Prerequisite for Sustained Economic Growth

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The ultimate objective of economic policy, including monetary policy, should be improving the economic welfare of individuals, which can be reasonably approximated by sustained economic growth. A central bank is thought to be responsible for price stability.<sup>1</sup> A natural question we should investigate here is whether price stability is really relevant to achieving sustained economic growth. As a starting point for discussion, let me summarize our knowledge obtained from the previous literature on this question.

#### A. Classical Dichotomy

In an economy where the “classical dichotomy” holds, real variables do not depend on nominal variables, such as monetary aggregates and the price level. Thus, economic growth or productivity growth, which is crucial for improving economic welfare, is determined by capital accumulation, population growth, and technological progress, and is not influenced by changes in the rate of inflation.

Long-run monetary neutrality is a widely accepted idea in theoretical as well as empirical analyses in economics. In the theoretical analysis, monetary neutrality is generally assumed to examine the long-term consequences for the economy, including

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\* I have benefited a great deal from the comments of Shigenori Shiratsuka. The views expressed here are mine and do not necessarily reflect the official views of either the Bank of Japan or the Institute for Monetary and Economic Studies.

1. Indeed, Article 2 of the Bank of Japan Law stipulates that market operations of the Bank of Japan “shall be aimed at, through the pursuit of price stability, contributing to the sound development of the national economy.”

economic growth.<sup>2</sup> In the empirical analysis, long-run monetary neutrality is often employed as an identifying restriction on a structural model to study business cycles.<sup>3</sup>

If we subscribe to the view of long-run monetary neutrality, price stability is not the prerequisite of sustained economic growth. In other words, fluctuations in monetary aggregates and general prices are neutral with respect to economic welfare. Can we accept this line of argument at face value?

## **B. Some Empirical Evidence**

Yet the classical dichotomy does not fully describe the real world. On a more realistic basis, inflation is probably not strictly neutral; price stability, however, minimizes distortions in the economy, thereby promoting sustainable economic growth.<sup>4</sup>

In fact, some empirical studies show the evidence of a negative correlation between inflation and economic growth (Figure 1). One plausible interpretation of this empirical evidence is that price stability is one of the fundamental bases for achieving favorable economic performance in the long run. To put it differently, businesses and households perform poorly when inflation is high and unpredictable. Monetary policy thus seems to make its best contribution to economic growth by maintaining price stability.<sup>5,6</sup> However, it should be noted that low and stable price development itself does not necessarily ensure a stable economic development, as I will argue later.

## **III. How to Define Price Stability in an Operational Manner?**

If price stability is really a prerequisite for achieving sustained economic growth, a central bank needs to have a practical definition of price stability to pursue.

Federal Reserve Board Chairman Alan Greenspan has referred to price stability as the state in which “economic agents no longer take account of the prospective change in the general price level in their economic decision making” (Greenspan [1996]). This statement can be interpreted as indicating the importance of attaining the

2. Some theoretical arguments, however, assume monetary non-neutrality even in the long run. For example, Tobin (1965) introduces outside money into an economic growth model to show that inflation, induced by a central bank's excess supply of outside money, raises the capital-labor ratio. Obstfeld and Rogoff (1995) employ a two-country dynamic equilibrium model to show that short-term changes in the money supply influence production and consumption in the long run through fluctuations in trade imbalances.

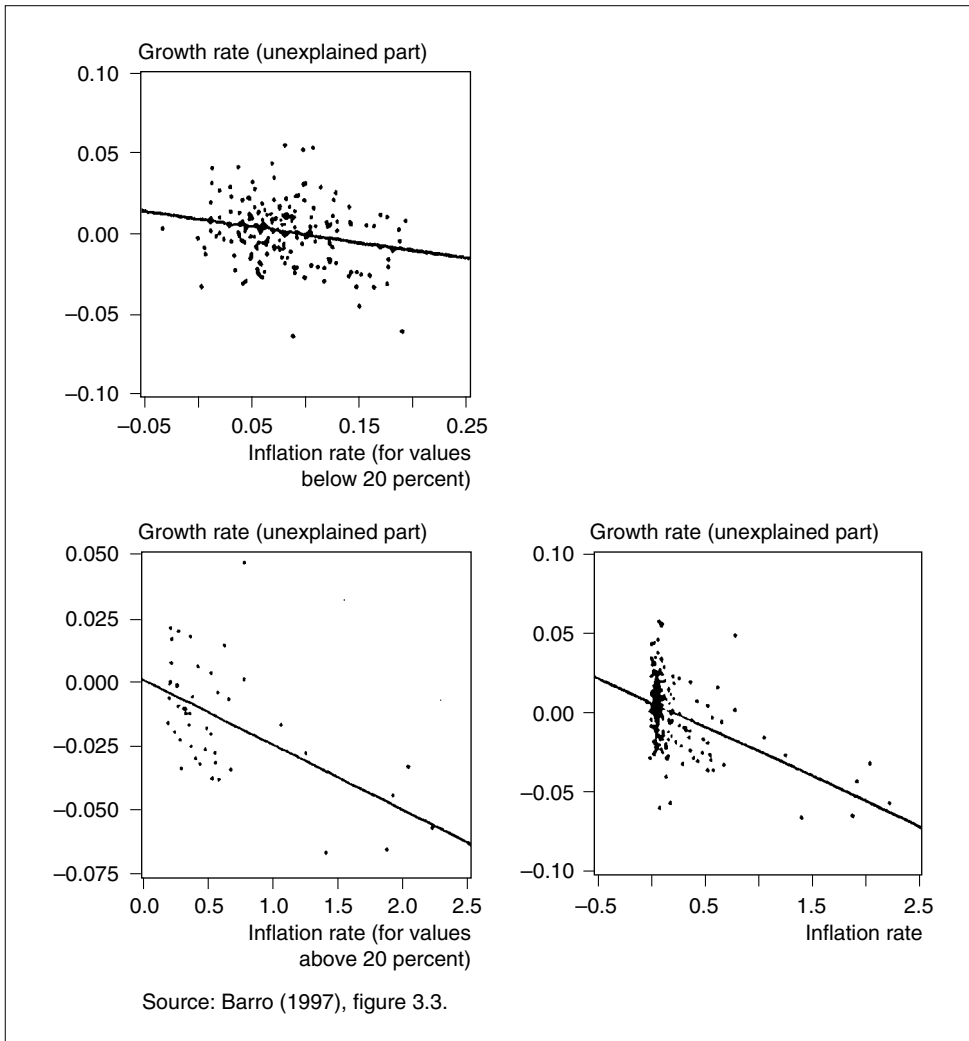
3. For an early example, Blanchard and Quah (1989) employ long-run monetary neutrality as an identifying restriction in their structural vector autoregression (VAR) model.

4. See Fischer (1993), Judson and Orphanides (1999), and Barro (1997). In particular, evidence of adverse effects of inflation on economic growth becomes clear from the experience of high inflation, while such evidence becomes unclear from the experiences of low and stable inflation. Given, however, that inflation is determined by the interaction of various factors, it should be noted that empirical evidence which links inflation with overall economic performance is not especially robust.

5. For example, Lucas (1987) states that “a society can use monetary and fiscal policy to attain any average inflation rate it wants,” and that “[l]ong-run price stability is one of the few legitimate ‘free lunches’ economics has discovered in 200 years of trying.” In other words, the rise and fall of the average inflation rate affects the decision making of private agents, thereby inducing distorted resource allocation in the economy.

6. In addition, it is likely that the relationship between relative price variability and the rate of inflation does matter. Barro (1997) points out that it is difficult to identify the effects of the level of inflation and the variability, due to the high correlation between them.

**Figure 1 Growth and Inflation**



classical dichotomy state in which price fluctuations do not affect the decision making of economic agents regarding resource allocation.

To conduct monetary policy to realize such price stability, however, a central bank is required to transform the above idea of price stability into a more operational guideline.<sup>7</sup> Here, a central bank needs to know the following information: the inflation rate we should maintain, the kind of price index we must stabilize, and the appropriate time horizon a central bank must keep in mind. I will discuss each of these items in turn.

7. Shiratsuka (2001) classifies the views on price stability into two. The first definition is “measured price stability,” which specifies price stability numerically to set a tolerable target range for the inflation rate, for example, from zero to 2 percent. The second definition is “sustainable price stability,” in which price stability is considered to be an important basis for sustainable economic growth. This approach emphasizes the importance of achieving a stable macroeconomic environment as a fundamental condition for sustainable growth, rather than merely pursuing measured inflation using a particular price index.

## **A. Small but Positive Rate of Inflation**

The first question regarding the operational definition of price stability is whether a numerical value of inflation is set in a consistent manner with sustained economic growth.

As for what is the desirable rate of inflation, the prevailing view in academic circles seems to be some small but positive measured rate of inflation. The often-cited reason is that a central bank needs a “margin for safety against the risk of deflation” and “adjustment for the upward bias in price indices” (see, for example, Bernanke *et al.* [1999]).

With respect to the risk of deflation, there is a perception that monetary policy should be conducted to prevent deflation from occurring. This is because deflation is more difficult to deal with than inflation due to various factors, such as the downward rigidity in nominal wages and the non-negativity constraint of nominal interest rates.

About the adjustment of an upward bias, measurement errors in price indices are almost inevitable because the “true measure” of general prices should instantaneously account for the dynamic nature of economic activity such as the changes in consumers’ behavior in choosing between goods and services in response to relative price fluctuations, the improvement of quality, and introduction of new goods, which is almost impossible.

## **B. Quantitative Assessment**

Then, do we have enough information to quantify a desirable margin for the risk of deflation?

### **1. Margin for safety against the risk of deflation**

As for the downward rigidity in nominal wages, it is often cited as a factor that prevents the smooth adjustment of real wages under a very low rate of inflation.<sup>8</sup> This impediment to real wage adjustment is likely to hamper reallocation of the labor force across sectors and areas, thereby leading to an increased equilibrium unemployment rate.

For the case of Japan, Kuroda and Yamamoto (2003a, b, c) find robust evidence of some downward rigidity using longitudinal data in 1993–98. The impact of the downward rigidity is considerably less than in the case of perfect downward rigidity. However, since no country has experienced a situation in which near-zero inflation has continued for a long period of time, it is certainly still too soon to come to any definite conclusion. We must wait at least several more years for accumulation of longer time series before conducting an additional estimation to find a definite answer.

Turning to the non-negativity constraint of nominal interest rates, since the nominal interest rate cannot be negative, a low level of nominal interest rates leaves a central bank with very little room to lower real interest rates when the economy faces deflationary pressure.

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8. See, for example, Akerlof, Dickens, and Perry (1996).

Looking at Japan's recent experience, monetary policy has maintained its effectiveness by working on expectations, the so-called "policy duration effect."<sup>9</sup> A central bank can influence market expectations by making an explicit commitment to the duration during which it will hold short-term interest rates at virtually zero.

The policy duration effect was very effective in stabilizing market expectations for the path of short-term interest rates, lowering longer-term interest rates, and flattening the yield curve. However, it alone was unable to reverse the deflation when coupled with low economic growth.

## **2. Adjustment for the upward bias in price indices**

An upward bias in price indices has a direct implication for price stability, because the existence of an upward bias means that pursuing a zero measured inflation rate is actually a deflationary policy, which possibly results in a loss of economic welfare.<sup>10</sup> Thus, it is often argued that an upward bias of price indices should be adjusted in considering the desirable rate of inflation.

However, there might be a reason to exclude from this adjustment an upward bias caused by the improvement of quality or introduction of new goods and services. For example, a recent innovation in the field of medical care could save many lives and improve the quality of life. Such an improvement of the quality of goods and services is widely observed in contemporary life. If we seriously try to reflect all improvements of this kind, general prices tend to decline.

If a major innovation improves our quality of life without inflation, should monetary policy create inflation to offset the effect of the decline of the "true measure of the cost of living"? Is it really the case that such a monetary policy response is consistent with the price stability *à la* Chairman Greenspan in which "economic agents no longer take account of the prospective change in the general price level in their economic decision making"?

## **C. CPI and Asset Prices: Japan's Experience**

The next question is which price index we should stabilize. For this question, the consumer price index (CPI) seems to be the most widely used inflation indicator.<sup>11</sup> However, I feel somewhat uncomfortable focusing merely on the CPI.

As I noted previously, the low and stable development of consumer prices itself does not necessarily ensure a stable economic environment. Looking at the experiences of major asset price bubbles, including Japan's experience, drastic increases in asset prices are most likely to occur during periods of stable prices. Under continued price stability, the perceived potential output path shifted upward as the economic expansion was prolonged, resulting in the emergence of euphoria and the underestimation of inflationary pressure in view of the output gap.<sup>12</sup>

9. See, for example, Fujiki and Shiratsuka (2002) and Okina and Shiratsuka (2004a).

10. The size of upward bias in the CPI of major industrial countries ranges from 0.5 percentage point to 1.1 percentage points per year, as summarized in Shiratsuka (1999).

11. The U.S. Federal Reserve focuses more on the chain-type price index for personal consumption expenditure (PCE) than the CPI.

12. See Okina and Shiratsuka (2003).

As in our paper presented this morning (Okina and Shiratsuka [2004b]), asset prices in Japan have continued a remarkable decade-long decline after the bursting of the asset price bubble at the beginning of the 1990s, while consumer prices have remained almost constant. Stock prices plunged in the early 1990s and have since followed a downward trend, albeit with continual ups and downs. Land prices started declining with a two-year lag relative to stock prices, and have since kept declining at an annual rate of around 10 percent. Mild deflation of less than 1 percent per annum, which has attracted public attention, is deemed far less significant than asset price deflation.

Our experience suggests that price stability should be assessed from the viewpoint of “sustainable price stability” beyond two or three years. It can be seen that Japan’s economy experienced deflation in the late 1990s as a result, at least partly, of the emergence of the bubble economy in the second half of the 1980s. In other words, the experience of the bubble period and after seems to suggest the importance of the sustainability of price stability over a fairly long period, not two or three years.

This view seems to be consistent with the recent majority view of central bankers and academics who are in favor of flexible inflation targeting, which probably could be summarized as follows: asset prices may have important information, but are too volatile to control by means of monetary policy. Instead of targeting them, a central bank should consider having a somewhat longer time horizon for inflation targeting so that asset prices can be brought more comfortably into monetary policymaking.<sup>13</sup> If a central bank does this, then the remaining question is the time horizon of price stability.

The longer time horizon of price stability, however, is likely to make the central bank’s communication with the public more difficult. When we are cautious about problems resulting from asset price inflation or deflation in the context of price stability, we must explain the risk that may exist several years in the future and is not conspicuous today. Our experience since the late 1980s suggests that this is quite difficult.

#### **IV. Monetary Policy Framework for Sustained Economic Growth |**

The final question I should raise here is related to all the previous questions. That is how to formulate a monetary policy framework to achieve an environment conducive to sustained economic growth.

A desirable framework for the conduct of monetary policy is deemed to balance two requirements: one is to provide a long-term nominal anchor, and the other is to stabilize short-term fluctuations in business conditions. Such a framework enables a central bank to meet its twin objectives, price stability and sustainable economic growth, in a fully compatible manner in the long term. However, many issues should be addressed to transform such a framework into the practice of monetary policy.

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13. See Richards and Robinson (2003), for example.

Looking at the above from the viewpoint of the aforementioned definition of price stability, consistency between “measured price stability” and “sustainable price stability” is not automatically assured in practice. It is important to ask how to balance the two, to achieve compatibility between flexible policy responses and a high degree of transparency.

When faced with large-scale asset price fluctuations, for example, how should monetary policymakers deal with the adverse effects of induced misallocation of resources on the economy? Should they give more consideration to asset price fluctuations in formulating monetary policy? Or should they remain unperplexed by asset price fluctuations and conduct policies focusing only on the general price level, such as an inflation targeting regime would warrant?

## V. Summary

I could raise more questions but, instead, will summarize my questions as to how a central bank contributes to achieving sustained growth.

- (1) How much inflation should a central bank maintain?
- (2) Which price index should a central bank stabilize?
- (3) How long a time horizon should a central bank have in mind?
- (4) How should a central bank formulate its monetary policy framework?

I would appreciate it if the panelists could offer their views on these questions. Of course, I do not intend to restrict the issues to be raised in the concluding panel discussion and hope the panelists will discuss any issues they wish.

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## Panelists’ Remarks

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I cannot sufficiently address here all the points raised by Kunio Okina in his introductory remarks. Instead, I will discuss the recent attempt by the Bank of Japan (BOJ) to stabilize prices and relate that discussion to the questions asked and also to the broader theme of the conference, i.e., conditions for sustained economic growth.

Let us first get right the macroeconomic picture during the last decade or two. Note that Japan’s consumer price index (CPI) inflation rate between 1982 and 1997 was almost perfectly in the zero to 3 percent range. Roughly speaking, the BOJ succeeded in delivering near-perfect price stability during that period. Yet the performance of the economy on other fronts has been far from perfect. The boom-and-bust cycle in land and stock prices is well known. The excesses built up in the late 1980s and early 1990s—excess capital, debt, labor, and so on—have had to be worked off over a long period. The fall in asset prices generated negative financial accelerator effects. As a result, the GDP growth rate averaged a minimal 1.0 percent rate during 1992–2002. Thus, price stability alone does not seem to ensure sound macroeconomic

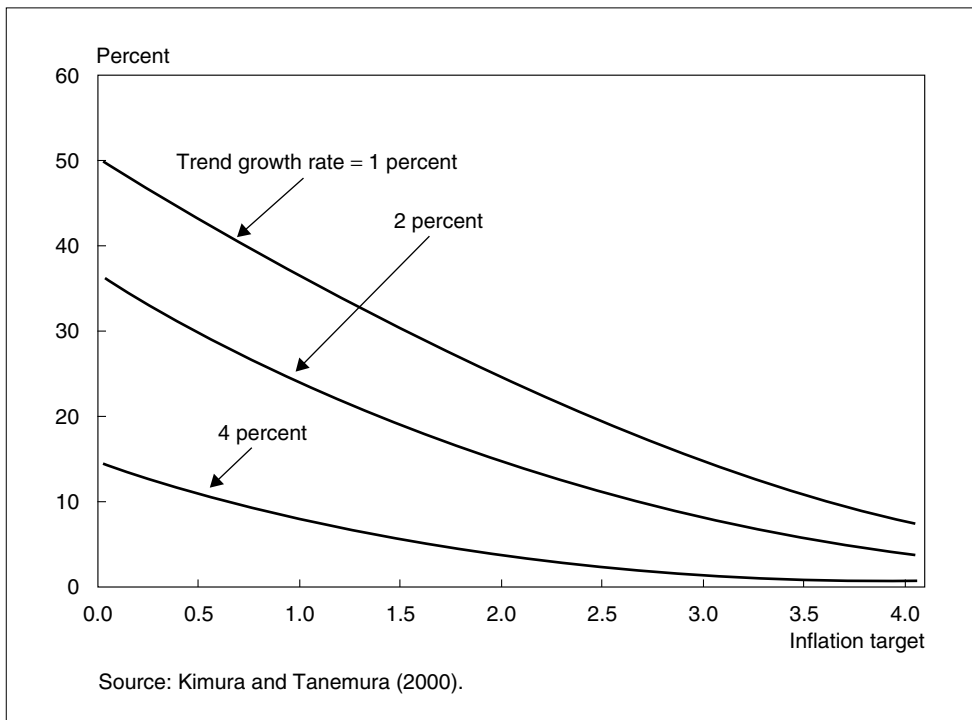


performance. The deflation of the CPI since 1998 has been more a result of such malperformance of the economy rather than its cause.

Having said this, I must admit that it is still a good thing to maintain price stability. The question then naturally arises, as asked by Okina, as to what exactly price stability means. The paper presented by Reinhart (2004) neatly summarizes various arguments useful for determining the optimal rate of inflation. After going through the arguments, however, one is left with the feeling that we are still very far from pinning down the optimal rate of inflation within a narrow range. Thus, rather than presenting a balanced view on the optimal rate of inflation, I would like to focus on the question of by how much a central bank ought to take into account the zero lower bound (ZLB) constraint on nominal interest rates in choosing its target rate of inflation. This seems to be an appropriate topic for me to discuss, given the BOJ's recent experience with a zero short-term interest rate.

Figure 1 shows results by Kimura and Tanemura (2000) that try to get at the question of how much "safety margin" a central bank needs to avoid hitting the ZLB. They construct and estimate a simple macro model of the Japanese economy, expose the model economy to what they regard as standard supply and demand shocks, assume a Taylor rule type monetary policy, and calculate the probability that the ZLB is hit. As expected, hitting the ZLB is less likely with a higher trend growth rate, or a higher natural rate of interest. With a 2 percent trend growth rate, avoiding a zero nominal interest rate with 80 percent (90 percent) probability requires a 1.5 percent (2.5 percent) target inflation rate. A 1 percent trend growth rate raises the target to

**Figure 1 Probability of Hitting the Zero Lower Bound**



2.5 percent (3.5 percent). This is just one example of such calculations, but shows that some safety margin does seem to be necessary, although it does not have to be very large.

The importance of the above type of consideration depends on how serious a threat the ZLB is. There are at least three types of measures a central bank can use at the ZLB. First, it can try to influence expectations of future short-term interest rates and thus current long-term interest rates by making strong commitments about future monetary policy. Second, it can carry out operations in nonconventional instruments such as equities, nonperforming loans, and foreign exchange. Third, there is the “helicopter drop” of money.

In the following, I would like to discuss in some detail the first of the three options, since the BOJ has been adopting this approach for some time. The essence of the approach is stated in Krugman (1998). Once the ZLB is hit due to, say, a large exogenous decline in the natural rate of interest, a further increase in the money supply today has no effect on the economy. Assuming, however, that there is a nonzero probability that the economy is pushed out of the ZLB as a result of an exogenous rise in the natural rate of interest tomorrow, a promise today of monetary expansion tomorrow will raise inflation expectations today and stimulate aggregate demand.

It is at once apparent that such a commitment ought to be stronger than what the market naturally assumes about future monetary policy in the absence of the commitment. Otherwise, it will not affect expectations. There are two ways to achieve this end. One is the announcement of a very high inflation target. As Krugman (1998) puts it, “the central bank needs to announce that it will be irresponsible.” The other is to commit to, in the event of a rise in the natural rate of interest, slower increases in the interest rate than a baseline monetary policy, say, the Taylor rule, suggests. In this case, the target rate of inflation does not have to be very high; but the possibility of inflation temporarily overshooting its target needs to be tolerated. Clearly, what the BOJ has been doing is closer to the second of the two approaches.

Such an “expectations management” approach has been employed by the BOJ and the Federal Reserve Board, and has had some significant effects on the term structure of interest rates, as shown in, for example, Baba *et al.* (2004). It is also important, however, to recognize the limitations of the approach.

Essentially, the approach requires forces other than monetary policy for stimulating the economy. As a result, it can become very strained when such forces are weak. In the Krugman (1998) version, a lower probability of the economy moving out of the ZLB tomorrow requires a correspondingly higher inflation target. Very soon, the target becomes incredible because of time inconsistency problems. The second approach, i.e., raising interest rates more slowly than the Taylor rule as the economy improves, only starts to exert large effects on medium- to long-term interest rates when such improvements in the economy are expected to occur very soon. A central bank may have to wait a desperately long time before such improvements take place. Improvements in the economy may not materialize under the policy board that made the decision. As King (2004) points out, the difficulty here is that “collective decisions today may fail to bind future collective decisions.”

Another problem the BOJ has encountered in its recent experience with such an approach has been that the unhealthy financial system has weakened the power of the

approach to stimulate the economy. As pointed out elsewhere, for example, by Baba *et al.* (2004), the BOJ's monetary easing has successfully lowered government bond yields and credit spreads on corporate bonds. The resulting low interest rates on corporate bonds, however, have failed to stimulate bond issuance and business fixed investment. The reason behind this is a segmentation of the credit market. Firms rated A or above have not faced serious credit constraints with the exception of the years 1997 and 1998. In contrast, many firms rated BBB or below have faced serious credit constraints. In fact, with the exception of those rated BBB, firms in this segment have not had access to the bond market. As a result, they have not been able to take advantage of narrow credit spreads in the corporate bond market. The major suppliers of funds to these companies, banks, have been struggling with the nonperforming-loan problem and have not been able to finance new projects. Thus, the impaired banking system and the absence of the bond market for a large subset of the firms have lowered the effectiveness of the easy monetary policy to stimulate the economy.

Finally, let me say a few words on nonconventional operations. Compared with operations in government debt, operations in private debt or equity certainly generate problems of interference with private resource allocation. Purchases of large amounts of risky assets could render a central bank insolvent. Such an operation then may require advance backing by the government. A "helicopter drop" of money surely cannot be done without cooperation of the government. Consequently, it is not impossible to use these nonconventional approaches, but they come with significant political and economic costs.

To summarize, monetary policy alone does not deliver sustained economic growth. A healthy and resilient financial system seems to be almost a precondition for sustained growth and effective monetary policy. Turning to the issue of a desirable inflation target, I think that difficulties associated with the expectations management approach and various costs of other nonconventional approaches that can be employed at the ZLB are non-negligible. Hence, the threat of the ZLB on the nominal interest rate justifies a higher inflation target than otherwise, although the margin of difference here does not seem to be very large. I hasten to add that I have only partially addressed the difficulties that might arise if the BOJ attempted to pursue such a target starting from the current deflationary environment with a zero nominal short-term interest rate.

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## I. Introduction

In his keynote speech, Bennett T. McCallum noted that when monetary policy appears in a modern economic model, it is almost exclusively described in terms of the setting of a short-term interest rate. This triumph of interest rate rules owes both to the empirical success of simple rules in explaining central bank behavior (as in Taylor [1993] and Clarida, Gali, and Gertler [1999]) and the increasing sophistication of theorists in employing interest rate rules (as in Woodford [2003]). I will first reflect upon this victory and then ask two questions that follow logically from this discussion. First, what is a central bank's responsibility for communicating its economic outlook? Second, what is the best way to describe a central bank's objectives?

## II. The Triumph of Interest Rate Rules

I admit a certain nostalgia for thinking about setting policy in terms of a quantitative target for some monetary aggregate, perhaps because we are meeting some distance from Washington and in one of the few remaining countries with a quantitative guideline. This nostalgia is not for a past once lived, because quantitative targeting was never tried for long in the United States and only reluctantly embraced when it was.<sup>14</sup> And the reality was that focusing on the money stock fell completely out of favor by the early 1990s when the only remaining aggregate that exhibited a relatively stable velocity, M2, came unmoored from spending.

The source of my nostalgia is instead that using money growth rules had certain advantages for thinking about the way monetary policy influences the economy. Specifically, describing central bank behavior in terms of a current level and constant growth thereafter of some nominal monetary aggregate closed a model very neatly in a way that seemed to satisfy the principle of comparative advantage. The central bank was assigned to control its balance sheet in a way that was easily verifiable

\* I want to thank the Bank of Japan for this second opportunity to participate in the Institute for Monetary and Economic Studies conference. I appreciate the comments of J. Clouse, D. Danker, W. English, J. Kim, B. Madigan, and A. Orphanides. The views expressed are my own and are not necessarily shared by others within the U.S. Federal Reserve System.

14. October 2004 marks the 25th anniversary of the adoption of a quantitative target by U.S. Federal Reserve Board Chairman Paul Volcker and his colleagues on the Federal Open Market Committee (FOMC).

by the public. The private sector then priced assets accordingly and planned its consumption stream, which involved a complicated intertemporal dimension reliant on forecasts of future behavior.

While targeting nonborrowed reserves never worked that way in practice for long in the United States because of the idiosyncratic behavior of various monetary aggregates, something may have been lost by coming to think of monetary policy exclusively in terms of interest rates. In particular, to be effective the shift in responsibility for setting the short-term rate from markets to central banks requires policy-makers to internalize some of the complicated intertemporal decisions formerly made by households. A simple way to see the challenge is to consider the path of the short-term rate required to produce a given level and constant growth thereafter in some monetary aggregate. Only in the simplest of models in which there are no important roles for expectations and dynamics could the dual solution to constant money growth be described by just the current level of the short rate. In an economy where households plan their actions intertemporally, the appropriate setting of the current short-term rate should depend on current and expected future economic conditions. Moreover, because optimizing agents look ahead, the central bank should also communicate its plans for the future or make explicit the policy rule it follows. In an appendix, I give a formal example of the determination of the level of the short-term interest rate that will deliver constant growth of a monetary aggregate given a simple specification of the household planning problem. It turns out that if a central bank wants to achieve steady growth of the money stock by varying the short-term interest rate, it must be forward-looking. And it must set that rate at a level which depends on the present discounted value of the entire future paths of the real interest rate and inflation, not just on current realizations.

### III. What Is a Central Bank's Responsibility for Communicating Its Outlook?

This way of thinking about interest rate rules provides the basis to answer my first question posed in the introduction concerning central bank communications. Because of the intertemporal nature of many private-sector decisions, a central bank using an interest rate rule (or one that may anticipate doing so as in the case of the Bank of Japan) should provide the private sector with enough information so that agents can plan their behavior over many periods. The reality, however, is that central banks are unlikely to call out an anticipated path for the short-term interest rate except in extreme circumstances.<sup>15</sup> Policymakers are unwilling to do so because they prefer not to make strong commitments given the inherent fluidity of economic conditions, may fear that the private sector would misinterpret conditional statements as binding promises, and anticipate second-guessing should events dictate a change in plans.

15. Consider, for example, the controversy in August 2003 surrounding the FOMC's inclusion in its policy statement the conditional commitment that "In these circumstances, the Committee believes that policy accommodation can be maintained for a considerable period." The decision to offer some reassurance that the federal funds rate would be kept unchanged for some time can be seen as a resort to an unconventional policy at a time when there was a risk that inflation would fall to a too-low level (as discussed in Bernanke, Reinhart, and Sack [2004]).

The reluctance to speak about policy plans poses a problem, though, because the current level of the short rate represents only the starting point of a policy path and is not a sufficient statistic for pricing long-lived assets or planning spending decisions over time. A long-run inflation goal, similarly, is not a sufficient statistic because it provides information only about the end of the policy path. Planning spending and pricing assets requires hazarding a guess on the movement of the policy rate from the starting point (the current setting of the interest rate target) to the ending point (the steady-state equilibrium real interest rate plus the inflation goal). In principle, if the central bank acts predictably in response to a small set of indicators, the public would eventually catch on to this rule-like behavior and correctly infer the path of policy. However, changes in behavior and other aspects of the economy's structure would make such inference more difficult and imprecise. In such circumstances and given a reluctance to provide guidance on the future path of interest rates, a central bank could help private-sector decision making by characterizing some of the elements shaping its policy choice, such as information on its economic outlook, its long-run objectives, and a sense of its tolerance of short-run deviation from those objectives. But this interacts with the final question posed in my introduction.

#### **IV. What Is the Best Way to Describe a Central Bank's Objective?**

The easiest way to open a discussion of the question of describing a central bank's objectives is to consider a straw man that I am sure that my fellow panelist, Otmar Issing, is tired of hearing about. It is sometimes said that specifying a single objective of achieving an inflation goal is inappropriate because a central bank should also be concerned about smoothing resource utilization and minimizing the risk of systemic problems. That is mistaken (as forcefully described in Svensson [1997], for instance) because in the presence of nominal rigidities introduced by contracts and menu costs, real rigidities posed by adjustment costs, information asymmetries, and missing markets, even a central bank with an inflation goal will respond to resource slack and systemic strains to deliver stable inflation. The specification of the long-run goals, however, determines the relative weights to put on different economic outcomes. The reduced-form responsiveness of the policy rate to economic surprises will depend on the contours of the objective function, the inertia in inflation and spending, and the degree of forward-looking behavior in the economy. That is, different behavioral coefficients in otherwise identical models could produce the same reduced-form weights on economic developments for a single-goal and a multiple-goal planner.

I take two lessons from this. First, central bankers with explicit multiple goals (such as those at the Federal Reserve, which has been given multiple objectives by the U.S. Congress) should not act superior about their concern for unemployed resources because they are not unique. Such concern may also be shared by central bankers operating with a single long-run goal for inflation. Also, central bankers with explicit multiple goals should state them explicitly and be symmetric in their discussions of concerns for output and inflation gaps and systemic strains.

Second, central bankers operating under a single long-run goal for inflation should recognize that the public needs to know more than the inflation target. If policymakers are systematically responding to output gaps and trying to minimize systemic strains, knowledge of such systematic behavior is part of the information set that the public needs to price longer-term assets and plan spending over time.

I have spoken about the goals of both smoothing resource slack and avoiding systemic strains because they are naturally paired. The characteristics of an economy that make it welfare-improving to smooth resource slack—again, nominal and real rigidities, information asymmetries, and missing markets—also makes systemic strains costly to bear. But we must recognize a tension among those goals. Providing a smoother path of income and lowering the risk of systemic strains encourages investment in longer-run projects and may be directly welfare improving by reducing uncertainty. But that lower uncertainty may also encourage more risk taking and reliance on leverage, potentially leading to resource misallocations. However, if the pursuit of those goals is important to the setting of policy, some sense of that should be conveyed to market participants. This may argue for being explicit about having those objectives but also being “constructively ambiguous” about how closely they are pursued. Thus, there may be limits to openness about objectives.

## V. Conclusion

Milton Friedman’s advocacy of a  $\mu$ -percent rule can be interpreted as a judgment about comparative advantage: a monetary growth rule assigned bureaucrats a relatively simple task (control the amount of currency and reserves they issue) and expected the public to do something complicated (solve the planning problem to maximize its welfare). This simple solution turned out to be too simple because of the unpredictability of the relationships of the monetary and reserve aggregates to economic activity. Rather than accept the volatility of interest rates under a reserve aggregate target, most central banks have opted to target a short-term interest rate. In doing so, they are now asked to solve a complicated information problem themselves in their setting of the nominal short-term interest rate.

The not-so-surprising conclusion I reach is that the Federal Reserve’s solution to this problem—the ambiguous embrace of three goals (price stability, maximum employment, and financial stability)—strikes the right balance. It provides information to assess the future path of policy and a sense of the important conditioning factors that could lead to deviation from that path, but does so without providing a specific commitment that could encourage excessive risk taking.

## APPENDIX: A SIMPLE EXAMPLE

I can make my point by discussing an example of the household planning problem in which money is important in transacting. To be specific, the representative household is assumed to choose a path of consumption  $\{c_t\}$  and real money balances  $\{x_t\}$  to maximize household welfare in which total output is exogenously fixed. The

government issues two obligations: money in a nominal amount of  $m_t$  (in logarithms) and a deposit bearing a nominal instantaneous return of  $i_t$ . Money is useful in facilitating consumption, but the deposit is not. More formally, households need real money balances to support consumption, as expressed in the cash-in-advance constraint,

$$c_t \leq \alpha x_t,$$

where  $\alpha$  is a constant describing transactions technology. In equilibrium, this will hold as an identity. The logarithm of the price level is  $p$ , and its rate of change over time is  $\pi$ . Lifetime welfare takes the form

$$\int_{s=t}^{\infty} \frac{c_s^{-\gamma}}{1-\gamma} e^{-\rho s} ds,$$

where the constants  $\rho$  and  $\gamma$ , respectively, describe the rate of time discount and preference for the smoothness of consumption. Defining the dot operator as  $\dot{x} = dx/dt$ , the optimal path for consumption will satisfy

$$\frac{\dot{c}}{c} = \frac{i - \pi - \rho - (i/\alpha i)}{\gamma}.$$

That is, the margin between the current real rate and the rate of time preference, adjusted for expected changes in the nominal interest rate, determines the change in consumption.

Suppose that the central bank follows an announced commitment to keep the growth of the nominal stock of money constant at  $\mu$ . The Clower constraint tells us that nominal consumption spending ( $\dot{c} + \pi$ ) must also grow at that rate as well. As a result, the consumption-smoothing equation determines the path for the market-clearing nominal interest rate. (To work this out explicitly, linearize the above equation around its steady state, add  $\pi$  to both of its sides, note that it now equals  $\mu$ , and solve for the change in the nominal interest rate.) The nominal interest rate must satisfy

$$\dot{i} = \beta[(i - \pi - \rho) + \gamma(\pi - \mu)].$$

The coefficient  $\beta$  simply equals  $\alpha$  times the steady-state nominal rate,  $\rho + \mu$ . Thus, a money growth rule can be written in dual form as an interest rate rule, but that rule is not Taylor's (as in Taylor [1993]). This rule is set in terms of the change, rather than the level, of the short-term rate. We can integrate forward this differential equation to arrive at a representation for the current level of the policy rate in terms of the future path of inflation, as in

$$i_t = \int_{s=t}^{\infty} [(\rho + \pi_s) + \gamma(\mu - \pi_s)] e^{-\beta(s-t)} ds.$$



Thus, if a central bank wants to achieve steady growth in money by varying its short-term rate, it must be forward-looking, in that it puts the nominal rate at a level which depends on the present discounted value of the entire future path of the real interest rate and inflation, not just current realizations.

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Central banking activities can impact on longer-run growth through a number of potential channels. These include the role of central banks in payment systems, in contributing to financial stability, and through the quality of policy advice provided to governments. Indeed, in the past it had been argued that even the choice of operational framework can impact on growth. For example, the use of discounting of commercial bills was said to facilitate trade, thereby promoting real activity. In my remarks today, I want to focus on a crucial channel by which the central bank can influence long-run growth, namely, by its ultimate ability to control inflation in the long term through the conduct of monetary policy. Specifically, the question addressed is whether the pursuit of the objective of price stability by the central bank leads to higher output and living standards in the longer term.

Interest in the link between monetary policy and economic growth has a long tradition. Up until the middle of the 20th century, the dominant opinion was encapsulated in the "classical view" of John Stuart Mill and other classical economists. According to this view, money is essentially a "veil." Monetary policy, via the resulting quantity of money, determines the overall price level but has no impact on the level of output. Of course, observers such as David Ricardo were aware of the temporary stimulative effect on output emanating from increases in the money stock. Indeed, as a result of the Keynesian revolution, the short-run relationship between monetary policy and growth has been a dominant interest of macroeconomists since the middle of the 20th century. The subsequent neglect of the longer-run relationship between monetary policy and output is somewhat surprising since,

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\* I would like to thank Gabriel Fagan for his valuable contribution.

when cumulated over time, longer-term sustained changes in output have welfare implications that substantially outweigh the effects of normal cyclical fluctuations. As Lucas (1988) points out, “the consequences for human welfare involved in questions like these are staggering: once one starts to think about them, it is hard to think about anything else.”

From the 1960s onward, there has been some revival of interest in the question of whether money policy affects output in the long run, and quite a number of papers have been written on this subject. However, it is fair to say that up to now this theoretical literature has not provided clear-cut conclusions. According to the seminal contribution of Tobin (1965), an increase in the rate of growth of the money stock (i.e., a more inflationary policy) would lead to an increase in the capital stock and thereby a higher level of output in the long run. The mechanism is straightforward. A higher rate of inflation reduces the own return on money, inducing a portfolio shift on the part of agents in favor of real capital. This leads to a higher capital stock and therefore higher output in the long run. However, this result is in principle difficult to take seriously. It would imply, for example, that hyperinflation would lead to dramatically improved performance in the real economy! Just two years later, Sidrauski (1967) overturned the Tobin result. By introducing money explicitly into the utility function and treating the intertemporal allocation decision within the framework of dynamic optimization by infinitely lived economic agents, he reestablished the classical result that the long-run capital-labor ratio (and therefore output itself) is pinned down by the rate of time preference and does not depend on the rate of inflation. He thus established the “superneutrality” of money—that is, the independence of the long-run growth path of the real economy from the rate of monetary growth and inflation.

In subsequent years, a number of theoretical papers have been produced, some showing a positive effect of money growth and inflation on output, others showing either a negative effect or no effect at all. The main message from this literature is that the results depend crucially on the specification of the model and how money is introduced into it. For example, when money is introduced via a cash-in-advance constraint, the results are sensitive to whether the cash constraint applies to consumption or investment goods and to whether labor supply is endogenous or not, as shown by Cooley and Hansen (1989) and Stockman (1981). When money is introduced into the model as a factor of production, superneutrality is rejected, but the direction of the effect of money growth on long-run output is ambiguous, depending on the partial derivatives of the production function with respect to money. In overlapping-generations models, the outcome is found to depend in particular on the assumptions made regarding the distribution of the seigniorage to the old versus the young generation.

Concluding his survey of money in growth models, Stein (1970) noted that “my main conclusion is that equally plausible models yield fundamentally different results.” Two decades later, Orphanides and Solow (1990) noted that “all we have is more reasons for reaching the same conclusion.” In view of these ambiguities, it is hardly surprising that interest in the impact of monetary policy on long-term growth has waned following a flurry of interest in the 1960s triggered by Tobin’s

contribution. It is, for example, notable that one of the current leading textbooks on economic growth (Barro and Sala-i-Martin [1995]) contains just a single reference to inflation and no references at all to central banks or money!

Can we then take the ambiguous theoretical results as indicating that we do not know whether or not price stability improves output over the longer term? I think not. It seems to be the case that the ambiguous theoretical results reflect the fact that the focus of these studies is too limited. These studies concentrate mainly on the effects of portfolio substitution between money and real capital in frictionless markets where agents do not face informational constraints. In addition, the way money is introduced into these models hardly captures in a satisfactory way the key role played by money and by the price mechanism in a market economy. Since these issues are very difficult to capture in a simple analytical framework, it is not surprising that they are typically neglected in the theoretical growth literature. However, from a practical point of view, when assessing the impact of inflation on output in the longer term, it is crucial to take these elements into consideration. In particular, in assessing the impact of inflation or deflation on long-run growth, it is important to bear in mind three types of costs of inflation that are typically neglected in the growth literature.

First, the price mechanism plays the crucial role in allocating resources efficiently in a market economy. Inflation seriously disrupts the functioning of this mechanism, leading inevitably to distortions and misallocation of resources. Price stability improves the transparency of the relative price mechanism and helps it to signal the allocation of resources where they can be put to the best uses. It therefore helps to avoid distortions and allocate resources efficiently both across uses and over time. Inflation leads agents to confuse transitory and permanent price changes, and thereby distorts their decision making over possibly prolonged periods of time that would further hinder the efficient allocation of resources and reduce real output in the longer term. In evaluating investment opportunities, it is essential for good investment decisions that firms have confidence in the signals conveyed by relative price changes, since these are the prices that determine whether an investment project will be profitable or not. For the relative price mechanism to function properly, firms must be able to discriminate between relative price adjustments and general changes in the overall price level. They can only be sure of not making mistakes in a situation of overall price stability. The longer the gestation period of the investment, the more important it is for firms to have confidence in the signals that relative prices are conveying. With imperfect signal extraction devices, the producer can make two types of mistake. It can increase production when the price increase is only due to overall inflation, or it can fail to increase production when the price increase is due to a favorable relative price movement. In either case, resources are misallocated.

Second, price stability eliminates the need for private agents to have in place indexation mechanisms and procedures. The costs and complexities involved were clearly apparent in the difficulties that were encountered in the 1970s when attempts were made in many countries to implement systems of "current cost accounting." In fact, no satisfactory solution to the problem of appropriately accounting for inflation was found, and such systems were rarely implemented in practice given the costs and complexities involved.

Third, inflation exacerbates in a very significant way the distortions already inherent in the tax and welfare systems as they affect economic behavior. Even without inflation, the imposition of personal and corporate income tax distorts the allocations of productive resources in a market-based economy, because it leads to a bias toward current consumption relative to savings and investment. Work by Feldstein (1999) and his collaborators shows that these costs can be substantial: up to 1 percent of GDP annually for an inflation rate of 2 percent.

The link between money and growth is clearly a complex phenomenon. This means that it is very difficult to encapsulate all of the important aspects in a neat theoretical model in such a way as to yield clear-cut conclusions. But what does the empirical evidence have to say on this issue? While some controversy remains, it is fair to say that the weight of the evidence does point to a negative relationship between inflation and output in the long run. That is, inflation is bad for growth in the long run. A number of such studies have been carried out, mainly looking at the experiences of groups of countries over extended periods, i.e., cross-sectional analysis. The list of papers that establish such a negative relationship includes Kormendi and Meguire (1985), Grier and Tullock (1989), Fischer (1983), Cozier and Selody (1992), and Barro (1995). The result is not unanimous, however. McCandless and Weber (1995), for example, reach the conclusion that there is no correlation between growth and inflation. However, no study of which I am aware manages to find a positive relation, which would support a Tobin effect.

Still, there is some controversy regarding the interpretation of the negative inflation-output relation found in most of the literature. For example, it is argued that the negative correlation between inflation and growth is due to the inclusion in the samples of specific countries, and moreover it is difficult to establish a negative relationship when inflation is relatively low (Bruno and Easterly [1996]). However, a recent study by Andrés and Hernando (1999), focusing on the countries of the Organisation for Economic Co-operation and Development (OECD), finds that even in low- or moderate-inflation countries, there is evidence of a robust negative relationship between inflation and output in the long run.

In this context, it is important to note that the output gains from low inflation—even if in a particular year they appear to be small—are *permanent*. In present value terms, then, the value of these gains is substantial. By way of illustration, discounted at a 3 percent real interest rate, a 0.5 percentage point gain in output per year amounts to 17 percent of GDP in present value terms. In fact, the empirical evidence suggests even bigger gains than this. For example, the study by Andrés and Hernando (1999) points to a permanent gain of between 0.5 and 2 percentage points of GDP a year and other estimates reported in Feldstein (1999) also point to gains lying within this range.

To sum up, the formal theoretical literature regarding the impact of monetary policy on the long-run growth path of output yields ambiguous results. This ambiguity can be traced to the difficulties of incorporating into these models the key roles performed by money in a satisfactory way. When account is taken of this role, there are well-based *a priori* grounds for believing that inflation is damaging to long-run economic performance and welfare. While empirical evidence in economics is rarely definitive, the available evidence appears to be robust in showing that low inflation is

good for output in the long run. No study of which I am aware suggests a negative effect on output. Thus, even in the worst case, there is nothing to be lost in terms of output by pursuing price stability—a sort of “free lunch.” All in all, the conclusion I derive is that a medium-term monetary policy oriented to price stability is the best contribution that a central bank can make to long-run economic growth.

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One of the most thought-provoking charts that we viewed during the conference was Allen and Oura’s (2004) comparison of U.S. economic growth during the Great Depression and Japan’s performance during its recent “Great Stagnation.” Of course, these two lengthy episodes both began with dramatic crashes of asset price bubbles,

followed by systemic financial distress and a hesitant monetary response. In both cases, monetary policymakers seemed to be “fighting the last war,” with U.S. central bankers through the late 1930s concerned about resurgent inflation, and Japanese policymakers even now so concerned.

There is much to be learned, therefore, by reflecting upon the differences between the two experiences. Like the Great Depression, in which the international gold standard played a key role, Japan’s Great Stagnation had a global element that emerged in the Asian currency crisis of the late 1990s. But that global shudder, while showing some signs of spreading out from the Asia-Pacific region, turned out to be relatively brief. Events might have transpired quite differently if, for example, China had devalued its currency or Long-Term Capital Management had been allowed to fail. Clearly, international influences such as the politics of the yen-U.S. dollar exchange rate and the secular rise of China and the East Asian tiger economies are central in understanding Japan’s experience.

Compared to the United States in the 1930s, Japan’s growth slowdown is a milder affair. Real output has fallen more than Allen and Oura’s chart suggested, though, because of efficiency losses that do not come through in official GDP numbers. As argued by Anil Kashyap and others, the fall in measured GDP has been cushioned by the practice of financial “evergreening,” which, along with regulatory forbearance, has prolonged the life of “zombie” firms and helped to hide unemployment (see Caballero, Hoshi, and Kashyap [2003]).

Another great contrast has been in the political economy of economic policy. In the United States, the central bank lost considerable independence as a result of the crisis—while in Japan, the central bank gained target as well as instrument independence! Unlike in the 1930s, financial and trade liberalization have, despite some occasional setbacks, continued on the whole to advance since the late 1980s.

Japan’s domestic and international experience in the past 15 years, despite encompassing the first protracted period of deflation and very low interest rates since the Depression, is far from a replay of that earlier experience. The story is as complex, however, and again shows the difficulty of policy formulation in a rapidly shifting world. It is already clear that the economic historians should get to work. Japan’s Great Stagnation will need its Friedmans and Schwartzes—as well as its Temins, Eichengreens, Christina Romers, Bernankes, and Meltzers. They should not wait 20 years; the time to interview the bankers, policymakers, and other market participants is now. We still debate the Great Depression vigorously, and it seems equally likely that we will debate the lessons of Japan for many years to come.

I submit that one important lesson we have learned is the need to avoid what Reinhart (2004) in his presentation on the war against inflation called “too much of a good thing.” We need to adopt inflation targeting strategies that avoid excessive deflationary risks.<sup>16</sup>

One way to do so, I conjecture, is provided by the following symmetry proposition: *To prevent inflationary pressures, the central bank must be able credibly to promise that it will tolerate some slow growth, or even an output decline, if inflation appears set to*

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16. The author wisely did not give his paper the title “Mission Accomplished.”

*become too high. Similarly, to prevent deflationary pressures, the central bank must be able credibly to promise that it will tolerate a period of inflation that is somewhat above its target average level.*

To understand how to put this advice into practice, consider an alternative widely accepted recommendation. That recommendation is to adopt an inflation target that is higher than what might otherwise be desirable, to reduce the risk of hitting the zero lower bound on the nominal policy interest rate. This prescription, in my opinion, puts too much emphasis on the importance of the zero lower bound. As is clear from Krugman's (1998) Brookings paper on the liquidity trap, or from my more recent work together with Alan Auerbach (Auerbach and Obstfeld [2005, forthcoming]), the main obstacle to effective monetary policy at the zero bound—in the form of quantitative easing of the money stock—is the public's fear that the central bank is so inflation-averse that it will ultimately reverse any money supply expansion. This fear could be eliminated if the central bank were credibly committed to a target range of allowable positive inflation rates, with the notional "target" perhaps the midpoint of that range.<sup>17</sup> In this setup, much like the European Central Bank's (ECB's) definition of "price stability," the central bank would be perceived as willing to move rapidly to the top of its allowable inflation range in response to actual or threatened deflation. That stance will normally allow for effective monetary policy, even in a liquidity trap.

The point can be made more formally in a multi-period example based on my work with Auerbach. There are three dates, 1, 2, and 3, and initially the central bank's inflation objective is the point target  $\pi^* = 0$ . Prices are partially sticky (predetermined) for one period. The inflation rate initially expected between dates 2 and 3 is  $\pi_2^e = 0$ , but I assume that the date 2 nominal interest rate  $i_2 > 0$ . Between dates 1 and 2, however,  $\pi_1^e < 0$  and  $i_1 = 0$ : the liquidity trap prevails on date 1. As a result, raising the money supply in period 1,  $M_1$ , has no effect. All that matters for stimulating the economy on date 1 is  $M_2$ .

If the central bank can credibly and permanently raise  $M_2$ , then it can stimulate the economy on date 1, at the same time raising  $P_2$ ,  $P_3$ , etc., in proportion. But consider an announced increase in  $M_2$ , given the central bank's inflation target of  $\pi^* = 0$ . One might assume that if this change raises period 1 inflation,  $\pi_1$ , exactly to zero, then there is no problem. Inflation is at its target of zero in all periods. But there is a credibility problem—we must ask what happens if the public does not believe that  $M_2$  will be raised permanently. In that case, period 1 inflation,  $\pi_1$ , will remain negative and to nonetheless implement its "threat" to raise  $M_2$ , the central bank would have to allow positive inflation between dates 2 and 3. It will not do so, given the preceding assumed preferences. So if the public disbelieves the announcement that  $M_2$  will be raised, the central bank will ratify that skepticism. As Svensson (2003) observes, there are multiple equilibria.

But suppose the central bank, instead, has an allowable target range for inflation with a positive ceiling, say, at  $\epsilon > 0$ . Suppose also, as in my paper with Auerbach, that the bank, once within its inflation target range, places some weight on moving the

17. Interestingly, Stein (1989) has shown that even a central bank that cannot credibly communicate a precise inflation target may be able credibly to communicate a target range.

money supply in the direction it has promised. Now, when it promises to increase  $M_2$ , there is some room for positive inflation between dates 2 and 3. The fact that this room is small does not matter—any wedge allows for some small monetary increase on date 2 in case the public is skeptical, which, in turn, will stimulate the economy on date 1, moving some of the resulting inflation earlier in time and pushing down inflation between dates 2 and 3. This again creates some wiggle room between dates 2 and 3, allowing more of a monetary increase on date 2 to be carried out if the public fails to believe. In the resulting (unique) equilibrium, the full monetary increase can be credibly promised. My conclusion is that having a target range, rather than a point target of zero, and being willing to move aggressively upward in that range, can be very beneficial in terms of fighting deflation. Incidentally, the ECB has wisely allowed inflation slightly above its normative range in recent years.

The message of this analysis is that the central banks wishing to combat deflationary pressure need to communicate to the public that in some circumstances, some inflation is allowable.<sup>18</sup> One problem with Japan's quantitative easing policy of recent years may be public fears of just how inflation-averse the Bank of Japan really is. The Bank of Japan Law of 1997 gives the Bank independence to pursue "price stability" but does not define the term, nor, to my knowledge, has the Bank itself ever done so in an operationally meaningful way. It would be helpful at this juncture for the Bank to be more transparent in communicating a clear definition of price stability to the public—a definition that recognizes that a credible willingness to tolerate some inflation is necessary to fight deflation effectively. Brief periods of moderate inflation should not be too costly in any case, so the obstacles to such communication with the public are hard to see.

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18. A similar message comes out of the optimal monetary rules implied by the precommitment analysis of Eggertsson and Woodford (2003).



**Bennett T. McCallum**  
Carnegie Mellon University

In my 10 minutes, I would like to make two arguments that pertain to the monetary policy framework, as was suggested by Kunio Okina.

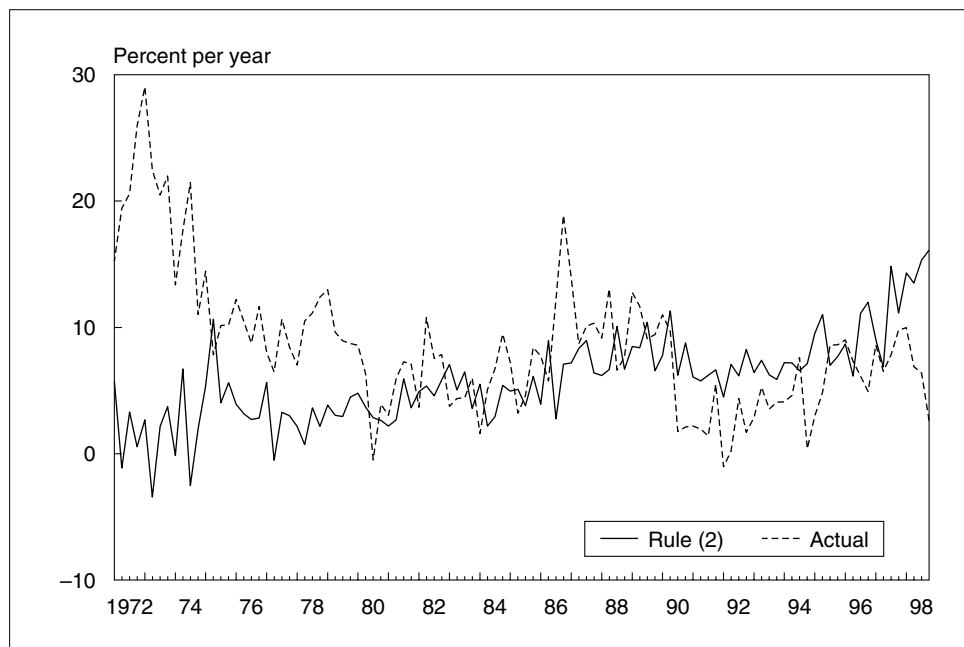
First, it is very dangerous for a central bank to respond strongly to output gap measures, because these are based on estimates of an unobservable “potential output.” Orphanides (2001, 2003) has done much work on this topic that is very valuable, but I think the problem is even more difficult than in his account of it. Why? Because the problem is not just measurement error, not just real time versus final revised data, but instead is fundamentally *conceptual*: What is the proper concept of the reference output level? Is it potential output, or capacity output, or natural rate output, or the NAIRU (non-accelerating inflation rate of unemployment) rate of output, or market-clearing output, or flexible-price output, or *trend* output (of one of many different types)? The point is that if the central bank uses one concept, e.g., a trend measure, but actually the true, appropriate concept is different, e.g., the flexible-price level of output, then the mistakes are *not* revealed, they just keep being repeated. I have a small study (McCallum [2001]) that indicates that in this case the outcomes will tend to be extremely bad if the central bank responds strongly to its measure of the level of the gap. So I would prefer an output growth rate such as Orphanides (2003) and I have proposed in numerous writings.

Second, the argument for paying special attention to asset prices seems to be based in part on a presumption that conventional measures would not have indicated that Japanese monetary policy was too loose during the period 1986–89. So I want to show you what a policy rule that I have promoted in the past—e.g., in my (1993) Bank of Japan paper—says in this regard. Specifically, in my (2000) study I looked at seven different policy rules historically, to see which ones would have given good advice as judged now, after the fact. These are based on data for the United States, the United Kingdom, and Japan over the years 1970–98. The rules included the Taylor rule and several others with different combinations of target variables and instrument variables. One of these is the rule that I promoted for several years (say, 1985–95) that has the growth rate of the monetary base as the instrument or indicator variable and nominal income growth as the target variable. My rule involves a velocity adjustment and responds only to observable variables from previous periods. It is important to recognize that one does not need to view the monetary base as being the week-to-week operating instrument; instead, the base can be an *indicator* for setting the overnight interest rate as the operating variable.<sup>19</sup>

The most relevant plot from McCallum (2000) is reproduced here in Figure 1. Its calculation assumes that the target rate of nominal GDP growth is 5 percent per year (e.g., 3 percent real growth and 2 percent inflation). It shows that actual base growth was much higher than the rule calls for over the 1970s, and I think we all agree now that monetary policy was too inflationary during those years. That finding occurs for all seven rules and all three countries in this study! Next, note that Figure 1 shows

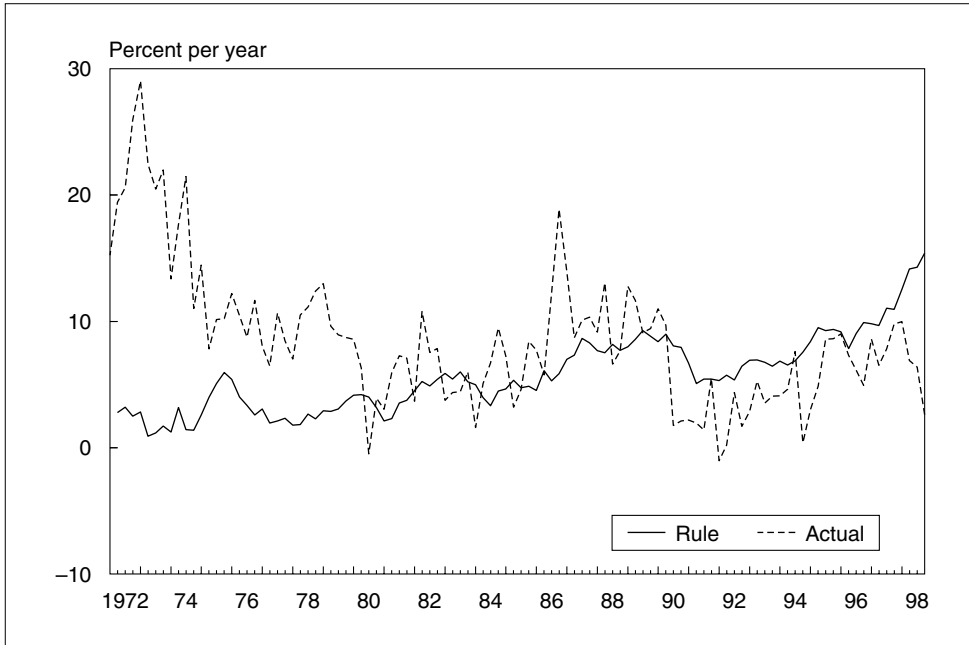
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19. McCallum (1995), written for the 1993 edition of this conference, is a study of this type of procedure.

**Figure 1 Japan Base Growth, Actual and Rule (2)**



that actual base growth has been lower than the rule calls for ever since early 1990 (through 1998). That would suggest that policy was too restrictive during that period. That is of course still somewhat controversial, but I think many of you will agree with me. Anyhow, the crucial point now concerns the years 1986–89. What the figure shows is that monetary policy was too loose throughout that period—actual base growth exceeded rule-dictated base growth in almost every quarter over that span. This shows up even more clearly in Figure 2, which differs only in using *average* nominal GDP growth over the past four quarters for the rule to respond to. Furthermore, if you think that 4 percent is a more reasonable target value for Japanese nominal income growth, rather than 5 percent, then the target curve would be shifted down by 1.5 percentage points, and the result would be even more clear-cut.

In sum, my argument is that at least one rather conventional way of looking at monetary policy, with an indicator involving *no* use of asset prices, says that Japanese monetary policy was too loose during the bubble period. (This may not have been the fault of the Bank of Japan, it could have been due to the Ministry of Finance or the U.S. Treasury.) So perhaps it is not necessary, after all, to pay special attention to asset prices in conducting monetary policy.

**Figure 2 Japan Base Growth, Actual and Rule with Averaged Nominal Income Growth**

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### I. Discussion among Panelists

Following the speeches by the panelists, they exchanged views on four main points: Japan's monetary policy during the bubble period; policy responses to an extreme event; time inconsistency in policy commitments, and practical definitions of price stability.

First, there was a discussion regarding Bennett T. McCallum's statement that monetary policy was too loose during Japan's bubble period based on his nominal income targeting rule without considering asset price fluctuations. Kazuo Ueda asked McCallum to clarify whether nominal income targeting was superior to inflation targeting in light of Japan's inflation performance after the early 1990s. Otmar Issing stated that the rise in asset prices must have influenced the policy response, even in McCallum's method, since it was very unlikely that any major overshooting of asset prices had occurred without strong increases in money or credit. Kazumasa Iwata (Bank of Japan), the chairperson of the panel discussion, pointed out that the demand for the monetary base could fluctuate widely under fragile conditions in financial markets, as Japan had experienced recently.

Responding to Ueda's remark, McCallum clarified his views and contended that pure inflation targeting showed results similar to nominal income targeting in his study. He then reemphasized that it was not necessary to pay separate attention to asset prices. McCallum addressed Iwata's concerns, and claimed that his own suggestion was solely focused on the performance of Japan's monetary policy during the bubble period, and the same argument could not apply to Japan's recent monetary policy under zero interest rates. On this matter, however, Vincent R. Reinhart emphasized that it must be difficult for a central bank to discern a velocity shift in real time.

Second, the discussion turned to Ueda's statement that questioned how a central bank could make an extreme policy action credible. On this point, Reinhart agreed with Maurice Obstfeld's suggestion that we should be flexible in interpreting long-term goals, with the willingness to tolerate inflation above a numerical target, to make a policy action credible. However, Ueda claimed that committing to a 3 or 4 percent inflation rate might not be enough, when the evolution of negative shocks to the economy is too large. He continued by arguing for a commitment to an extremely high inflation rate for quite a long period of time, which would be impracticable.

Third, Iwata raised the issue of credibility and time inconsistency, by emphasizing Michael Woodford's timeless perspective policy as McCallum stressed in his keynote speech.<sup>20</sup> Iwata argued that Paul Krugman's proposal had a time-inconsistency problem

20. The timeless perspective policy enables a central bank to commit to the process of policy responses that would be optimal if the decision had been made in the distant past. Thus, it is argued that this type of policy behavior is free from the time-inconsistency problem. For details on the timeless perspective policy, see Michael Woodford, *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton: Princeton University Press, 2003, or Michael Woodford, "Commentary: How Should Monetary Policy Be Conducted in an Era of Price Stability?" *New Challenges for Monetary Policy*, Federal Reserve Bank of Kansas City, 1999.

and questioned how to restore credibility in price stability after a central bank had executed an irresponsible policy to inflate the economy.<sup>21</sup> He also mentioned Gaudi B. Eggertsson and Michael Woodford's paper recommending a combination of Ricardian accommodative fiscal policy and price level targeting to escape liquidity traps.<sup>22</sup> His concern was that although Eggertsson and Woodford's proposal might solve the time-inconsistency problem to some extent, because it committed to a decision-making process, there still was some form of a time-inconsistency problem. In response, McCallum stated that Woodford's timeless perspective policy continued to have one type of a time-inconsistency problem, since there was still the temptation to depart from a pre-committed process.

Obstfeld insisted that anti-deflation credibility did not necessarily require a willingness to tolerate very high rates of inflation, according to the results from a new version of Alan J. Auerbach and Maurice Obstfeld's paper.<sup>23</sup> He noted that the basic mechanism depended on "out of equilibrium threats" that a central bank could credibly make. A central bank's important task would be to communicate its long-term objectives of price stability to the public. He then made it clear that if the objectives gained credibility, a central bank would not actually have to pay the cost of high inflation.

Fourth, Issing noted the European Central Bank's (ECB's) experience regarding questions of Kunio Okina's practical definitions of price stability. He explained that the ECB's definition of price stability was an annual increase in the harmonized index of consumer prices (HICP) of below 2 percent. He added, however, that the time horizon for achieving price stability was difficult to define, beyond the description of "medium term," given the uncertainty of transmission mechanisms and the magnitude of external shocks. He then emphasized the importance of balancing two things: adherence to clearly defined principles and rules, and ensuring necessary flexibility in policy actions.

## II. General Discussion among Participants

### A. Tolerance of a Temporal High Inflation Rate to Escape from a Liquidity Trap

The discussants expressed various opinions regarding Obstfeld's remarks that a central bank's clear commitment to tolerating inflation temporarily above the long-term target level would be a solution to deflation.

21. Krugman proposes that a central bank can boost an economy out of a liquidity trap if it can credibly promise to be irresponsible in the sense that it allows inflation to increase sufficiently. For the details of Krugman's proposal, see Paul R. Krugman, "It's Baaack: Japan's Slump and the Return of the Liquidity Trap," *Brookings Papers on Economic Activity*, 2, 1998, pp. 137–187.

22. Eggertsson and Woodford show that a credible commitment to the history-dependent policy rule is effective enough to offset the distortions created by the zero bound on nominal interest rates. In their model, optimal policy involves a commitment to adjust interest rates to achieve a time-varying price-level target. For details, see Gaudi B. Eggertsson and Michael Woodford, "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity*, 1, 2003, pp. 139–233.

23. Auerbach and Obstfeld argue that Japan can achieve a substantial welfare improvement through large open-market purchases of domestic government debt by using a dynamic general-equilibrium model. For details, see Alan J. Auerbach and Maurice Obstfeld, "The Case for Open-Market Purchases in a Liquidity Trap," July, 2004 (revised from NBER Working Paper No. 9814, National Bureau of Economic Research, 2003).

Gregory D. Hess (Claremont McKenna College) agreed with Obstfeld's suggestion that stressed the importance of mild temporary inflation tolerance in the face of a sustained deflationary episode. Hiroshi Fujiki (Bank of Japan) questioned whether Obstfeld's suggestion sought to prevent a liquidity trap or escape it. In response, Obstfeld stated that it was ideal for such a framework to be developed in advance over time to combat a liquidity trap. If it were not done in time, there would be no choice but to try and combat the trap.

Hiroiyuki Hino (International Monetary Fund) disagreed with Obstfeld's idea because of the irretrievable cost of higher inflation, which was analogous to a nuclear threat. Instead, he suggested the possibility of having a negative interest rate when the cost of staying at the zero bound was high. Philip W. Lowe (Reserve Bank of Australia) and Issing cast doubt on Obstfeld's suggestion because of the lack of credibility in a central bank's commitment to tolerating temporary high inflation under a huge slack in the economy.

In response, Obstfeld emphasized that the small threat which tolerated a rate slightly higher than the normal inflation target might work as it gained credibility. He added that a central bank with a target inflation range simply targeted the middle of the range in normal times, but once the economy fell into a liquidity trap, it could make clear that it was willing to tolerate the top of that range. Issing responded that if a central bank's strategy was credible, then the public simply expected inflation to return to the middle of the target range. He questioned how it would be possible to increase credibility in a liquidity trap by announcing that a central bank would tolerate a higher level of inflation. Obstfeld stressed that the announcement of a targeting range of inflation, including a positive rate, would enhance the effectiveness of monetary policy in a liquidity trap.

## **B. Current Situation of the Japanese Economy and Monetary Policy**

Ueda said that Obstfeld's idea closely resembled what the Bank of Japan (BOJ) was currently doing. Put loosely, the BOJ had been trying to "stay behind the curve" to create strong easing effects. In this view, this must imply the willingness to tolerate the risk of inflation temporarily overshooting. Miyako Suda (Bank of Japan) stated that despite such policy actions and recent surprisingly high growth, it was puzzling that the response of inflation was very weak and the deflationary trend still continued.

Responding to Ueda, Obstfeld recommended a more explicit commitment that would be more likely to influence inflation expectations in a more positive way, since there was currently no clear perception among market participants regarding the BOJ's target range. Obstfeld addressed Suda's point by proposing the hypothesis that businesses' responses in pricing behavior were very limited, because they were still skeptical about the monetary policy's intentions. Hess also suggested that the BOJ still needed to make additional moves to clarify where the monetary policy was headed. McCallum noted that, if the BOJ had adopted a zero interest rate policy in 1995 and had stuck to it until the problems ended, then Japan's slump would have ended five years earlier.

### C. Multiple Goals versus a Single Goal for Monetary Policy

Assaf Razin (Tel Aviv University and Cornell University) stated that the optimizing Taylor rule that included the output gap and the inflation rate as policy objectives was desirable because of its consistency with households' optimization behavior. He then argued that a monetary authority with a mechanical and strict inflation rule would be led astray by various shocks due not to an intrinsic instability in the monetary economy but to the mechanical nature of the rule. He insisted that in an optimizing setup the central bank should target not only the inflation rate but also the output gaps. Hess disagreed with Razin's idea since the output gap was inherently unobservable, and the economy was not necessarily well approximated by linearized models that were generally assumed in articles about the optimizing Taylor rule. He then suggested that central banks take a more prudent approach. Simon Price (Bank of England) commented that a central bank should elect an output gap based on a particular model in explaining economic developments to the public. Referring to Hess's argument, Reinhart suggested that although it would be better to not put too much stock in an unobservable variable, being sensitive to variables other than the inflation rate should lower the risks of policy mistakes.

McCallum stated that we should look not for a policy rule that is optimal in a specific model, but for one that does reasonably well in a variety of models. He also responded to Price that it might seem natural to focus on an output gap that fits a particular model, but if the output gap pertains to an incorrect model, then it will not work well in practice. Shigenori Shiratsuka (Bank of Japan) stated that commitment to a single monetary policy rule was in itself not necessarily important, but good monetary policy practice that could be *ex post* approximated by a simple rule was essential, because it would provide a fundamental basis for achieving sustained economic growth.

Hess stated that the U.S. Federal Reserve Board had been pursuing a stance similar to McCallum's idea of responding to asset price fluctuations. Lowe commented that incorporating asset prices into monetary policy decision making, such as the ECB's two-pillar approach, was not the ultimate solution, since it was not clear to what extent the ECB responded to movements in inflation and movements in credit and asset prices. Rather, he argued that flexible inflation targeting with a transparent explanation was a better approach.

In response, Issing referred to the ECB's two-pillar strategy. He claimed that major imbalances in asset prices would be accompanied or even preceded by the development of money and/or credit aggregates, so giving weight to these aggregates would contribute to less risky monetary policy decisions. He also stated that it would never be easy to be transparent in dealing with uncertainties.

Razin stated that judging from several criteria such as synchronization of cycles across regions and capital market integration, the United States and Japan were closer to the optimal currency areas than the euro zone. He questioned whether the ECB's targeting a single policy goal was efficient compared with the cases of the United States or Japan, since inflation and output gaps for euro zone countries were country-specific. Issing responded that it would be relevant to think about what would have happened during the last five years if the monetary union members still had their

own currencies, even though the euro zone was not necessarily a perfectly optimal currency area.

Iwata addressed the issue of defining price stability, noting that the general consensus was for the importance of mild but stable inflation. Even with price stability targets, questions have been raised regarding what the upper bound of tolerable inflation rates should be. He stated that his preference for Japan was not to overshoot or undershoot on inflation, given the enormous amount of government debt. It was also better to have a clearer description of price stability targets, but such targets only provided an endpoint.

In closing, Iwata thanked all the panelists for their presentations and valuable contributions during the discussions.