Low Inflation, Deflation, and Policies for Future Price Stability

Keynote Speech by John B. Taylor

The effects of three different inflationary environments—high inflation, low inflation, and negative inflation—on real output stability are examined by looking at the experiences of Japan and the United States during the last 30 years. I begin by going back to see how things looked from the vantage point of the 1987 international conference at the Bank of Japan. Next I trace out how economic performance has evolved since then. Economic performance appears to have been better with low inflation than with either high inflation or negative inflation. I also look at some of the reasons for the different inflationary environments. I take both an interest rate policy rule approach and a quantity theory of money approach. Both approaches suggest that monetary policy has been the key factor in generating the different inflationary experiences.

Key words: Monetary policy; Inflation; Policy rule; Money growth; Zero interest rate policy

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I. Introduction

The main subject of this conference—deflationary shocks and their monetary policy responses—is an excellent one. There is a huge amount of recent research to build on, and the conference is taking place at a time when policy makers—who have confronted the reality of deflation and zero interest rates—can bring a wealth of practical experience and market information to bear on the subject. I want to thank the Institute for Monetary and Economic Studies (IMES) for organizing the conference. I am looking forward to the papers and to the discussion, and to coming back to these issues at the panel session at the end of the conference.

In this keynote speech, I will first focus on the consequences of different inflationary environments—including near negative inflation, or deflation—for macroeconomic stability. To do so, I will look at the experiences of both the United States and Japan. I then look at possible causes of deflationary shocks and instability. Finally, I draw some general policy implications. In examining recent developments in inflation and deflation in Japan, I will use and react to some of the results presented in the papers prepared for this conference by the staff of the IMES.[1]

Although much of the recent discussion of monetary policy in Japan concerns the zero interest rate policy that began in February 1999, I take a longer perspective. In my view, the recent zero interest rate policy—while important and precedent setting in its own right—is a continuation of the period of near-zero interest rate policy—around 50 basis points—that began in 1995, which in turn grew out of policy changes in earlier years.

II. Perspective: The Third International Conference

To provide some perspective for this conference, it is useful to go back to the time of the Third International Conference of the Bank of Japan, held 13 years ago in June 1987. It was the first time that I had attended one of the Bank's international conferences, and like all conferences in the series, including this one, it was extremely well organized with much time and effort devoted to selecting topics, authors, and discussants. That 1987 conference had two themes: (1) the causes of macroeconomic instability from 1973 through the early 1980s, and (2) the choice of an optimal monetary regime to reduce instability in the future.

My main job at that conference was to present and write up a summary of the research and policy implications that emerged from the papers and the discussion. In addition to taking advantage of a summarizer's prerogative to slip in some of my own views,[2] I believe I was able to document two important points of wide agreement that emerged at the conference. First, during the period from 1973

1. Okina, Shirakawa, and Shiratsuka (2001) and Mori, Shiratsuka, and Taguchi (2001).
2. One view is still quite relevant: "I like to think of the ideal policy rule" as one in which "If inflation picks up, the central bank should contract and let the economy drift below normal until inflation dies down. The main difficulty with this rule is determining what is the normal or natural level of output" (Taylor [1988], p. 33). That is still a difficulty for monetary policy, but it is not unique to policy rules.

through the early 1980s macroeconomic *cyclical* performance in Japan—measured by aggregate output and price stability—was remarkably good, especially in comparison with the poor performance in the United States over the same period. (I will provide more information about this later in the speech.)

Second, there was also broad agreement among conference participants—who included Andrew Crockett, Stanley Fischer, Allan Meltzer, James Tobin, and Ted Truman—that monetary policy differences could explain a good part of the differences in performance between Japan, the United States, and other countries. In particular, there was "considerable agreement that a big monetary policy mistake in the U.S. . . . was the overexpansion of the late 1970s" and that by keeping inflation low and stable "Japan did not have to go through the boom-bust cycle brought on by the overexpansion [in the United States] of the late 1970s" (Taylor [1988], p. 32). This low and stable inflation performance, it was argued, was brought on by a gradual decline and much greater stability in money growth (M2+CDs) starting in the early 1970s in Japan. An M2+CD growth rate chart presented by Suzuki ([1988], p. 82) at the conference showed how the nominal GDP growth and inflation had come down along with the growth of money.

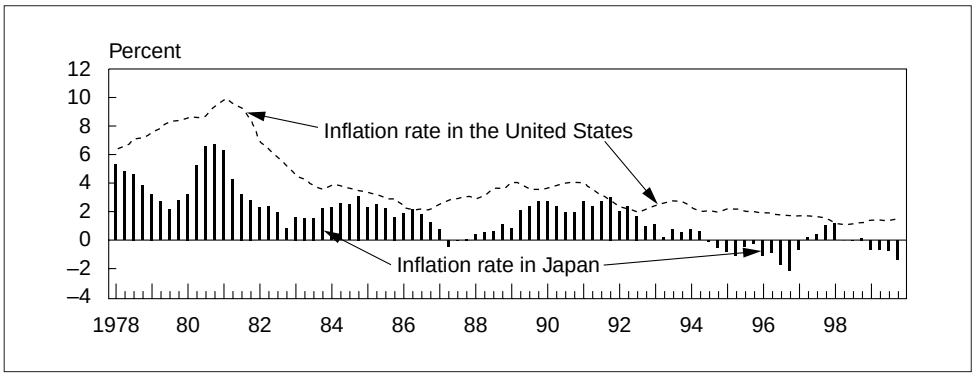
The policy implications of these two consensus views were clear. A monetary policy of low and stable inflation—similar to that of Japan in the 1970s—could improve economic performance, reducing the frequency, depth, and severity of recessions. In fact, the United States had embarked on such a monetary policy with the disinflation of the early 1980s. And with a new chairman of the Federal Reserve Board appointed in 1987, the United States was reaffirming its commitment to such a monetary policy. The hope was that this new policy would reduce the cyclical instability observed in the United States in the 1970s. If the consensus view was correct, cyclical stability in the United States might even match that seen in Japan.

With this historical perspective, let us now review what actually happened.

III. Parallel Disinflations

Figure 1 shows the inflation rate in Japan and the United States from the 1970s to the present. The bar graph in Figure 1 shows the inflation rate in Japan, with the

Figure 1 Inflation Rates in the Japan and the United States: January 1978–April 1999



recent bout of deflation shown at the lower right. The line graph shows the inflation rate in the United States for the same period. For both countries, the measure of inflation is a four-quarter average of the percentage change in the GDP deflator.

Several things are apparent in Figure 1. First, the inflation rate in Japan has come down steadily since the late 1970s, with the recent deflation—negative inflation—seeming like a continuation of that trend. The average inflation rate fell from 3.0 percent in the 1978–86 period, to 1.2 percent in the 1987–94 period, and to –0.5 percent in the 1995–2000 period. That is a total of 3.5 percentage points of disinflation: (3.0 percent – (–0.5 percent)). During this period, there has been about the same amount of disinflation in the United States: 4.1 percentage points. In the United States, the average inflation rate fell from 5.8 percent in the 1978–86 period, to 3.0 percent in the 1987–94 period, and to 1.7 percent in the 1995–2000 period.

Second, through this whole period the inflation rate in Japan has been lower than in the United States, and the differential between Japan and the United States has remained remarkably steady at about 2 percentage points. Table 1 shows that the mean difference is 1.9 percent for the period from January 1978 to January 2000 and shows a small variation in different periods. Is there an explanation for this empirical regularity of a nearly constant inflation differential for more than 20 years? Or is it merely a coincidence, with the Fed and the Bank of Japan seeking to achieve different levels of inflation?

Table 1 Inflation Rates: Averages, Differentials, and Volatilities from 1978–2000

Percent changes in GDP deflators over four quarters

	Average in Japan	Average in the United States	Difference United States–Japan	Standard deviation in Japan	Standard deviation in the United States
Jan. 1978–Apr. 1986	3.0	5.8	2.8	1.5	2.6
Jan. 1987–Apr. 1994	1.3	3.0	1.7	1.1	1.9
Jan. 1987–Jan. 2000	0.6	2.5	1.9	1.3	0.9
Jan. 1995–Jan. 2000	–0.5	1.7	2.2	0.9	0.3
Jan. 1978–Jan. 2000	1.6	3.8	2.2	1.9	2.4

With a credible fixed exchange rate, one would expect that the inflation rates would be about the same—a zero differential. With the 2 percent differential, it is as if people expect a constant 2 percent appreciation of the yen, and then used that expected appreciation along with an expectation of inflation in the United States to form expectations of inflation in Japan, which then affects actual inflation.[3] McKinnon and Ohno (2000) hypothesize that the key factor underlying the recent deflation in Japan is the expectation of yen appreciation (explained on politico-economic grounds

3. To help determine whether inflation in the United States could be influencing inflation in Japan, I performed Granger causality tests for the 1978–99 period. The hypothesis that inflation in the United States does not Granger-cause inflation in Japan was rejected with a probability level of .006, while the hypothesis that inflation in Japan does not Granger-cause inflation in the United States could not be rejected (probability level of .335). Of course, Granger causality is simply a statement of intertemporal correlation, not of true causality. I also estimated a simple price adjustment equation for Japan in which the Japanese inflation rate is the dependent variable and the output gap in Japan and the inflation rate in the United States are explanatory variables. Both the output gap and the U.S. inflation rate have highly significant coefficients; gap: .085 (*t*-value = 3.09), U.S. inflation: .54 (*t*-value = 10.3).

relating to trade policy) coupled with the low inflation in the United States. This hypothesis requires that Japanese monetary policy accommodate the expectation of yen appreciation. Such an accommodation is not evident in published discussions of the Monetary Policy Board of the Bank of Japan, and an observationally equivalent hypothesis is that the Bank of Japan has goals for price stability that call for an inflation rate that happens to be 2 percentage points less than the Fed during this period. The expectation of yen appreciation then comes out of the differential in the inflation rates.

IV. Macroeconomic Stability: The Effects of the Inflationary Environment

Can we learn anything about monetary policy and its role in different inflationary environments from the data in Figure 1? To answer this question, note that the disinflation in Japan and the United States during the period from the 1970s to the 1990s left three different types of inflationary experiences in its tracks as shown in Figure 1:

(H) High inflation: United States in the late 1970s and early 1980s.

(L) Low inflation: Japan in the late 1970s and 1980s, and the United States in the late 1980s and 1990s.

(N) Near negative inflation, or disinflation: Japan in the 1990s.

Table 1 provides more detail about the average inflation rates for the different periods.

The three categories (H, L, and N) are, of course, very rough, and one can quarrel with whether high is really that high, or whether low is really that low. Also, inflation is measured with errors and biases; most likely there is an upward bias (though less with these GDP deflators than with CPIs), so that the 0.6 percent average inflation rate in Japan from 1987 to 2000 could easily represent average deflation.

How did macroeconomic performance change in these different experiences? Figures 2 and 3 provide a graphical comparison of overall economic stability in

Figure 2 Real GDP, Japan and the United States, January 1978–April 1986

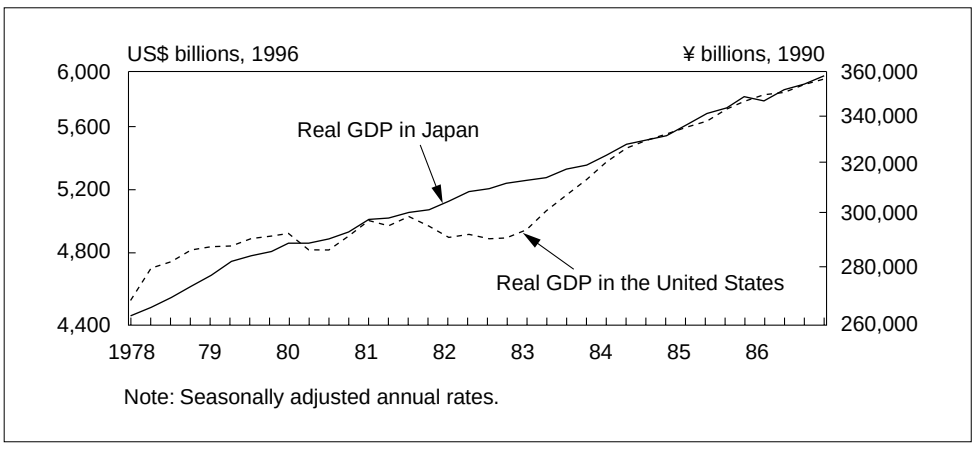
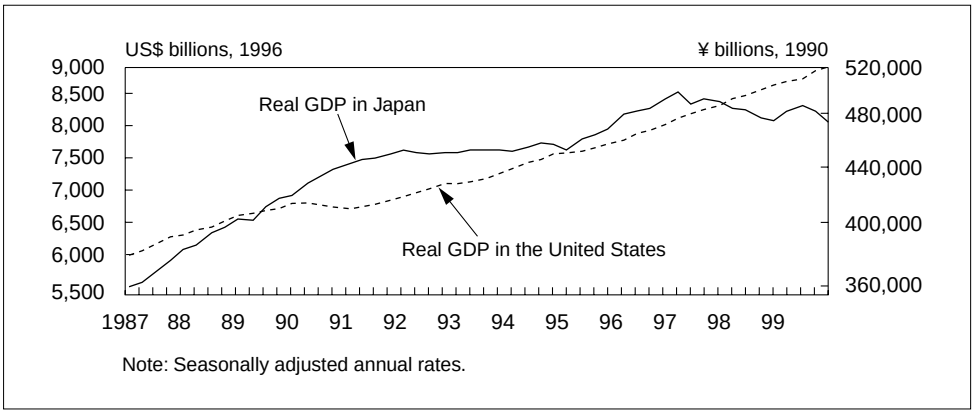


Figure 3 Real GDP, Japan and the United States, January 1987–April 1999



different experiences. First, consider Figure 2. It compares the *cyclical* performance of the Japanese economy and the U.S. economy from 1978 to 1986 using a simple dual scale to plot real GDP in the two countries together. During much of this period, the United States was experiencing (on average) high inflation and Japan was experiencing (on average) low inflation. Note how much less volatile real GDP is in Japan during this period. Real GDP in Japan looks as smooth as a trend line compared to the swings in the United States. The period of back-to-back recessions in 1980 and 1981–82 in the United States has no counterpart in Japan.

Figure 2 is essentially an updated version—using current data—of the chart that I produced in 1987 for my summary of the Third International Conference of the Bank of Japan (Taylor [1988]). I subsequently used this chart in other contexts, including my intermediate economics textbook with Robert Hall (Hall and Taylor [1988], p. 470), to show how successful monetary policy was in Japan during this period. I think the comparison shows the clear advantages of a monetary policy that keeps inflation low and stable in comparison with one that has high inflation, because inflation was low in Japan in the late 1970s and high in the United States. Japanese policy makers were very successful in keeping the economy moving along a steady growth path—in the face of oil and other shocks—during this period, while other countries had huge cyclical swings. (See the 1991 U.S. *Economic Report of the President*, pp. 96–97, for an examination—using a comparison of Japan versus the United States—of how the inflationary environment affects the pass-through of oil shocks.)

Figure 3 updates Figure 2 in another way. It looks at the fluctuations in real GDP in the two countries in the period *since* 1986. It is striking how different things look. Now it is U.S. real GDP that looks like a smooth trend line in comparison with the huge fluctuations in real GDP in Japan. Big events, such as the long slowdown and downturn in the mid 1990s and the subsequent downturn in the late 1990s, are not evident in the United States. The 1990–91 recession in the United States looks very small in comparison with the fluctuations in Japan.

The reversal reminds us that there is nothing necessarily permanent about good macroeconomic performance or bad economic performance. In another 13 years (at

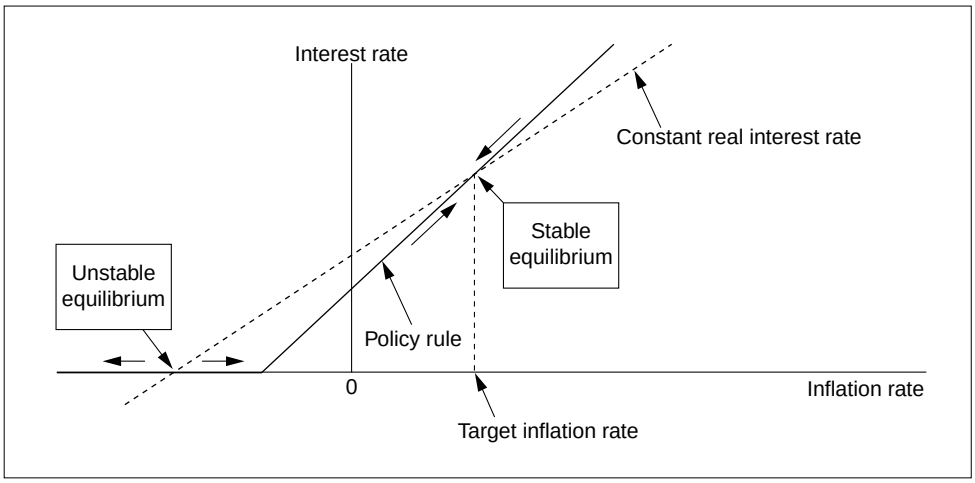
the 15th International Conference of the Bank of Japan?) one could update the charts again and see another reversal, or much better, two plots of real GDP that look like a trend line with infrequent, short recessions.

The output stability comparison in Figure 3 is different from the comparison in Figure 2: Figure 3 is comparing an L-regime with an N-regime, rather than an L-regime with an H-regime as in Figure 2. To combine the information in the two figures, note that both low-inflation regimes—one in Japan and one in the United States—were associated with good macroeconomic performance, while the high and near negative regimes were associated with poor economic performance. There are, of course, good theoretical explanations why economic stability might deteriorate as inflation gets near negative, just as there are good reasons for deterioration when inflation gets high. When the nominal interest rate approaches zero, one of the channels of monetary policy—the interest rate—is truncated. Thus, combating a slump may be difficult, and economic instability could increase. Also, when inflation gets negative a downward spiral can occur, which lowers inflation, which raises real interest rates, which lowers inflation even further, and so on.

The constraint that the nominal interest rate cannot go below the lower bound of zero has been effectively binding in Japan since 1995 in the sense that policy guidelines for the interest rate have called for interest rates below zero. The constraint has been literally binding since February 1999. But there are disagreements among economists about whether monetary policy loses its power to raise aggregate demand when the short-term nominal interest rate hits zero. Figure 3 indicates an increase in instability even before the lower bound of zero was approached in 1995.

Is there any evidence that a downward spiral of exponential instability has occurred? Figure 4, which shows a typical policy in which the short-term nominal interest rate reacts to inflation, suggests that the classic case of an unstable equilibrium was not reached in the 1990s in Japan. The typical upward sloping policy rule has a kink at the zero nominal interest rate, creating two intersections with the equilibrium real interest rate line. The intersection on the upper right is

Figure 4 Policy Rule with an Unstable Deflation Equilibrium



stable: declines in inflation lead to lower real interest rates, which tends to stabilize inflation. But the intersection at the lower left is unstable: decreases in inflation lead to higher real interest rates, which lead to even lower inflation. The deflation rate at which the unstable equilibrium occurs is equal to the equilibrium real interest rate in Figure 4. Suppose that the equilibrium real interest rate is 2.5 percent. Then a spiral would not occur until the inflation rate started spiraling down below –2.5 percent. At least according to Figure 1, that did not happen in Japan. The trough of the inflation rate—at least as measured by these yearly averages of changes in the GDP deflator—was above –2.5 percent in the deflationary bout of 1996, and it soon rebounded from its trough. The more recent deflationary bout also seems to be ending without a downward spiral and in this case the interest rate is virtually at zero.

For these reasons, Figure 3 suggests that near negative inflation led to deterioration in economic performance in Japan, but it does not prove it is the cause. I now focus on Japan in the 1990s and explore the connections between near negative inflation and monetary policy.

V. The Role of Money Growth

Although there is wide agreement among monetary economists that inflation is ultimately a monetary phenomenon, money growth measures have not figured prominently in most discussions of monetary policy in recent years. One problem is that velocity growth has been volatile and different measures of money give different indicators. The European Central Bank (ECB) has chosen to have money growth as one of its pillars, but it has been criticized for doing so (see Rudebusch and Svensson [1999] for a model and analysis that shows the disadvantages of money targeting).

But if one views money growth as an instrument of monetary policy, then the only viable alternative means of inflation control (at least in a flexible exchange rate regime) is the short-term nominal interest rate, and this too becomes a poor instrument when it approaches zero, for the reasons discussed above. Hence, it seems reasonable to consider the role of money growth.

What has happened to money growth in Japan during the period of economic instability documented in Figure 2? Consider M2+CDs, traditionally the favored measure of money in Japan (Suzuki [1988]). The paper prepared for the conference by Mori *et al*. (2001) examines the ratio of M2+CDs to nominal GDP or what is sometimes called the Marshallian k, or the inverse of velocity. The ratio k has been growing secularly over time in Japan. Stated differently, velocity has been declining.

Mori *et al*. ([2001], Figure 28) show that M2+CDs, as a ratio to nominal GDP, have been above the secular trend for k in the 1990s. The trend is estimated from 1970 to 1986. They cite this above-trend growth in this ratio as evidence (there is similar evidence for the monetary base) in support of their view that "ample liquidity was provided" during the 1990s and apparently shedding doubt on the argument that the "volume of monetary aggregates was insufficient." They suggest therefore, that money growth could not have been a cause of either the disinflation leading to deflation or the output instability.

However, that the ratio of the money supply to GDP was above the pre-1986 trend in the 1990s is not an indication that the volume of monetary aggregates was sufficient. Money supply and money demand can of course be in balance for a whole range of money growths and nominal GDP growths. It is the change in the growth rate of the numerator (M2+CDs) of k and its possible impact on the growth rate of the denominator (nominal GDP) of k that is of concern to monetary policy and a measure of the impact of changes in money. Something very big happened to these growth rates in Japan in the 1990s.

Figure 5 shows how money growth was much less in the 1990s than in the 1980s, and that this decline in money growth was associated with a sharp decline in nominal GDP growth. The effects of the changes in k are in fact a small part of the story in Figure 5.

Figure 5 Money Growth (M2+CD) and GDP Growth in Two Periods

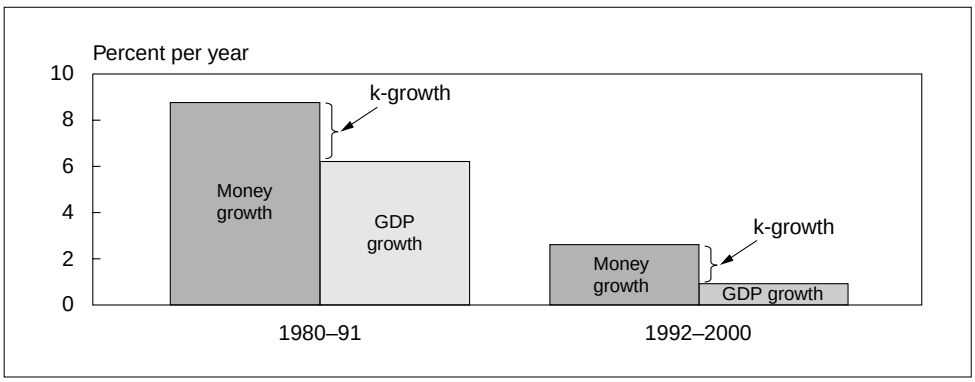
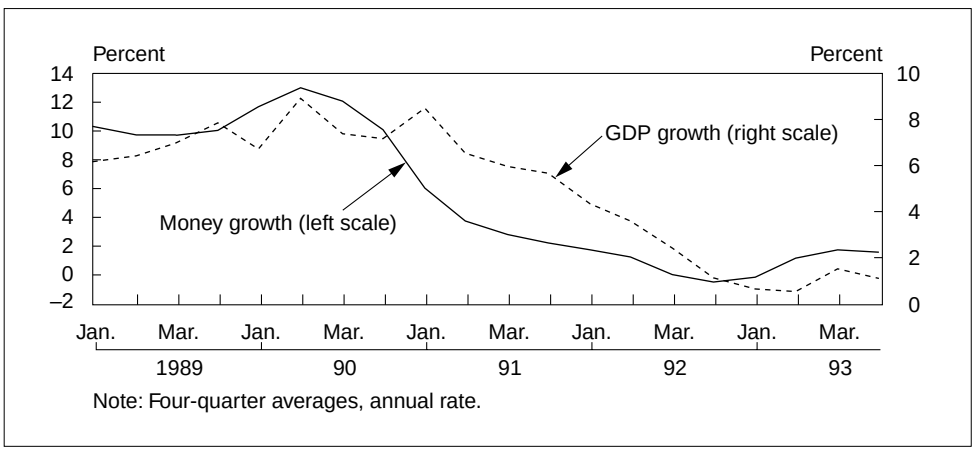


Figure 6, which focuses solely on the period of the major decline in nominal GDP growth, shows that the timing of these changes in money growth and nominal GDP growth were well synchronized. It is true that M2+CD growth picked up a bit in the late 1990s, but it has a long way to go before reaching the average level of the 1980s.

Figure 6 Money Growth (M2+CD) and Nominal GDP Growth, January 1989–April 1993



Even if one is skeptical about the use of money growth and other quantitative aggregates, these changes are large enough to make one worry that the causation went from the decline in money growth to the decline in GDP growth, especially when combined with the earlier M2+CD charts used at the 1987 conference. These money growth statistics help me understand and explain the macroeconomic changes in Japan in the 1990s. (A version of Figure 6 replaced Figure 2 in my intermediate macroeconomics text in the 1998 edition.) The sharp decline in money growth in Japan has also been noted as a cause of the instability by Meltzer (1999), Friedman (1997), and Hetzel (1999). To be sure, one cannot rule out the possibility that the decline in nominal GDP was independent of the decline in money growth and indeed caused the decline in money growth by lowering money demand.

A puzzle is why the decline in money did not bring about a larger decline in inflation and a smaller decline in real GDP, especially after a number of years had passed. As Table 2 shows, about half of the 6 percent decline in money growth came in the form of a decline in real GDP growth, with the other half showing up in the disinflation mentioned earlier. In this sense, more deflation would have been preferable, and would have improved macroeconomic performance! For the same change in nominal GDP growth, there would have been a smaller decline in real GDP.

Why was there not more deflation under the circumstances? Perhaps there are more significant *nominal* price and wage rigidities than was previously thought, but it must be pointed out that research in the 1980s found that Japan actually had more nominal wage flexibility than the United States, due to such institutions as bonuses or synchronized annual wage setting. Another possible explanation is that there was a very strong expectation of only near negative inflation, not substantial deflation, and that this has kept actual prices from falling more rapidly. This is clearly an area for fruitful research.

Table 2 Average Annual Growth Rates

	M2+CD	Real GDP	Nominal GDP	Velocity
Jan. 1980–Apr. 1991	8.86	3.90	6.27	–2.59
Jan. 1992–Jan. 2000	2.63	0.98	0.94	–1.69
Difference	6.23	2.92	5.33	0.9

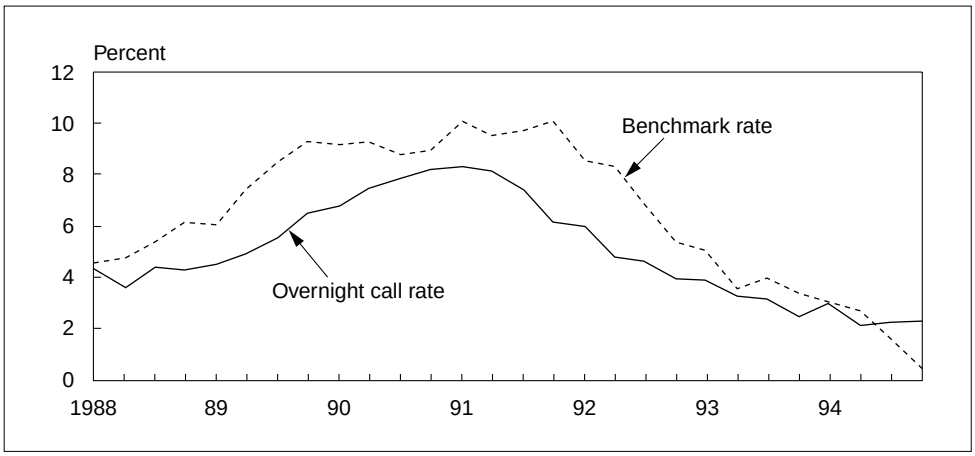
VI. The Role of Interest Rate Policy

How does the above evidence on money growth as an instrument of policy compare with interest rates? Several researchers have already examined the impacts of monetary policy by looking at actual interest rate settings in comparison with the settings suggested by guidelines or monetary policy rules (McCallum [2000], Bernanke and Gertler [1999], and Mori *et al*. [2001]). As emphasized in Taylor (1997), such rules are not inconsistent with policies that focus on money growth; money growth rules and interest rate rules are closely connected. Moreover, no one who uses policy rules for this type of analysis suggests that such rules should be used mechanically, though that suggestion is frequently criticized.

There is agreement that the actual increase in interest rates in the late 1980s was less than implied by an optimal policy rule. However, as Yamaguchi (1999) has pointed out, this does not mean that the implied "optimal" policy could have been followed. Taking interest rates to near double digits due to an overheated economy without visible signs of inflation rising would indeed have been difficult.

However, there is some disagreement about whether policy rules suggest that there was insufficient or delayed easing in the early 1990s. Figure 7 shows the interest rate settings for a policy rule for Japan and compares these with the actual call rate. This is exactly the same rule I suggested a number of years ago for the Fed and which I discussed in Taylor (1997). Like the policy rule analysis of Bernanke and Gertler (1999), Figure 7 suggests that a more rapid rise in interest rates in the 1980s would have been appropriate. But Figure 7 also suggests a much larger fall in the interest rate from 1991 to 1994. The decline in the interest rate with the policy rule is twice as large (nearly 10 percentage points) as with the actual policy (about five percentage points).

Figure 7 Overnight Call Rate and Benchmark Rate Based on Policy Rule with Parameters in Taylor (1993): January 1988–April 1994



To be sure, several assumptions—about which there is much uncertainty—must be made in order to arrive at this conclusion. For example, to implement the policy rule in Figure 7 one needs an estimate of the normal or natural level of output (potential GDP). In Figure 7, the estimate[4] of potential GDP is based on a constant exponential trend starting in 1970. This raises questions about potential GDP in the late 1990s. With investment being relatively low for a number of years, one would expect potential GDP to slow. The method used to estimate potential by Higo and Nakada (1999) would better capture the slowing trend in potential.

Nevertheless, the analysis with interest rate policy rules gives results that are quite similar to the analysis with money growth, though less dramatic. An insufficient or

4. The regression of log real GDP on a constant and a time trend gives a slope coefficient of .085, which gives an annual growth of potential GDP of about 3.5 percent. Actual GDP equaled potential GDP in the fourth quarter of 1993 and has been below ever since. Actual GDP was 8 percent above potential in the fourth quarter of 1990.

delayed reduction in interest rates has the same effects as a decline in money growth: real GDP and inflation fall. Both analyses suggest that this action was the original source of the deflation and the instability in the 1990s. This does not imply that mistakes were made in the sense that policy makers with the information and powers available to them at the time could have made better decisions, but it does suggest certain lessons to improve economic stability in the future in Japan and other countries. In this sense, the situation is similar to the 1987 conference.

VII. Needed: A Target for the Rate of Inflation

The purpose of looking back at the past with the benefit of hindsight, as I am doing in this speech, is to learn how to improve policy in the future. But what are the lessons to learn?

First, it is necessary for monetary policy makers to have a target for the rate of inflation, even if the target is implicit or stated indirectly—such as "a rate of inflation that does not interfere with decision-making by firms and consumers." That target should not change over time unless one is in a transition stage moving from one target to another, or unless the bias in measuring inflation changes. By a target for inflation, I simply mean a value for the inflation rate that one would like to see the actual inflation rate fluctuate around. Having a target for the inflation rate prevents policy from drifting and causing unnecessary economic instability. If the target for inflation were 1 percent, for example, then a decade with inflation equal to –1 percent would not be a good policy. Formally, the inflation target is the value that appears in the objective functions used by policy staffs for policy evaluation.

It is hard for me to see how monetary policy evaluation can be performed without an inflation target. For many years, policy evaluation research has started with a target inflation rate. The "target rate of inflation is therefore given" (Taylor [1979], p. 1276) when one decides how to vary the instruments of policy. Having an inflation target does not necessarily mean that the central bank announces an explicit numerical value. The Federal Reserve, by stressing the importance of price stability and by discussing what price stability means, effectively has a target for inflation that helps guide its decisions.

Having a target for the inflation rate is not enough, however. There are many different policies—including the use of different instruments—that will achieve an inflation target over time. In my early work on monetary policy rules and targets for inflation (Taylor [1979]), I used money as the instrument in the policy rule to keep inflation and output steady, but starting in the 1980s I have found that interest rate rules usually work better.[5] Some policies will involve much larger fluctuations in inflation around the target. And some policies will lead to larger fluctuations in other

5. When nominal interest rates get very low they are increasingly misleading as an indicator of monetary stimulus, and need to be supplemented or even supplanted by quantitative measures. Interest rate rules work well in a range between very low inflation and high inflation, but more reliance must be placed on money growth in other situations. This does not mean that money growth must be fixed, but rather that it should respond to inflation and the output gap.

variables of concern to policy makers. The choice of an operating procedure (a policy rule) is an outcome of the normative macroeconomic research once one sets an inflation target. Thus, choosing an inflation target still leaves open most of the important questions about monetary policy decisions.

It should be clear that choosing a target for the inflation rate is not the same as adopting an "inflation policy," as that term has been used at the Bank of Japan. An "inflation policy" is one in which the central bank chooses a high inflation rate, such as 4 percent, solely for the purpose of stimulating the economy. It is not a long-run target for inflation, but a temporary stimulus. My recommendation is also not necessarily the same as "inflation targeting" as the term has been used at the Bank of Japan. Choosing a target for the inflation rate does not necessarily mean that the instruments of policy should be set so as to bring a *forecast* of inflation into equality with the target. Publishing staff forecasts for inflation and other variables might work very well for particular central banks, but such publication is more than simply having and sticking with a target for the inflation rate. The Federal Reserve does not publish its staff forecasts, but for the period in Figure 3 it has focused on keeping inflation low and has succeeded.

What is a good target for the inflation rate? I think that the evidence I presented in this speech should give one cause for concern about a target for inflation that is "near negative." A better idea would be for the Bank of Japan to have a target for the inflation rate close to that of the ECB and the Fed. The ECB target is between 1 and 2 percent. The Fed target has been closer to 2 percent, based on actual results. Hence, a target in that range would be appropriate and would, over the long haul, even prevent the expected appreciation that McKinnon and Ohno (2000) have written about. This will create a more stable exchange rate system.

VIII. What Comes after the Zero Interest Rate Policy?

Clearly, choosing a target for the inflation rate does not answer this question. But I think a combination of recent research and the recent experience with the zero interest rate policy suggests the answer.

In February 1999, the Monetary Policy Board of the Bank of Japan announced that it was taking action to bring the key short-term interest rate—the uncollateralized overnight call rate—to virtually zero. The action was taken to combat deflationary pressures and to halt a downturn in the economy. This overnight rate had already been very low for nearly four years. It reached 0.5 percent in September 1995 and had been hovering around that level; but with the new zero interest rate policy the rate soon drifted down even further, to about two basis points.

In April 1999, Governor Hayami provided important information about the zero interest rate policy. He stated that the zero interest rate would continue until "deflationary concerns are dispelled," and in subsequent remarks he clarified how the Bank of Japan would determine this (Hayami [2000]). He mentioned, for example, that an opening up of the output gap would indicate that deflationary concerns are not dispelled, suggesting that interest rates would not be raised. However, a

narrowing of the output gap (from negative toward zero) would suggest that interest rates would be raised.

Note that all these useful clarifications of the zero interest rate policy are in the form of a contingency plan, stating under what circumstances interest rates will change in the future. We can expect, according to what has been stated, that the Monetary Policy Board will increase the interest rate if inflation rises by a sufficient amount and/or the output gap narrows by a sufficient amount in the future.

These kinds of contingency plans for policy responses are of course just another name for monetary policy rules. As the zero interest rate policy evolves first into double-digit basis points, and then into triple-digit basis points, it will be necessary to determine the best size for those responses. It will also be necessary to determine whether it is the change or the level of the output gap that is relevant to the decision. If these contingencies can be specified in advance—as the zero interest rate policy does today—then monetary policy will operate more smoothly in the future. Research on monetary policy rules shows that the size of the responses matters a lot. It is also important to have continuity between the zero interest rate policy and what will come after. Such continuity is best achieved by being more and more specific about the directions and even the magnitudes of the responses. My recommendation is to be as analytical as possible in determining the right sizes of the responses for Japan and to be as transparent as possible about what they are likely to be.

IX. Conclusion: An Example

In conclusion, it might be helpful to give an example of how greater degrees of specificity might occur within a particular analytic framework. Figures 8 through 12 give a graphical representation, illustrating a series of frameworks with increasing degrees of specificity.

Figure 8 is a graphical characterization of the current zero interest rate policy as

Figure 8 A Non-Quantitative Description of the Zero Interest Rate Policy

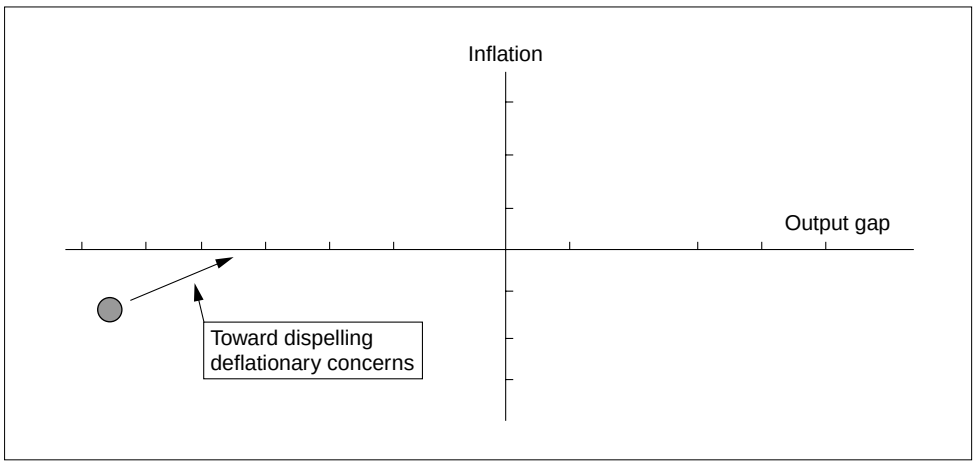


Figure 9 Adding Numerical Values to Describe the Current Situation

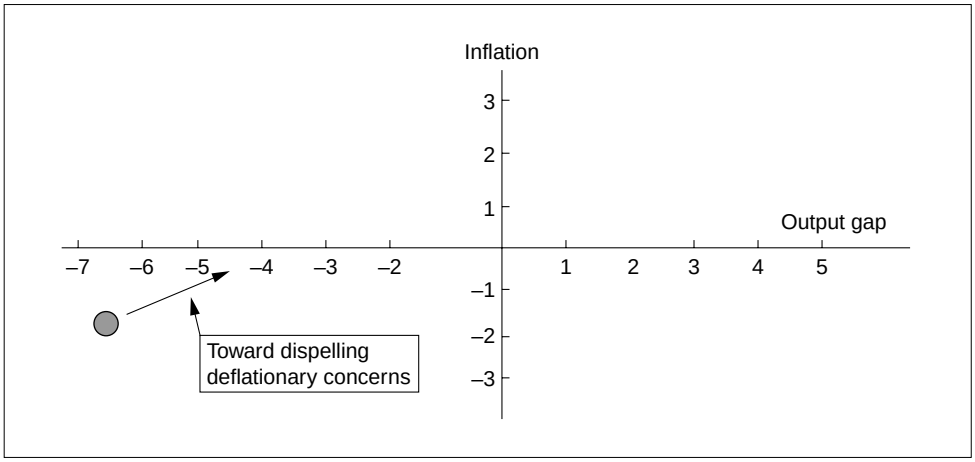


Figure 10 Adding a Target for the Inflation Rate

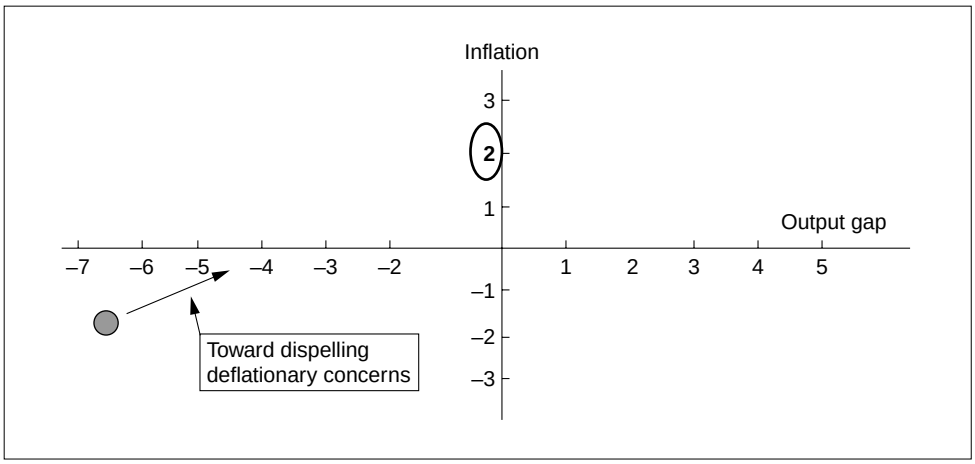
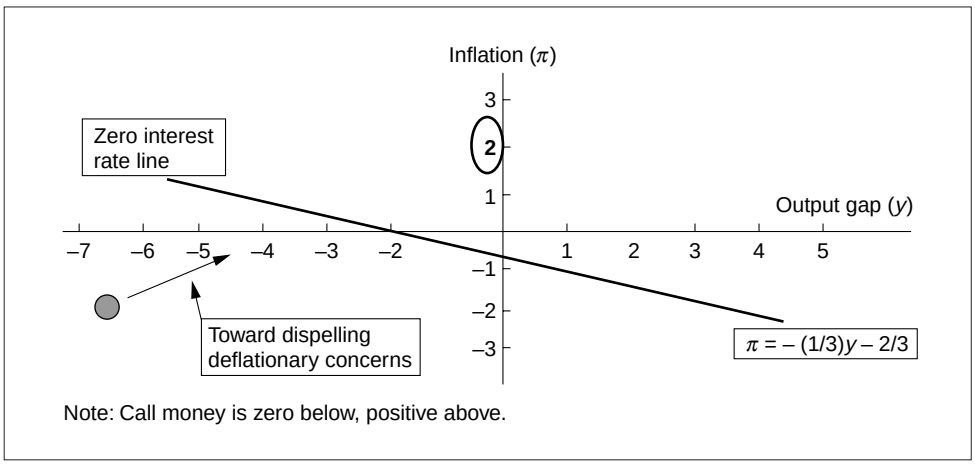
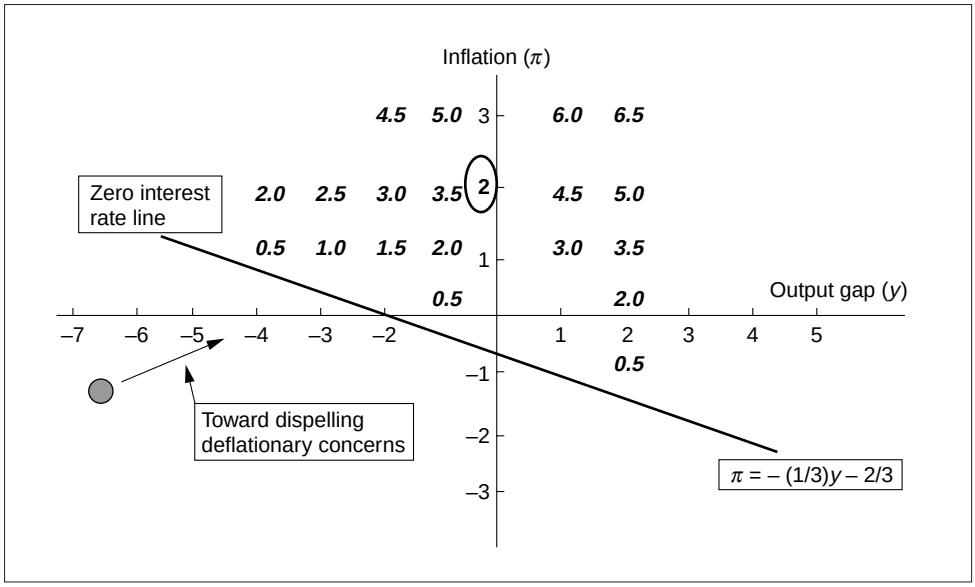


Figure 11 Adding the "Zero Interest Rate Line"



Note: Call money is zero below, positive above.

Figure 12 After Zero Interest Rate Policy: A Full Specification



stated by Governor Hayami. From his statements, we know that higher inflation and an increase in the output gap are in the direction of dispelling deflationary concerns. Figure 9 is more specific than Figure 8; it puts numerical values on the axes and thus quantifies the current amount of deflation and the size of the output gap. In my view, this size of the gap—around 6 or 7 percent—reflects an average of most current estimates in Japan, but it could even be larger. Figure 10 goes beyond Figure 9 by specifying the target inflation rate to be close to that of the ECB and the Fed.

Figure 11 draws in the zero interest rate line (found by substituting a zero interest rate into the policy rule in Taylor [1993], which also assumes a 2 percent target inflation rate). Not until inflation and the output gap pass beyond that line should the interest rate turn positive. Of course, the particular line in Figure 11 is just an example; the more fundamental suggestion is that it is important to have some line.

Finally, Figure 12 puts in nonzero values of the interest rate, which are relevant after the zero interest rate policy has ended. Figure 12 is a complete description of a policy rule for the interest rate including a zero interest rate region. Again, it is an example to illustrate the main recommendation—to have a target for the inflation rate and to be as analytical and as transparent as possible about the plans and procedures for changing the instruments of policy in order to achieve this target.

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