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**Trying to Make Sense of the Bank of Japan's  
Monetary Policy since the Exit from  
Quantitative Easing**

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Trying to Make Sense of the Bank of Japan's Monetary Policy since the Exit from  
Quantitative Easing

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Abstract

In this short note I review the Bank of Japan's monetary policy since its exit from the so-called quantitative easing regime early in 2006. The major characteristic of the policy stance during the period, called Strategy 2 below, has been to adjust the policy interest rate gradually upward in response to a healthy real economy despite stagnant behavior in consumer prices. Such a policy stance can be contrasted with a hypothetical strategy, Strategy 1, whereby the Bank of Japan would have kept the policy rate at lower levels, possibly at zero percent, until inflation starts to show an upward trend more clearly. The two strategies are compared on many fronts with particular attention to well-known recent empirical regularities about inflation —a smaller response of inflation to output and larger uncertainties about the response. Various comparisons of the two strategies offered here, though far from conclusive, tend to support Strategy 1 over Strategy 2. In my discussion of the two strategies I also comment on some of the major features of the Nishimura article in this issue.

1, Introduction

This short paper reviews the Bank of Japan (BOJ)'s monetary policy since it exited from the so-called Quantitative Easing (QE) framework in March 2006, and in so doing comments briefly on Nishimura's article in this issue.

The major point of the paper is that the stubbornly low rate of inflation of Japan's consumer price index (CPI), despite the strong real economy in recent years, has made the task of the BOJ unusually difficult, and raised a number of questions about its basic policy stance as well as its communication with the market. Since the exit from QE in March 2006, the BOJ has been able to raise the policy interest rate only twice, given the slower than expected rise in the rate of core CPI inflation. Even such a timid tightening has raised questions about its necessity, given the stagnant behavior of inflation. In light

of this, I discuss below cases for and against the BOJ's recent approach by comparing them with those of an alternative strategy where the BOJ held rates at lower levels, possibly at zero percent. The comparison is done from a number of angles, including inflation targeting aspects of the issue and the relationship between asset prices and monetary policy. By proceeding this way, I think we would be able to understand better Nishimura's or the BOJ's view on monetary policy.

Before proceeding further, it would be useful to summarize Nishimura's article in this issue briefly at this point. He first points out that the volatility of Japan's real GDP growth rate has declined since around 2002 and then speculates that this might be related to a substantial increase in the diversity of demand for final goods and services across industries. He provides evidence for the latter point by showing that the cross sectional correlation of industry activities declined after 2002. He goes on to construct a theoretical model of output pricing by firms in which there is confusion between macro and micro demand shocks. A positive shock to the demand for a firm's product, when perceived to be macroeconomic, tends to result in a rise in output price because other firms are also likely to follow suit and the firm is less likely to lose demand for its product. Turning to the implication of such an analysis, Nishimura argues that as a result of the reduced inter-industry correlation of activities observed in the data firms are now more likely to regard shocks to the demand for their product as microeconomic and, hence, do not respond to them by changing prices. Aggregating over firms, one obtains a smaller response of prices to output—that is, a flatter Phillips curve. Using macroeconomic data, Nishimura then estimates a Phillips curve and an IS equation. He finds that both the inflation response to output and output response to the interest rate have become smaller and less predictable recently. Finally, he concludes that such an environment supports the recent BOJ's approach to monetary policy—one of gradually raising interest rates despite a weak reading on the inflation front.

The major contribution of the Nishimura article is his explanation of the flat slope of the recent Phillips curve. This, however, is only one of the many existing explanations of the phenomenon. Other explanations include increased global competition and stable inflation expectations. Choosing between these hypotheses is beyond the scope of the present note. Thus, in the following I will concentrate on other aspects of the Nishimura paper. That is, the phenomenon of the flat Phillips curve, increasing uncertainty of the slope of the curve, and his discussion of the implications of these for monetary policy.

In the next section, section 2, I briefly review the BOJ's policy after its exit from QE in March 2006. In section 3, I discuss the performance of the CPI inflation rate

during the period and the BOJ's overestimates of the inflation rate. In section 4, I try to offer some justification of the BOJ's policy stance. But this attempt immediately draws attention to an alternative policy strategy of keeping a zero rate until inflation becomes more clearly positive. Thus, in section 5 I turn to the comparison of the two strategies from a number of angles. Section 6 offers some concluding remarks.

## 2, The BOJ's Monetary Policy since early 2006

In March of 2001 the BOJ adopted the QE framework whereby it would keep injecting large amounts of excess reserves until core CPI inflation became stably positive.<sup>1</sup> Measured by the CPI that uses the benchmark year of 2000, inflation rose to 0.5% in January 2006, and the BOJ decided to exit from QE. The BOJ stated in its announcement of policy decision on March 9, 2006 that

“Year on year changes in the consumer price index are expected to remain positive. The Bank, therefore, judged that the conditions laid out in the commitment (contained in QE) are fulfilled.”<sup>2</sup>

In fact, the inflation rate stayed at around 0.5% for a few months and rose to 0.7% in August 2006. (See the inflation rate movement that uses the benchmark year of 2000 in Figure 1.)

The March 2006 decision to exit from QE involved a switch of the operating target of monetary policy from the current account balances at the BOJ to the overnight call market rate. The level of the target was set initially at 0% in March 2006.

In addition to the change in the operating target of policy, the BOJ announced a new monetary policy framework in March 2006. The framework consisted of the definition of price stability and two principles, called pillars, that would guide monetary policy making. The definition of price stability was a collection of individual board members' preferred inflation ranges and turned out to be [0%, 2%]. The BOJ hastened to add that this was not an official inflation target range of the Bank. The first of the two pillars contained in the new monetary policy framework dictated that policy would be set so that the economy would achieve sustainable output growth under inflation rates consistent with the definition of price stability over a horizon of one to two years. The second pillar cautioned that policy may deviate from what the first pillar suggested if risks of unstable output and or inflation movements over a longer run were significant.

Seeing the rise in inflation toward summer, the BOJ decided to raise the target for the call rate to 0.25% in July 2006. The BOJ stated in its policy statement that

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<sup>1</sup> See Ueda(2005) for a detailed account of this framework.

<sup>2</sup> The expression in the parentheses is by the present author.

“Maintaining the previous level of the policy interest rate may result in large swings in economic activity and prices in the future. ....The Bank will adjust the level of the policy interest rate gradually in the light of developments in economic activity and prices if they follow the projection presented in the Outlook Report...”

Unfortunately, inflation peaked in August at 0.7% and started to decline after that. In October it fell to 0.4% even using the data before the benchmark revision. The benchmark revision of CPI in August lowered inflation significantly and inflation was only 0.1% in October based on the new index.

The media and market started to question the March decision to exit from QE or the July decision to raise the call rate. The real economy was showing a temporary sign of weakness--a quarter on quarter real GDP growth rate of -0.1% in 2006Q3--and observers thought that a further hike in the policy rate might be difficult.

The BOJ, however, maintained that its economic outlook outlined in the Outlook Report was basically intact and looked eager to raise the policy rate. Such a stance of the BOJ and press reports of a high likelihood of a January 2007 rate hike invited strong comments against such an action from some influential politicians right before the January 2007 monetary policy meeting. The BOJ stayed on hold in the January meeting, but decided to raise the policy rate to 0.5% in the February meeting. Meanwhile, inflation fell to -0.1% in January and further to -0.3% in March.

The January 2007 fiasco over a possible rate hike culminating in the decision to stay on hold in January and the subsequent decision to raise the policy rate in February in the midst of a decline in the inflation rate to negative territory have created the unfortunate perception that the guiding principle of the BOJ's policy making was unclear.

### 3, Large Inflation Forecast Error

One of the most serious problems the BOJ faced during the last two years has been the failure of the CPI to rise. This is apparent in Figures 2 and 3. They show the median of the BOJ board members' forecast ranges of real GDP growth rate and core CPI inflation rate. The forecasts are taken from Outlook Reports in April 2006, October 2006 and April 2007. While the growth forecasts were not revised much during the 12 months, the inflation forecasts were revised down sharply. Thus, as of April 2006 the median forecast (henceforth, the BOJ's forecast) was 0.9 % for fiscal year 2007. It came down, however, to 0.5% in October 2006, and further down to 0.1% as of April 2007.

The large overestimates of inflation were due to two factors. First, as stated in the last section, the CPI data went through a benchmark revision in the summer of 2006.

The timing of the revision was known, but the size of the revision, somewhere between 0.3%-0.5% depending on at what point one measures the difference between the two indexes, was larger than expected. Figure 1 shows, however, that whichever definition of CPI inflation one looks at, one obtains the conclusion that it peaked in August 2006, and then started to decline after that. Under the new definition, it dropped into negative territory again in March 2007 and stayed there since then.

The second reason for the disappointing inflation performance has been the weak response of inflation to output growth. Figure 4 and Figure 5 show how the Phillips Curve has become flatter recently. They plot the inflation of a trend component of core CPI against a measure of the GDP gap officially published by the Cabinet Office for 1980-2007Q1 in Figure 4 and for 1998-2007Q1 in Figure 5.<sup>3</sup> It is apparent that the curve is flatter recently. A simple regression of inflation on a constant and the gap results in a slope of .62 (.067) in the former, and .076 (.041) in the latter.<sup>4</sup> Figure 6 displays the time series behavior of the trend component of the core CPI inflation rate—the so-called core of the core CPI inflation rate.<sup>5</sup> It may be seen that the response of inflation to output has not only become smaller but also more uncertain. For example, Figure 6 shows that prior to the spring of 2006 inflation did respond, if mildly, to the growth in output, while it has stopped rising at all since then. Nishimura makes a similar point by referring to a significant rise in the standard error of the estimate of the slope of the Phillips curve after 2000Q3.

The tendency for the slope of the Phillips curve to become flatter is a world-wide phenomenon and has invited many attempts at explanation. It seems fair to say, however, that none have been totally satisfactory. The near-term relationship between inflation and output remains very uncertain.

To summarize, inflation has been falling since the BOJ raised the policy rate in July 2006 and it is, at the time of the writing of this article, in negative territory. The inflation rate of -0.1% in August 2007 is, if marginally, below the definition of price stability, [0%, 2%], of the BOJ board members. The weakness in inflation has been largely unanticipated. Despite this, the BOJ raised the policy rate again in February 2007. The policy rate is still at 0.5% and there is not much room for easing monetary policy to counter a major negative shock to the economy.

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<sup>3</sup> The core CPI excludes fresh foods from the CPI. The trend component of core CPI here is calculated by taking away from core CPI rice, petroleum products, public medical fees and tobacco. After 2000, mobile phone fees are also excluded.

<sup>4</sup> The numbers in parentheses are standard errors.

<sup>5</sup> There is no official definition of the core of the core CPI. Most researchers take away energy related items, public medical fees, mobile phone charges and a few other one-off factors from core CPI to form core core CPI.

#### 4, Trying to Make Sense of the BOJ's Monetary Policy since early 2006: Two Alternative Monetary Policy Approaches under Low Rates of Inflation

The BOJ's rate hikes when inflation is close to, or below the lower end of the price stability range have been under attack. Is it, however, really impossible to justify a rate hike by an inflation targeting central bank when inflation is very low or when it is well below the target? Of course, an obvious policy alternative in such a situation would be to lower rates in an attempt to raise inflation. I will not attempt to discuss this alternative given that the policy rate in Japan is still very close to zero and the room for easing is very much limited.<sup>6</sup> Below I first outline the basic structure of possible arguments to justify a rate hike in such a situation. Then, in the next section I examine more carefully how plausible such arguments are in the light of the current Japanese situation.

There are at least two ways to justify a rate hike when inflation is below target. First, one could argue that the actual GDP exceeds potential GDP—the GDP gap is positive—and that this is by itself costly even if it does not lead to a significant rise in inflation. In fact, the GDP gap estimated by the Japanese government as shown in Figures 4 and 5 has been positive since 2006Q4. Whether the output gap can really become positive or even if it can, what exactly the associated costs are is a difficult question. I will touch upon this question later, but for the time being let us assume that such costs are non-negligible. That is, we consider a central bank who attempts to minimize a loss function defined over the deviation of inflation from target and the output gap.

The second justification for a rate hike would go as follows. Suppose that today's inflation is well below target. Normally, the central bank would contemplate lowering the policy rate. The central bank, however, may have an inflation outlook whereby inflation will exceed the target in the near future if the policy rate is held at the current level. The cost of inflation overshooting in the future may be larger than the near term cost of inflation staying below the target.

Let us take up the second of these two possibilities and examine what the central bank should do. One obvious strategy (Strategy 1) would be for the central bank to wait until inflation becomes much closer to target before it starts to raise the policy rate. The other (Strategy 2) would be to start raising the policy rate today and try to achieve a

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<sup>6</sup> There is yet another difficult question--that is, whether or not, the exit from QE in March 2006 was appropriate given the fact that inflation went back to negative territory in less than a year after the exit.

smooth and gradual convergence of the policy rate to its neutral level, which presumably is well above today's level. The justification of Strategy 2 is that waiting for too long until inflation rises significantly as in Strategy 1 may lead to a non-negligible period of overly high rate of inflation. Alternatively, one could point to the cost of a positive GDP gap. Such seems to be close to the position of the BOJ. In fact, Nishimura states that

“To stand pat for a long time is not a prudent strategy, since the acceleration of economic activity may in the future come to require a large adjustment in the policy rate, causing unnecessary swings in economic activity and prices.”

There is a third justification of a rate hike embedded in the above remark. That is, a sharp adjustment of the policy rate could be by itself costly. So, a prudent central bank would start early, but proceed gradually when a large adjustment in the policy rate in the near future seems necessary.

To digress slightly, under Strategy 2 the speed with which the policy rate is expected to converge to the neutral level seems to become an important policy variable. Nishimura states that

“Policy adjustment cannot be pre-scheduled or occur at some fixed interval, since it should be in line with the general economic improvement, which never follows a fixed schedule.”

He goes on to justify the January 2007 decision to stay on hold along the same lines:

“there was a slight pause in the trend of general economic improvement in the last quarter of last year. A prudent policymaker should take this pause seriously and wait until the clouds over the trend have lifted somewhat. That is what the majority of the Policy Board did last December and this January.”

## 5, Comparing the Two Strategies

I now turn to the discussion of a most difficult issue of whether or not the BOJ's adoption of Strategy 2 under the recent environment is justifiable. Needless to say, it would be impossible to paint a black or white type picture here. After examining the issue from various angles, however, I will tentatively conclude that the balance of the argument favors Strategy 1 rather than Strategy 2.

### (5-1) The target rate of inflation

The outcome of such an analysis obviously depends on the target rate of inflation. The BOJ, however, has not made clear what their target rate of inflation is. The only thing the BOJ has announced so far is the [0%, 2%] definition of price stability.



Unfortunately, it is not clear how this is constraining monetary policy. A rate hike decision near a zero percent inflation rate can easily be justified if the target was 0%, while this may not be the case with a target of 2%. Simply put, even if [0%, 2%] was an inflation target range, it would be too wide to determine monetary policy.

Let us provisionally proceed on the assumption that the target rate of inflation is either 1%, the mid point of the range, or slightly higher, for example, 1.5%. Assuming that the equilibrium real rate of interest is 1.5%, the actual rate of inflation of -0.1%, the GDP gap of 0.9% (for 2007Q1 as estimated by the Cabinet Office) and putting equal weights of 0.5 to the inflation and GDP gaps, one obtains a Taylor rule rate of 1.3% with an inflation target of 1.0% and a 1.05% policy interest rate with an inflation target of 1.5%. Even with a 2% target, the policy rate is still 0.8%. All these hypothetical policy rates are higher than the actual, which is 0.5%. If these calculations were relevant, the choice of inflation target within the range of [0%, 2%] would be in a sense immaterial. The BOJ, even after the exit from QE, would still be deliberately moving behind the curve and is in a slow transition process to a normal central bank which would set the policy rate according to, say, the Taylor rule.<sup>7</sup> Such a line of thinking seems to support Strategy 2.

#### (5.2) Implications of the smaller and more uncertain slope of the Phillips curve

How would the decline in the slope of the Phillips curve affect the analysis in the last section? Also, what would be the implication of increased uncertainty of the slope?

The smaller slope of the Phillips curve has a clear implication for monetary policy. Since the same amount of a change in the interest rate generates a smaller rise in the rate of inflation, a larger change in the interest rate is required if inflation is away from target. In the current Japanese context, assuming that inflation target is much higher than 0%, an inflation rate of near 0% calls for a longer continuation of a near 0% policy interest rate. That is, Strategy 1 is preferable to Strategy 2. Let us put this in terms of the Taylor rule type argument. Solving an optimization problem for a central bank that minimizes costs arising from deviations of inflation from target (and the GDP gap) results in a Taylor-rule-like equation that places larger weight on the deviation of inflation from target if the inflation response to output is smaller. Thus, although a weight of 0.5 was attached to this term in the calculation in the previous section, the weight could be much larger. With a weight of 2, the optimal policy rate can be seen to

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<sup>7</sup> Of course, even in this case the speed of the rate adjustment would be a function of the target rate of inflation.

be still negative.<sup>8</sup> A smaller interest rate elasticity of aggregate demand leads to a similar conclusion.<sup>9</sup> Consequently, consideration of the implication of a smaller slope of the Phillips curve tends to weaken the case for Strategy 2.

What about the uncertainty of the slope of the Phillips curve? This certainly lowers the controllability of inflation. Suppose, as we have been assuming, that a central bank has multiple objectives. That is, in addition to price stability, it is concerned with the stability of output and /or the financial system. To the extent that the central bank has discretion over the weights given to these objectives, a decline in the controllability of inflation seems to lower the weight attached to price stability and raise the weights on other objectives. This may favor Strategy 2 at the expense of Strategy 1. It is, however, a fine point. If the interest rate elasticity of aggregate demand has also become uncertain as Nishimura claims, the weight given to output would also decline. It is then not clear what effects this discussion will have on the merits and demerits of the two strategies.

A more relevant consideration regarding the implication for monetary policy of the increased uncertainty of the slope of the Phillips curve seems to be the following. Given lags in the effects of monetary policy, central banks ought to forecast future inflation when setting the current policy rate. In this forecasting exercise central banks use information on the current state of the economy and the past statistical relationship among macroeconomic variables. For example, an analysis of data over the past two decades may indicate that a rise of output growth of 1% during the next year will generate a 0.5% rise in the rate of inflation, which may have policy implications. A rise in the uncertainty about the relationship between the two variables, however, forces the central bank to wait for a while to see if the data show the tendency to conform to the past relationship before making a decision on policy. That is, policy decisions would depend more on incoming data. Such a consideration seems to clearly favor Strategy 1 rather than Strategy 2. Inflation in Japan today is not rising by as much as the past relationship between inflation and output suggests. A natural reaction would be to wait until a clearer trend in inflation becomes discernible.

### (5.3) Risk Management Type Considerations

I have already touched upon some risk management issues above. A more straightforward analysis of risks associated with the two strategies would go as follows.

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<sup>8</sup> The weight on the deviation of inflation from target is dependent on the inverse of the slope of the Phillips curve. See, for example, Svensson (1997) or Ball (1997).

<sup>9</sup> More precisely, a smaller interest rate elasticity of aggregate demand raises both the weight on the inflation term and the GDP gap. So long as the GDP gap is small, however, the essential feature of the argument here remains true.

Strategy 1, by maintaining low interest rates for a long period, increases upside risks for the economy. Strategy 2 would entail the opposite, downside risks. Attempts to raise interest rates may generate adverse effects on the economy and inflation, which is already in negative territory, and inflation may remain subdued for a long period to come.

There are at least two fronts on which to evaluate these risks. First, the costs of the risks of the two strategies are obviously a function of the target rate of inflation. With a target of 0% inflation, upside risks of Strategy 1 are significant, while downside risks of Strategy 2 need to be taken seriously if the target was 2%. The BOJ will have to make clearer at least what subset of the [0%, 2%] range is more preferable to the rest. Without this, the continuation of Strategy 2 with emphasis on upside risks could be taken as revelation of preference for a very low inflation rate.

The second important point about the comparison of the risks associated with the two strategies is the asymmetric nature of the costs of deviations of inflation from target. The zero bound on nominal interest rates makes deflation a very serious cost for a central bank because it largely deprives the central bank of the ability to stimulate the economy to stop deflation. On the other hand, the central bank has an infinite amount of room to adjust the policy rate upward. This is in fact a major lesson of the experience of the BOJ during the period since 1998. This consideration obviously supports Strategy 1.

I may add the following point to the above discussion. Currently, the GDP gap is close to, or slightly above zero in Japan while inflation is still around zero. Although hard to measure, inflation expectations must be close to zero as well. Under such a circumstance, attempts to raise inflation substantially will necessarily create a period of overshooting, that is, a period of a large positive GDP gap. Trying to avoid overheating too much may end up in the failure to raise inflation.

It may be appropriate also to comment on what the costs, other than an increase in inflation, of an overheating economy could be. One easy answer would be, as the BOJ claims, “large swings in prices and economic activity in the long run.” Inflation may rise substantially in five years if not in two years. Business investment can go too far, leading to a sharp stock adjustment process later on. These are certainly valid arguments, but do not seem to be very serious concerns for Japan at the moment. For example, firms are not spending more than retained profits, and hence bank loans are not growing.

Another possible cost of an overheating economy would be large swings in asset prices and their effects on the stability of the financial system. In fact, Japan experienced this in a harsh way during the last two decades. The recent sub-prime

mortgage loan problem and its spread to the worldwide credit market and financial system is also a relevant example. Again, this is an important concern. Apart from the weakness in the yen that turned on low Japanese interest rates, however, world asset price movements including the possible credit market “bubble” do not seem to be the result of low interest rates in Japan. Domestic asset prices in Japan are only beginning to reverse the decade long downward adjustment. Worrying about bubbles at this stage does not seem to very convincing.

## 6, Concluding Remarks

The foregoing discussion seems to suggest that the balance of the argument supports Strategy 1 relative to Strategy 2. This is, of course, not a conclusion without qualifications, as I have argued in many places in this note. History may well show a few years from today that the BOJ policy during the last two years was reasonable. Even if this were the case, the point still remains that the BOJ’s strategy and its justification has not been clearly transmitted to its observers. At least, a narrower definition of price stability or inflation target range would be necessary, not just for communication with the market but also for sound policy making itself.

I would end with a few more remarks about issues discussed above. First is an intrinsic difficulty for the BOJ to adopt inflation targeting in the current environment of near zero inflation and a zero nominal interest rate. Even if the ultimate inflation target of the BOJ was 2%, announcing this immediately might not be a wise move. As Ueda (2005) argued extensively, with a near zero nominal interest rate there are serious limitations to what a central bank can do to increase the rate of inflation significantly. A mere announcement of a high target rate of inflation by itself does not seem to be much of a help unless it is accompanied by concrete measures to hit the target. QE was one such measure, but the BOJ has exited from the framework. One realistic approach would be to target a lower inflation rate in the short run, but with an eye to raising it if circumstances turn out to allow such a revision—an opportunistic approach. Such an approach involves a number of difficult problems including how to contain possible risk premiums on long-term interest rates arising from the uncertainty about inflation target. It appears, however, that announcing a little more about its longer-run strategy would help in terms of healthier communication with the market and media.

The second point concerns another dimension by which to compare Strategies 1 and 2. One of the major justifications for a positive inflation target is to secure some safety margin for lowering interest rates given the zero lower bound on the nominal interest rate. Which strategy would do better in terms of securing a safety margin? The

answer is not obvious. Strategy 1, by maintaining low policy rates for a long period, tries to bring the economy to a high inflation, high interest rate equilibrium. In the short run, however, the central bank is not able to create a large increase in safety margin. In contrast, Strategy 2 attempts to secure a small margin quickly, though by doing so it may not succeed in creating a large margin even in the long run. Thus, there is a clear tradeoff here. Depending on the preference of policymakers, either choice seems justifiable. If we were to place the discussion in the current Japanese context, however, even Strategy 2 has generated only a 50 basis point margin for the policy rate above the zero bound. It may be possible to generate a further rise in the policy rate, but relative to what Strategy 1 would have delivered—most likely still a zero rate—the margin seems too small as a preparation for a negative shock.

Finally, there are questions about the price index central banks should be watching or targeting. Currently in Japan, the CPI is not rising, but most of the other price indexes, including the corporate goods price index and corporate service price index are rising. The deflator for investment is also rising. One wonders whether the focus on the core CPI might distort monetary policy making or not. This is a legitimate question. Given that wages and the deflator for consumption are also weak, however, the weakness in the CPI seems to be real. Thus, unless one can make a strong case for targeting a broader index such as the deflator for domestic demand, one needs to take seriously the weakness in the CPI in the discussion of monetary policy.

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Figure 1 Core CPI Inflation

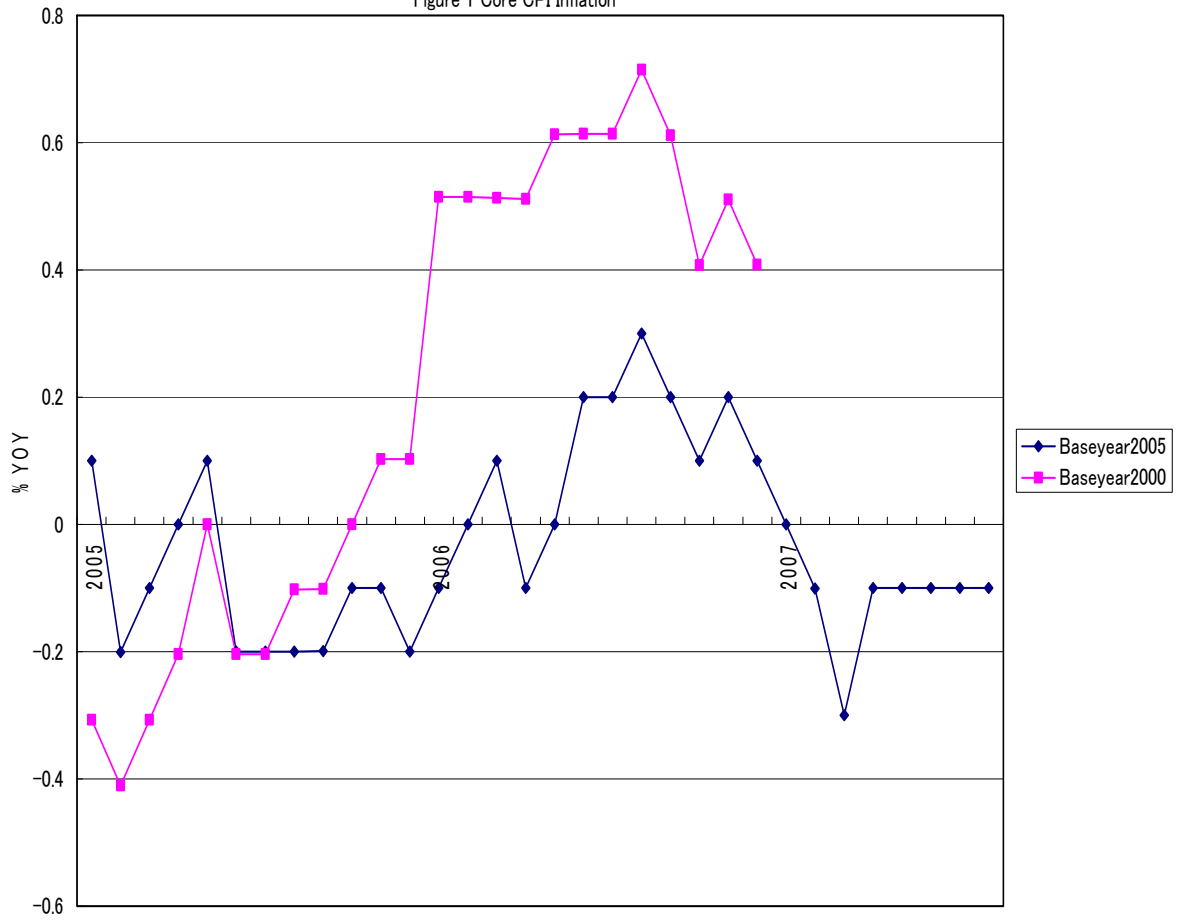


Figure 3

Output Growth Forecast

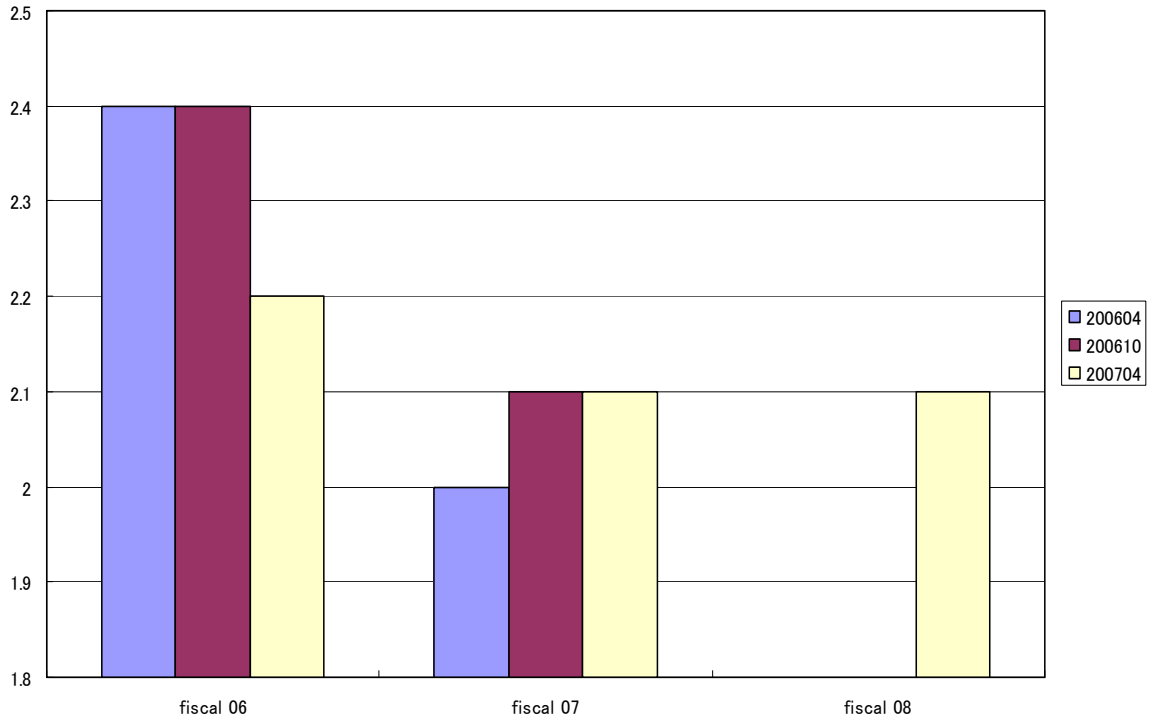


Figure 4

Core CPI Inflation Forecast

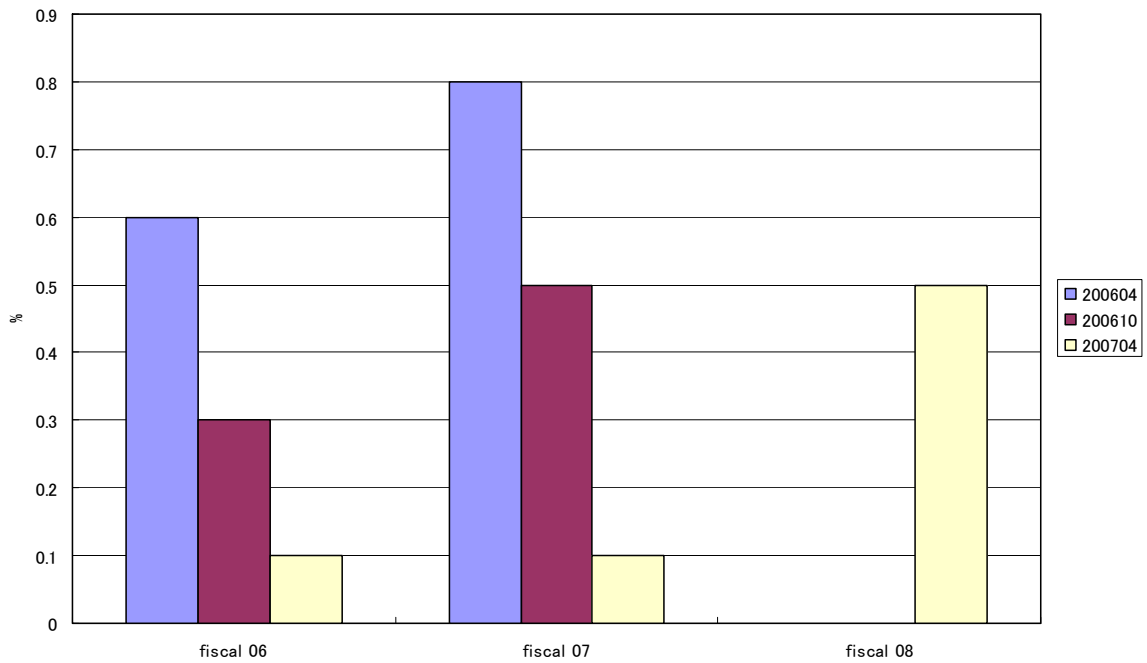


Figure 4 Phillips Curve:1980-2007

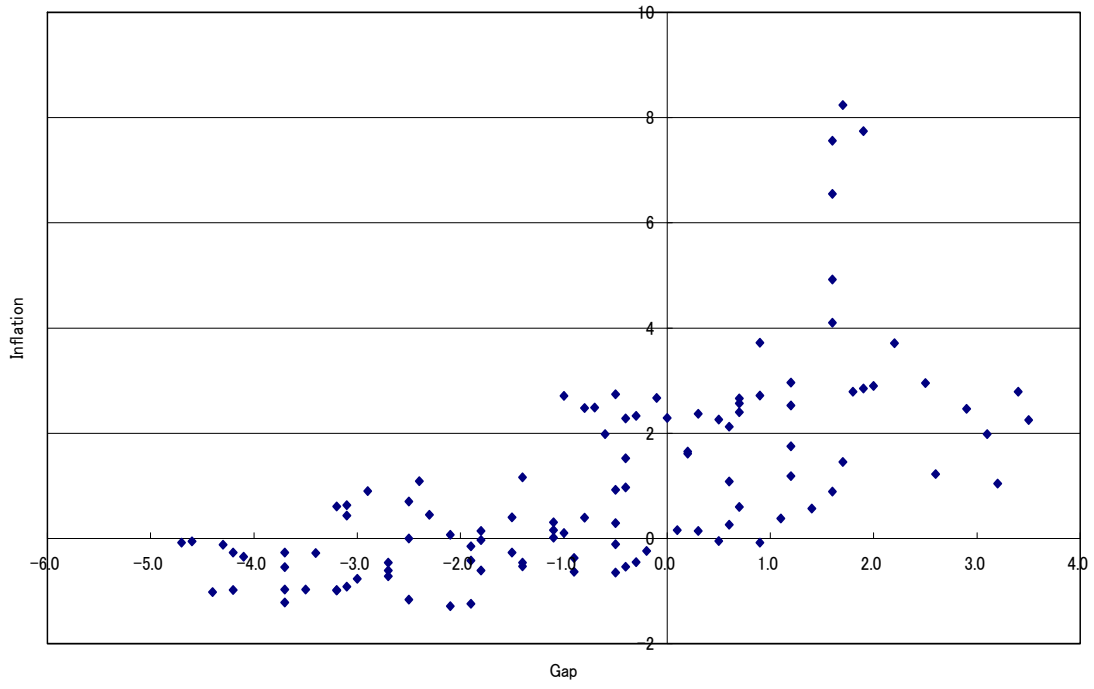


Figure 5 Phillips Curve: 1998-2007

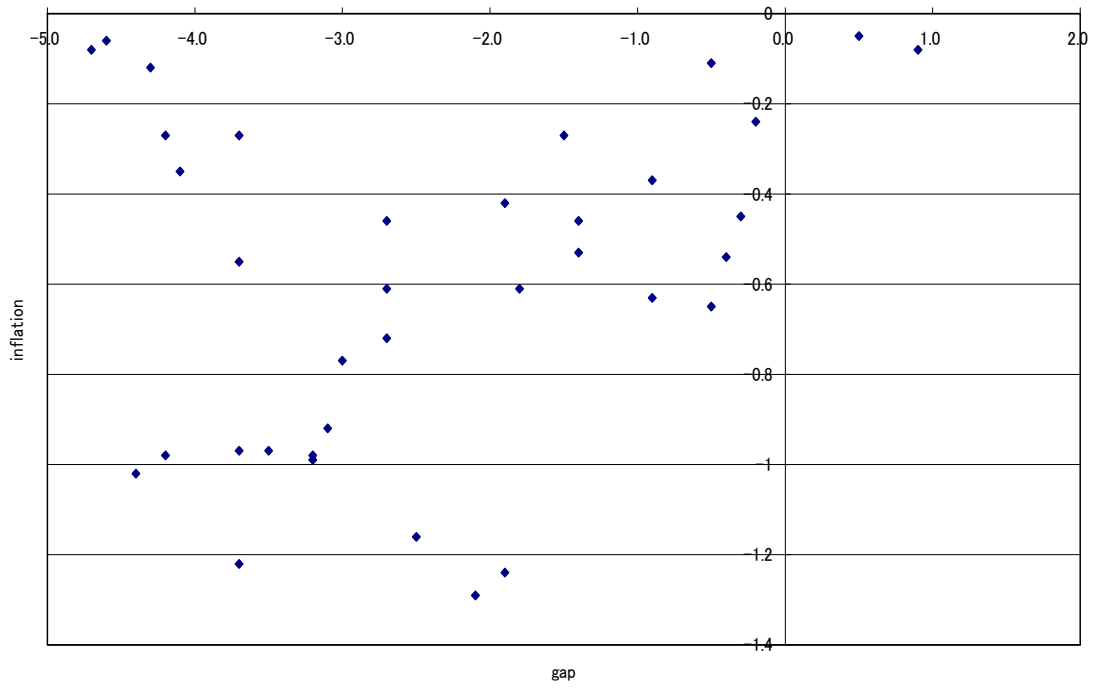




Figure 6 Inflation of the core of the core CPI

