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JAPANESE MONETARY POLICY

RULES OR DISCRETION? PART II

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ABSTRACT

This paper analyzes the conduct and performance of the Bank of Japan's monetary policy over the last 25 years. It is shown that the Bank of Japan's major policy instrument, i.e., short-term interest rate, have responded to a number of variables. The most salient has been the countercyclical response of interest rates to real GDP. The Bank has also paid close attention to exchange rate and current account developments. The adoption of the overly stimulative monetary policy in response to yen appreciation was the major cause of inflation in the early 1970s and the asset price bubbles of the late 1980s. The paper carries out a time series simulation analysis on the performance of base money targeting. It is shown that base money targeting does lead to improvements in inflation and/or GDP performance in certain subperiods of the sample, but that the margin of improvement is fairly small.

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1. Introduction

The two major objectives of a central bank are the maintenance of the stability of prices and that of the financial system. To use harsh language, the Bank of Japan (henceforth, the BOJ) has failed to meet each of the two objectives once during the last two and a half decades. In the early 1970s the rate of inflation rose to levels above 20%. Since 1992 the economy has been suffering from the most serious instability in the financial system since the 1920s. The purpose of this paper is to review the BOJ's conduct of monetary policy over the last two to three decades and discuss the relationship between the two mistakes and the way monetary policy has been carried out.

I emphasize the contrast between a textbook type central bank which sets the money supply to control inflation and/or GDP and central banks in the real world which pursue a variety of policy objectives using mostly interest rates as instruments. Based on some recent literature which describes the behavior of central banks in industrialized countries, especially the Fed, I analyze the behavior of the BOJ in some detail. I show that despite the diversity of the objectives pursued by the BOJ, some distinct patterns can be observed in its behavior. These behavioral patterns of the BOJ are related to the two major monetary problems Japan has faced since 1970.

A brief discussion of the nature of the two monetary problems is in order. The inflation of 1973 and 1974 in Japan was clearly a monetary phenomenon. During the expansion of the economy which started in early 1972, the rate of inflation quickly increased to crisis levels; the rate of increase in the GDP deflator was already 7.4% in 1972:IV, went up to 17.2% in 1973:III right before the oil price increases and to levels above 20% in 1974. Correspondingly, the monetary base was expanding at rates above 15% already in 1971 and at 25% in 1973:II. Clearly, the BOJ had failed to fulfill its responsibility.

The monetary expansion which started in 1986 was a very powerful one with six consecutive decreases in the official discount rate. The monetary base increased at a rate of 13.6% in 1987:III against a real GDP growth rate of 4.1%. The rate of inflation, however, stayed at around 0%. What was inflated was stock and land prices. The Nikkei 225 shot up to 39,000 in December 1989 from about 13,000 in early 1986. The BOJ turned to tightening in May 1989 with an inflation rate of only

2%, bringing the Nikkei 225 down in the summer of 1992 to around 14,000, the level of 1986.

In the early 1990s most people regarded the volatile asset price movements as the formation and collapse of a bubble with no serious real consequences, and praised the BOJ for successful control of the prices of goods. The economy, however, has not fully recovered from the recession which started in mid 1991, despite statements to the contrary by the Economic Planning Agency (henceforth, the EPA). The financial system is suffering from bad loans amounting to about 10% of GDP. The GDP deflator has been growing at negative rates since 1994:II. People have now realized the connection between the speculative boom in the assets markets in the late 1980s, its collapse in the 1990s, the bad debt problem and the volatile movements in monetary policy. The criticism of the BOJ is based on the realization that more stable monetary policy could have prevented both the speculative boom and the bad debt problem.

In the next section, I analyze the BOJ's monetary policy, especially its policy targets and the response of policy instruments to target variables, in a variety of ways. In section 3 I point out that each of the two mistakes of the BOJ led to an interesting debate between academics and the BOJ on the desirability of money growth targets. In section 4, some results of simulation of the performance of money growth target oriented monetary policy are presented. The last section offers some concluding remarks.

2. The BOJ's Policy Targets and Its Reaction Function

In analyzing the behavior of the BOJ it is useful to compare it with that of other central banks. A useful reference point is offered by Bernanke & Mishkin (1992). Some of their conclusions that relate to my analysis are offered here for later reference:

(B-M-1) Central bankers have multiple objectives and a crisis mentality.

(B-M-2) When central bankers' concern about inflation is strong, they are likely to adopt money growth targets, but they do not adhere to the targets strictly. Short-run adherence to money growth targets does not seem to be necessary for inflation control.

(B-M-3) The outcome of monetary policy does not appear to depend much on the operating procedure or the choice of instruments.

2.1 The BOJ's policy instruments and operating procedure

This paper will not discuss the BOJ's policy instruments and operating procedure in detail. A brief discussion, however, is offered by way of introduction.[1]

The major policy instrument of the BOJ has long been short-term interest rates, especially the official discount rate. In a simple minded model of monetary policy, changes in the discount rate would have no significant effects on the economy if discount window lendings are rationed by the central bank, as is the case in Japan.[2] The BOJ, however, has generally moved interbank interest rates such as the call rate and the bills discount rate in line with the official discount rate, and has changed the official discount rate only if a change in interbank rates is of a long-term nature. In this sense, the BOJ's policy stance has been most clearly represented by the official discount rate.

In addition to short-term interest rates, the BOJ relied until 1991 on the so-called "window guidance", i.e., restrictions on lendings of major financial institutions, to supplement its main policy instruments. Window guidance perhaps made the effects of a discount rate change more effective and rapid in the environment of less than perfect flexibility of interest rates. Thus, with most interest rates now freed to move, it is no longer used. The BOJ also used changes in the official reserve requirement ratios for monetary control purposes until the early 1980s.

The BOJ's operating procedure is one of interest rate targeting. Basically, it has supplied as much high powered money or more narrowly reserves as the private sector has demanded at the going interest rate. In other words, in the short run the BOJ has paid attention to interest rate stability. It has never adopted monetary base targeting or money supply targeting. I offer some evidence on this point in section 2.4 below.

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[1] For detailed discussions, see Okina (1993) and Ueda(1993a).

[2] There has been an important change in the BOJ's operating procedure recently. Since March 1995 the BOJ has moved the call rate in advance of a discount rate change. Moreover, since July 1995, the call rate has been below the discount rate, making it difficult for the BOJ to use the discount window for base money control. It remains to be seen whether these changes in the relative importance of instruments and in the operating procedure are permanent.

In what follows I let short-term interest rates, the official discount rate and the call rate, represent the BOJ's monetary policy stance.

2.2 Cyclical Changes in the Stance of Monetary Policy

Among the many targets of central banks, perhaps the most important in normal times has been the state of the economy, or more specifically, the GDP gap. The BOJ is no exception.

Romer & Romer (1994) have shown that the Fed has responded to the US business cycle very consistently. That is, the federal funds rate decreases quickly and significantly once the economy passes its peak. Conversely, after a trough in the economy the Fed tightens without too much delay.

Table 1 presents the same analysis as Romer and Romer for the downturns of the Japanese economy during the last 40 years. The entries in the table are changes in the official discount rate and the call rate in each quarter. The top row of the table shows the date of the peak of each cycle.

With only a few exceptions the rates decline once the economy passes its peak. Some differences between the US and Japan are: in the US interest rates have declined without exception during recessions, while this is not the case in Japan. The size of the decline in rates is larger for the US; the average decline in the federal funds rate between the peak and trough is 3.4 percentage points, while the corresponding figure is -.9 percentage points for the discount rate and -1.7 percentage points for the call rate. The BOJ also responds with some lag to downturns, while the Fed's response is immediate.[3] It is ironic to observe that one of the few exceptions to the declining pattern of interest rates during recessions is the period after the peak of 1973. Despite the maintenance of interest rates at high levels, the rate of inflation went up. This implies that policy was too expansionary before the peak.

Table 2 does the same for recovery periods. Here, no distinct patterns emerge. Unlike in the US, interest rates do not seem to rise as the economy passes its trough. If anything, the rates seem to keep

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[3] Another difference not shown in the table is that in the Japanese case real interest rates do not show as clear a pattern of decline during downturns. This is perhaps due to regulations that existed during most of the sample period which had limited the flexibility of interest rates.

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declining for a while after the trough. The most significant is the current period. Almost two years have passed since the last trough; but the discount rate is still being cut. This indicates the seriousness of the current recession.[4]

The analysis shows that the BOJ responds consistently to movements in real GDP, lowering rates in recessions and increasing them in recoveries. But the rates increases seem to come fairly late during recoveries. Thus, (B-M-1), i.e., the hypothesis that central banks respond to variables in crisis situations, does not seem to apply to the case of real GDP.

2.3 Motivations for the BOJ's Policy Changes

The last section has shown that the BOJ carries out a countercyclical policy to a certain extent. I now show that this has in fact been the BOJ's intention by reference to statements by the chairman of the BOJ's policy committee at the time of policy changes.

In Table 3 I have summarized the statements to highlight the motivations for discount rate changes. The first column represents periods of consecutive changes in the discount rate in one direction. The direction of change is shown in the second column. For each of the target variables, "A" means that it was the major concern of the BOJ at the time of the rate change. "B" means that it was mentioned as a motivation for policy change. An "A'" is in between "A" and "B". An "X(Z)" is meant to imply that the variable was regarded as important as a cause of the movement in Z. An "R(Z)" means that the policy in the previous period is reversed because the BOJ has successfully controlled movements in Z. I have used many judgments and discretion to arrive at this table. For example, some of the statements have been ignored either because the logic presented was not clear cut or because the variable did not seem to be as important as other variables.

The table shows a number of interesting things about the BOJ's behavior. First, as with other central banks, the BOJ's policy depends much on real GDP and inflation. Second, it has also paid attention to the current account and the exchange rate. Third, there is some evidence that the money

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[4] The US experienced a similar period in the early 1990s.

supply has been watched since the late 1970s. Fourth, consideration of the stability of the financial system has been an important motivation for policy changes since 1989.

More specifically, the first two rows represent the typical BOJ behavior during the 1950s and 1960s. The major target of policy was the current account. The BOJ tightened when the current account recorded a deficit and loosened as the current account improved.

Since 1970, most of the interest rate reductions have been partly motivated by a concern for GDP, an observation consistent with the analysis of the last section, and most of the upturns by a concern for inflation.

Importantly, most of the reductions in rates since 1970 have been motivated also by exchange rate and/or current account movements. It may be seen from Figure 1 that these are the periods of a current account surplus and a sharp appreciation of the yen. An interpretation of the BOJ's behavior is offered below.

2.4 The BOJ's Policy Reaction Function

A more formal approach to identifying policy targets of a central bank is to estimate the bank's reaction functions. This approach involves an inherent difficulty; i.e, target variables themselves are dependent on policy decisions, thus creating simultaneous equations bias when a policy variable is regressed on targets. Here, I offer a brief survey of the literature and present estimation results of several BOJ policy reaction functions, without pretending that these are the best equations one can find.

Among recent attempts at estimating the BOJ's reaction functions, Hutchison (1988) finds that the call rate responds significantly to the exchange rate and to some extent nominal income (as proxied by retail sales), but not to the difference between the actual money supply growth and the BOJ's forecasts for the period of 1973–1985. The last result shows that the forecasts are not a policy target. Okabe (1992) finds that the determinants of the call rate are inflation, the exchange rate, and the current account for the period of 1975–1990. In the following I update these results and offer some new insights.

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In Table 4 some estimates of the BOJ's policy reaction functions are presented. The equations are not derived from the maximization of an objective function of the BOJ, but are more or less in line with previous analyses of the reaction functions. In all cases the stance of policy is assumed to be represented by the call rate. All the independent variables are lagged by one period to alleviate the problem of simultaneous equation bias.

Equations 1 & 2 compare the policy stance before and after the first "oil shock". This division also roughly corresponds to the division between the fixed exchange rate and flexible exchange rate periods. The GDP gap variable has a wrong sign in equation 1. The current account has a strong effect on the call rate, as expected from the discussion in the previous section. For the post first "oil shock" period, all the three variables are significant and have correct signs. Thus, before 1974, monetary policy, as a first approximation, responded only to the current account, while since then it has responded also to inflation and GDP developments. The effect of the current account on monetary policy, however, remains surprisingly strong even after the adoption of the flexible rate.

Equation 3 uses a result of the BOJ's short-term survey of major enterprises as a proxy for GDP gap. This variable is carefully watched by the BOJ and may be a better indicator of the state of the economy. The equation includes the exchange rate as well. The result is not very different from equation 2, with the exchange rate being insignificant. This could be a result of high correlation between the exchange rate and the current account. In equation 4, we add the forecast errors of the money supply, calculated by using the BOJ's forecast of the money supply. If the forecasts are in fact policy targets, the call rate should respond positively to the error. The response is positive, but insignificant. Thus, we find no evidence for a target-like role for the money supply forecasts.

Finally, in equation 5, we do something more precise. That is, the response of the call rate to inflation and the business cycle is assumed to be non-linear, or piecewise linear. The estimation result shows that the BOJ does not respond to inflation unless the rate of inflation exceeds 5%. [5] This is

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[5] It would be interesting to estimate the threshold above which the BOJ responds to inflation. Here the threshold value is just assumed. Some preliminary estimations using a grid search method indicated that the threshold value could be much larger than 5%, for example 8.5%.

consistent with the hypothesis (B–M 1) that central banks respond to some of the target variables only at crisis levels. The result also shows that the call rate does not respond significantly to BOJ3, i.e., it does not go up in the early stage of a recovery, although at other times it moves procyclically. This accords exactly with the finding in section 2.1 that, unlike the Fed, the BOJ does not raise interest rates quickly after the trough of the business cycle. Given that the BOJ has succeeded in controlling inflation since the mid 1970s, this finding probably implies that a quick move to monetary tightening in economic recoveries is not a necessary condition for inflation control.

2.5 Summary and Interpretation

The foregoing analysis of the BOJ's policy targets and the pattern of response to the state of the economy can be summarized as follows. The BOJ carries out a feedback type policy in the sense that it increases (decreases) interest rates as the GDP gap shrinks (widens) and the rate of inflation rises (declines). The response, however, is non-linear in that short-term interest rates rise only when the inflation rate is very high and or in the later stages of economic recovery. The BOJ also watches the exchange rate and the current account carefully, but does not seem to have any money growth targets.

These findings roughly match the B–M hypotheses. As with (B–M–1), the BOJ pursues many targets. It has a crisis mentality especially with respect to inflation. Although the BOJ has not adopted money growth targets as in (B–W–2), it has started to pay attention to money growth since the inflation of the early 1970s. The BOJ, however, seems to respond to the state of the business cycle continuously with the exception of the early stages of a recovery, as does the Fed.

What can we make of the BOJ's significant response to the current account and the exchange rate after the mid 1970s? The following interpretation was offered in Ueda (1993), and I still believe that it is not far off the mark. The interpretation is succinctly summarized in Figure 1. It presents the current account relative to GDP, (–1) times the share of investment in GDP[6] , the rate of change in yen per dollar, the rate of change in the Nikkei 225 and the timing of shifts in monetary policy. An

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[6] The average has been adjusted to equal zero.

"L" stands for the first lowering of the discount rate after a period of tight monetary policy. A "T" stands for the first increase in the discount rate after a period of loose monetary policy. An exception is early 1986, when an L appears after an L, because there was no tightening in-between.

The chart reveals clearly that all these variables are closely related. The interpretation of the relationships offered in Ueda (1993) is as follows. A current account surplus causes an appreciation of the yen. It also worsens trade conflicts. The presumption has been that an appreciation of the yen exerts a strong deflationary impact on the economy. The public calls for measures to increase aggregate demand and reverse the trend of the exchange rate. Foreign governments also ask for an expansionary macro-policy. For these reasons, interest rates are lowered, leading to increases in asset prices and, with a lag, to a rise in investment and a worsening of the current account. There is, of course, the question why the BOJ wants to expand if one of the policy targets is to create a worsening of the current account. It could be that a monetary expansion leads to a worsening of the current account through expansion of domestic demand, which outweighs the effect of exchange rate depreciation.

The figure shows that the above pattern has been repeated four times in the last 25 years, the early 1970s, the late 1970s, the mid to late 1980s and the mid 1990s. The only deviation from the pattern is that in the mid 1990s we did not see an increase in stock prices. This interpretation of the variables in the figure will prove important in evaluating the performance of the BOJ's monetary policy.

3. The BOJ's Mistakes and Money Supply Controversies in Japan

3.1 Causes of the Failure of Monetary Policy

During the last three decades, the BOJ has made two major mistakes. First, it allowed the rate of inflation to surge to levels above 20% in the early 1970s. Second, it sat back and watched the Nikkei Dow go up to near 40,000 in 1989. The rise in land and stock prices looked all right for a while, apart from the arbitrary reallocation of wealth. But the monetary tightening in the early 1990s led to a sharp collapse of what was perhaps a bubble and has thrown the Japanese financial system into the worst

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crisis in the post war period. Thus, the BOJ has made two most serious mistakes, creating inflation and creating financial instability.

The source of the mistakes can be inferred from the interpretation of the correlation between the exchange rate, the current account and monetary policy offered in the last section.[7] Most easing of monetary policy during the last two and a half decades was prompted by a large current account surplus and exchange rate appreciation. The BOJ was worried about the deflationary impact of the yen appreciation on the economy and concerned about trade conflicts brought about by large surpluses. These considerations led to the adoption of excessively loose monetary policy in the early 1970s and the mid 1980s.

One of the sources of the mistakes is that the BOJ, or whoever put pressure on the BOJ, overestimated the deflationary impact of the appreciation of the yen. In the last section some evidence was presented for the BOJ's reliance on its short-term survey of enterprises for its policy decisions. The survey asks the enterprises to report their estimates of business conditions in the next quarter as well as their judgment of business conditions in the current quarter. This allows the calculation of expectational errors of business conditions. Figure 2 shows that underestimates were large in the three periods of loose monetary policy between 1970-1990. Each period of underestimation of business conditions came immediately after a sharp appreciation of the yen. In all three periods interest rates were lowered. In the late 1970s, however, the second round of oil price increases had forced the BOJ to tighten relatively early.

In each case, a move to tighter monetary policy was delayed by political interventions. In the early 1970s pressures to maintain an expansionary stance came from the then prime minister Tanaka. In the late 1980s international policy coordination and the existence of large fiscal deficits put strong pressures on the BOJ to expand.

The above consideration suggests that the two mistakes of the BOJ are typical of the problems inherent in a discretionary approach to policy making. Policy makers can misjudge the state of the

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[7] The discussion which follows is more fully developed in Ueda (1993b).

economy. Under discretion, politicians and others find it easy to intervene in a central bank's policy making.

A short comment on the current situation is in order. Since 1991, the current account surplus has increased. The yen has gone up. And the BOJ turned to loosening in the middle of 1991. All much the same as before. Land and stock prices, however, have stayed stagnant; and the economy has not shown a strong recovery. The pace of reductions in the current account surplus has been slow. Underlying these deviations from the previous pattern has been the bad debt problem of the Japanese financial system.

3.2 Money Supply Controversies in Japan

The assertion that money growth targets are necessary is a recurrent theme in monetary economics. It is interesting to observe that this assertion has surfaced in Japan each time the BOJ's policy has gotten into trouble.

The inflation in the early 1970s naturally gave rise to a series of papers attempting to analyze its causes. Kanemitsu & Komiya (1974) criticized the BOJ's policy most clearly. They asserted that the inflation was caused by excessive money supply growth, which was in turn a result of the BOJ's decision to increase the growth rate of high powered money. They did not go so far as to propose a money growth target. The implication, however, was clear that more attention to indicators such as the money supply or monetary base was desirable. In his paper Toyama (1980) of the BOJ criticized Kanemitsu & Komiya claiming that monetary base is an endogenous variable. Therefore, according to him, the high growth of monetary base was a result, not a cause, of inflation.

Given the operating procedure of the BOJ, Toyama was partly right in that at least part of the monetary base was endogenous and its high growth was a result of inflation. This does not mean, however, that the BOJ was not responsible for the inflation of the period. The BOJ could have increased interest rates earlier than it did. Kanemitsu & Komiya might have agreed with this, but they went further and pointed to the usefulness of paying more attention to the money supply.

In the aftermath of the bursting of the bubble of the late 1980s, the recession which started in

1991 has been characterized by very low growth rates of the money supply. For example, the growth rate of M2+CD in 1991 was 2.6% against 6.3% growth of nominal GNP, and in 1992 money growth decreased to 0.1% while GNP grew at 2.6%. Iwata (1992) criticized the BOJ for allowing the money supply to grow at such low rates and proposed that the BOJ set money or high powered money growth targets. McCallum (1993) also advocated use of base money targeting, showing that such a policy would have enhanced the stability of nominal GNP. Okina's reaction(1992) was in a sense similar to that of Toyama. He argued that given the BOJ'S current operating procedure, monetary base was an endogenous variable rather than a policy instrument. The BOJ can set interest rates so as to hit money supply targets, if this is desirable.

The debates involve two issues: first, whether or not a money growth target is a good thing; second, given a money supply target, which would be the optimal operating procedure, use of interest rates or the monetary base. If (B–M–3) is correct, the second question is rather unimportant. I would like to stop here and in the next section look at the performance of a version of the base money targeting.

4. Would Money Growth Targets Have Prevented the BOJ's Mistakes?

Given the two serious mistakes committed by the BOJ and the ensuing claim that the adoption of a money growth target was appropriate, an interesting question is whether a money growth target would have prevented the BOJ from making the mistakes.

As far as I know, the only study that comes even remotely close to addressing this question is McCallum (1993). He advocates using the monetary base for nominal income growth targeting. McCallum supports the use of the monetary base not for meeting money supply targets, but for meeting nominal income targets.

More specifically, he considers the effect on nominal income stability of the adoption of a rule that dictates that base money grow at a constant rate with adjustments for changes in the demand for monetary base and for deviations of actual income from target income. Based on a simple time series analysis, he concludes that such a rule would have increased the stability of income.

In what follows I use a variation on the McCallum approach to address a more specific question of what would have happened in the two periods of monetary instability, the early 1970s and the period since the late 1980s. The method of analysis is a simple one. Given that the variables we are interested in are inflation and stock prices, I run a simple three variable VAR, real GDP, GDP deflator and an index of stock prices, with monetary base added as an exogenous variable to the system. Then, a policy reaction function which entails base targeting is introduced and its effect on the paths of the three variables is analyzed.[8] In the simulation, the system is shocked by the residuals of the estimated VAR system.

More specifically, the data used are seasonally adjusted real GDP, GDP deflator, Nikkei 225 and seasonally adjusted monetary base. Monetary base is currency in circulation plus bank deposits at the BOJ with the latter adjusted for changes in the official reserve requirement ratio by the same method as used by McCallum. [9] Estimation is carried out using quarterly data for the period 1967:1 to 1995:1. Each variable is first differenced after being logarithmically transformed.

The results of estimation are shown in Table 5. The right hand side variables are two lags of the three variables and the current value of and two lags of the monetary base. The specification is similar to that of McCallum with the exception of the choice of variables. The monetary base is significant only at very high levels of significance with the exception of the stock price equation. The inclusion of the current value of the monetary base raises some doubt about possible simultaneous equation biases. Such biases could be especially serious given the partial lagged reserve accounting system used in Japan. In fact, when only lagged values are included, the monetary base was not even significant in the stock price equation. I choose, however, to work with the system in Table 5. My major

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[8] Needless to say, a more desirable approach would be to use a large macroeconometric model of the economy to study the effects of policy change. An ideal macromodel, however, does not seem to exist at the moment. A more serious criticism of the approach used would be that a switch to a monetary base growth rule would change the VAR system significantly. Therefore, the coefficients estimated using past data would be useless for simulation. I accept this criticism but present the results of the above simple minded simulation for want of a better alternative.

[9] Monetary base is the average of monthly data The monthly series is for end of month, seasonally adjusted at the monthly level. Use of the average of daily data was also attempted. The VAR coefficients changed significantly. The simulation results, however, did not change much.

conclusion will be that monetary base targeting is not as ideal as one would like it to be. Consequently, the use of a system like the one in Table 5 which shows strong effects of the monetary base would reinforce my conclusion.

The next step is to simulate the model with the McCallum type base money supply rule. The rule is:

$$db = a + c^* \; (b(-1)/y(-1) \; - b(-17)/y(-17))/16 \; + d^*(y^* - y) \qquad (1)$$

where b is the monetary base, y is GDP and y* is the target GDP. The first term on the right hand side of equation (1) represents a target growth rate for nominal GDP and monetary base. The second term is adjustment for changes in money demand, and the third term is the response of the base to deviations of GDP from the target level. The target GDP, y* is assumed to grow at a constant rate.

The first exercise I carry out is to determine whether the above rule would have allowed the BOJ to avoid the inflation of the early 1970s. I simulate for the period 1969:1 to 1975:4 using the model What matters is the setting of the initial date and the target growth rate. I have chosen the starting date well in advance of the inflation of the 1970s in order not to miss the effects of shocks on the inflation rate that took place before the inflationary period.

Even under a money supply growth rule, it would be unrealistic to assume that the target growth rate stays constant for decades. The target rate would be adjusted to changes in the expected growth rate of potential output and the target rate of inflation. As a proxy for the expected medium-term growth rate of the economy, I use a survey carried out by the EPA. The survey asks corporate executives at what rate they think the economy will grow for the next three years. Unfortunately, the survey started in 1974. But there is one observation for 1966, which is 10.7%. I thus assume that the target nominal GDP growth rate is 13.7%, which is 10.7% plus a 3% rate of inflation. The target inflation rate could instead be 2% or 4%, but it does not make much difference.

The simulated inflation rate is shown in Figure 3 with a tag of 13.7%. Clearly, the inflation rate is lower along the simulated path. But the difference is not as large as one would have hoped. At the

peak the simulated inflation rate is around 18%, while the actual rate is about 22%. This rather disappointing result comes from the third term of equation (1). Actual GDP did not grow as fast as 13.7%, creating a large gap between actual and target GDP. [10] This raises the obvious point that the performance of a rule like (1) depends much on the assumed medium–term growth rate of the economy.

One alternative is to make the base money rule literally of a constant growth rate type, by assuming that c and d of (1) are zero. The simulation result with this assumption is shown in the same figure with a tag of "constant, 13.7%." The difference between the actual and simulated paths is now much larger. Moreover, the difference is more striking for the pre–"oil shock" years. That is, until the third quarter of 1973, the "constant, 13.7%" path stays below 10%, but the actual and the "13.7%" paths are above 10% already in the second quarter of 1973. The chart also presents the result of the application of the strict constant base growth rule with a growth target of 9.4% for nominal GDP and monetary base with a tag of "constant, 9.4%." This rate corresponds to a 6.4% estimate of the three year growth rate of real GDP at the beginning of 1974 in the EPA survey, plus a 3% rate of inflation. The entire path shifts downward by about two to three percentage points. Inflation is very much under control until 1973:III, but not in 1974, the year of oil price increases. [11]

Obviously, any decreases in the rate of inflation on the simulated path do not come without costs. In Figure 4 the paths of real GDP growth are shown. With some exceptions, the growth rate of GDP is much lower for the simulated paths. Probably the large negative growth rates for the simulated paths would have been politically unbearable.

To summarize, the strict constant base money growth rule would have prevented the demand–pull inflation until late 1973, but not the inflation created by the oil price increases. Allowance for adjustment of base growth to GDP gap seems to deprive the base money rule of the ability to prevent

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[10] More precisely, the estimated negative shocks to GDP in the VAR system hold down the levels of GDP in the simulated path as well.

[11] Application of equation (1) with a 9.4% target growth rate creates a path that falls roughly between the constant 13.4% and the constant 9.4% cases for both inflation and real GDP.

even the demand–pull inflation of 1973, depending on the assumed growth rate. In addition, real GDP growth rates would have been lower than the actual ones under any version of the base money rule that has been analyzed here.

Next, I carry out the same type of simulation for the period 1985:1 to 1995:1. The target growth is again assumed to equal the expectation of corporate managers as surveyed by the EPA. As of 1985 the expected growth rate was 4.4%. I add an inflation rate of 2% to arrive at 6.4% for the target growth rate for nominal GDP and monetary base. Given the possible relationship between volatile asset price movements and the instability of the financial system in the 1990s, the variable which is of interest in our context is stock prices. A more stable path for stock prices would have probably meant a more stable financial system.

As can be seen from Figure 5, the base supply rule as represented by equation (1) gives rise to about the same degree of stock price volatility, shown with a tag of "6.4%", as we have seen. The peak in the Nikkei 225 around 1990 is almost 20% higher than the actual peak. The bottom in 1992 is correspondingly higher, leaving the volatility at about the same level. The major reason is again that the 6.4% target rate is much higher than the actual growth rates in 1986 & 1987, 4.4% & 4.1%, making the third term of equation (1) very large.

The use of the strict constant monetary base growth rule, shown with a tag of "constant, 6.4%," creates more stable stock price movements. The peak in 1990 is slightly lower than the actual peak. On the other hand, after 1991 the simulated path stays above the actual path. The volatility of the simulated path is still high. The rate of decline in the Nikkei 225 from the peak in 1990 to the bottom in 1992 comes close to 50%. Naturally, one would doubt whether such a small decrease in volatility would have prevented the financial system from facing the serious instability problem it faces now.

Turning to GDP growth, we find that the simulated paths do better than the actual path. This is more evident for the strict rule. The GDP growth rates are higher for both simulated paths after 1992. The reason for this is clear. The recession since 1992 has "coincided" with very low growth rates of the monetary base. A base supply rule such as (1) avoids as sharp a decrease in base money growth as has actually happened.

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The conclusion of the above analysis seems to be that under reasonable assumptions about the target growth rate of GDP it would have been very difficult for the base rule to avoid the asset price volatility we observed, although the volatility would have been lower for both real GDP and assets prices. This gives some mild support to rule based policy.

The less satisfactory performance of the monetary base targeting in the early 1970s probably comes from the supply shock nature of the inflation. The instability of the 1980s and 1990s may have been a more monetary phenomenon. Thus, the base rule does better.

5. Concluding Remarks

Using the language of Bernanke & Mishkin (1982), the BOJ has responded to a number of policy targets. The most consistent pattern in the BOJ's behavior, and for that matter, in the Fed's behavior as well, has been that interest rates are lowered in recessions and raised, with a lag in Japan, in recoveries. The BOJ has also carefully watched the movements in the current account and the exchange rate. During the downturns since 1970, the concern for the current account and the exchange rate has played a dominant role in the BOJ's policy decisions. The reason for the concern has been partly political and partly to use them as indicators of future GDP.

The BOJ has a crisis mentality as do other central banks, especially with respect to inflation and the instability of the financial system. Unfortunately, the BOJ created (or did not succeed in preventing) a crisis situation with respect to inflation in the early 1970s and with respect to the financial system in the early to mid 1990s. In retrospect, the two crises may have been related to the BOJ's excessive response to the current account and the exchange rate.

The performance of an alternative policy approach, base money targeting has been analyzed. It has been shown that it does not outperform the actual BOJ' policy in the Pareto sense, but that it leads to improvements in certain cases. The improvements, however, do not seem to be large enough to persuade the BOJ to forego the merits of the current discretionary approach, i.e., flexibility.

Table 1: The Discount & Call Rates in Recessions

		Jun-57	Dec-61	Oct-64	Jul-70	Nov-73	Jan-77	Feb-80	Jun-85	Apr-91
IK	Quarter after Peak									
	1	0.297	0	-0.333	-0.177	1.783	-1.191	2.038	0	0
	2	0	0	-0.409	-0.27	0	-0.41	-0.342	0	-0.5
	3	0	0	-0.353	-0.201	0	-0.538	-1.017	-0.461	-0.272
	4	-0.104	-0.401	0	-0.279	0		-0.547	-0.929	-0.728
	5				-0.089	0		-0.844	-0.11	-0.75
	6							0	-0.332	-0.359
	sum	0.193	-0.401	-1.095	-1.016	1.783	-2.139	-0.712	-1.832	-2.609
IC	1	1.88667	0	-2.55	-0.5	2.63367	-1.388	3.2961	0.18546	-0.04887
	2	-1.83	0	-1.22	-0.66667	0.09666	-0.04666	-0.40784	1.0278	-0.77093
	3	0	0	-0.73	-0.75	0.86367		-0.613	-2.05566	-1.22883	-0.80586
	4	-0.73	0.12333	-0.61	-0.33333	-0.16767		-1.49287	-1.61727	-0.91154
	5				-0.724	-0.00466		-1.39527	0.1268	-0.86304
	6							0.13087	-0.4418	-0.47877
		-0.67333	0.12333	-5.11	-2.974	3.42167	-2.04766	-1.92467	-1.94784	-3.87901

IK: The Discount Rate
IC: The Call Rate
Entries are interest rate changes over a quarter

Table 2: The Discount and Call Rates in Recoveries

		Jun-58	Oct-62	Oct-65	Dec-71	Mar-75	Oct-77	Feb-83	Nov-86	Nov-93
IK	Quarter after	-0.729	-0.378	0	-0.484	-0.55	-0.133	0	-0.374	0
	Trough	-0.262	-0.606	0	-0.038	-0.716	-0.617	0	-0.294	0
		-0.166	-0.075	0	-0.462	-0.984	0	-0.217	0	0
		-0.199	0	0	0	-0.25	0	-0.283	0	0
		0	0.112	0	0	0	0	0	0	0
		0.119	0.618	0	0.918	0	0.618	0	0	-0.75
sum		-1.237	-0.329	0	-0.066	-2.5	-0.132	-0.5	-0.668	-0.75
IC		-0.85	-0.73	0	-0.40067	-1.598	-0.11234	-0.44474	-0.1227	-0.22255
		-1.15333	-0.97333	0	-0.31033	-0.81367	-0.635	0.26784	-0.71626	-0.14933
		0.12	0.12	0	-0.35033	-2.352	0.25967	-0.1751	-0.03284	0.02359
		0	0.24333	0	0.022	-1.00667	-0.13567	-0.1019	0.27604	0.13312
		0.06333	0.67	0.12333	0.70233	-0.293	0.19867	-0.33747	-0.0364	-0.0483
		0	1.52334	0	0.94033	0.327	0.68973	0.30847	-0.1562	-0.835
sum		-1.82	0.85334	0.12333	0.60333	-5.73634	0.26506	-0.4829	-0.78836	-1.09847

Table 3: Motivations for Discount Rate Changes

	DIRECTION	Y	P	NX	e	Money	Stability
67.9-68.1	UP	X(NX)		A			
68.8	DOWN			R(A)			
69.9	UP	X(P)	A				
70.5-72.6	DOWN	A			X(Y)		
73.4-73.12	UP		A				
75.4-78.3	DOWN	A	R(A)	A	X(Y)		
79.4-80.3	UP	X(P)	A	X(e)	A',X(P)	B	
80.8-81.12	DOWN		R(A)				
83.10-87.12	DOWN	A		A	A		
89.5-90.8	UP		A			B	A
91.7-93.9	DOWN	A	R(A)	B	B		A',B

Direction:direction of the discount rate change
Y:GDP
P:inflation
NX:the current account
e:the exchange rate
Money:the money supply
Stability:the stability of the financial system

Entries mean:A, major motivations;B, important factors;
X(Z),the variable is of concern because it affects Z;
R(A),reversal of previous move

TABLE 4: THE BOJ'S REACTION FUNCTION

	DP	GAP	BOJ	E	NX	DM-DM*	IC(-1)	R2	DW
1 56:3-74:4	11.9	-9.4			-73.6			0.525	0.346
	2.47	-2.02			-5.55				
2 75:1-95:1	37.3	25.8			-90.2			0.686	0.315
	5.51	4.39			-7.99				
3 70:4-95:1	6.63		0.0144	0.293	-29.6		0.682	0.95	1.99
	2.09		4.55	0.848	-3.65		10		
4 79:3-95:1	-13		0.0138	1.346	-35.8	0.0492	0.638	0.949	1.88
	-1.16		3.53	2.68	-4.29	0.386	5.34		

	DP+	DP-	BOJ1	BOJ2	BOJ3	BOJ4	NX		R2	DW
5 70:4-95:1	7.27	4.05	0.0163	0.0151	0.131	0.009	-28.8	0.708	0.95	1.99
	2.27	0.183	2.48	1.91	1.98	1.15	-3.37	10		

NOTES:1, DP:GDP deflator inflation rate,relative to one year before.
GAP:GDP gap, with full-employment GDP estimated to be exponentially linear
  with a kink in time trend at the end of 1973.
BOJ:Business conditions, favorable-unfavorable,from the BOJ's Short-Term Econ. Survey.
E:Log of the yen price of the dollar.
NX:Current account/GDP.
DM-DM*:One year growth rate of M2 minus its forecast
DP+:DP if annual inflation rate is above 5%, otherwise 0.
DP-:DP-DP+.
BOJ1:BOJ if BOJ is above zero and is increasing, otherwise zero.
BOJ2:BOJ if it is above zero and decreasing, otherwise zero.
BOJ3:BOJ if it is below zero and decreasing, otherwise zero.
BOJ4:BOJ if it is below zero and increasing, otherwise zero.
  2, The dependent variable is the call rate, IC. All equations include a constant. Equations
     3-5 are estimated with correction for first order serial correlation.
  3, Numbers in italics are t-statistics.

Table 5 Real GDP, GDP Deflator and Stock Price Equations

	dy(-1)	dy(-2)	dp(-1)	dp(-2)	ds(-1)	ds(-2)	db	db(-1)	db(-2)	R2
dy	0.0841	0.305	-0.167	0.0601	0.0401	-0.00752	0.0948	0.00793	0.0656	0.334
	0.901	3.18	-1.25	0.469	2.77	-0.527	1.62	0.133	1.09	
dp	-0.0952	0.143	0.474	0.272	0.00752	0.00173	0.0578	0.0154	0.0583	0.686
	-1.45	2.11	5.06	3.01	0.738	0.172	1.41	0.366	1.38	
ds	-0.975	0.355	-1.31	-0.151	0.363	-0.188	1.08	0.689	-0.323	0.236
	-1.49	0.528	-1.41	-0.168	3.58	-1.88	2.63	1.65	-0.769	

Notes: 1, Notations are y:real GDP, p:GDP deflator, s:Nikkei 225, b:the monetary base,
  and d( ) is the long difference operator.
  2, The numbers in italics are t-statistics.
  3, The equations include a constant term not shown in the table.
  4, The sample period is 1967:3 to 1995:1.

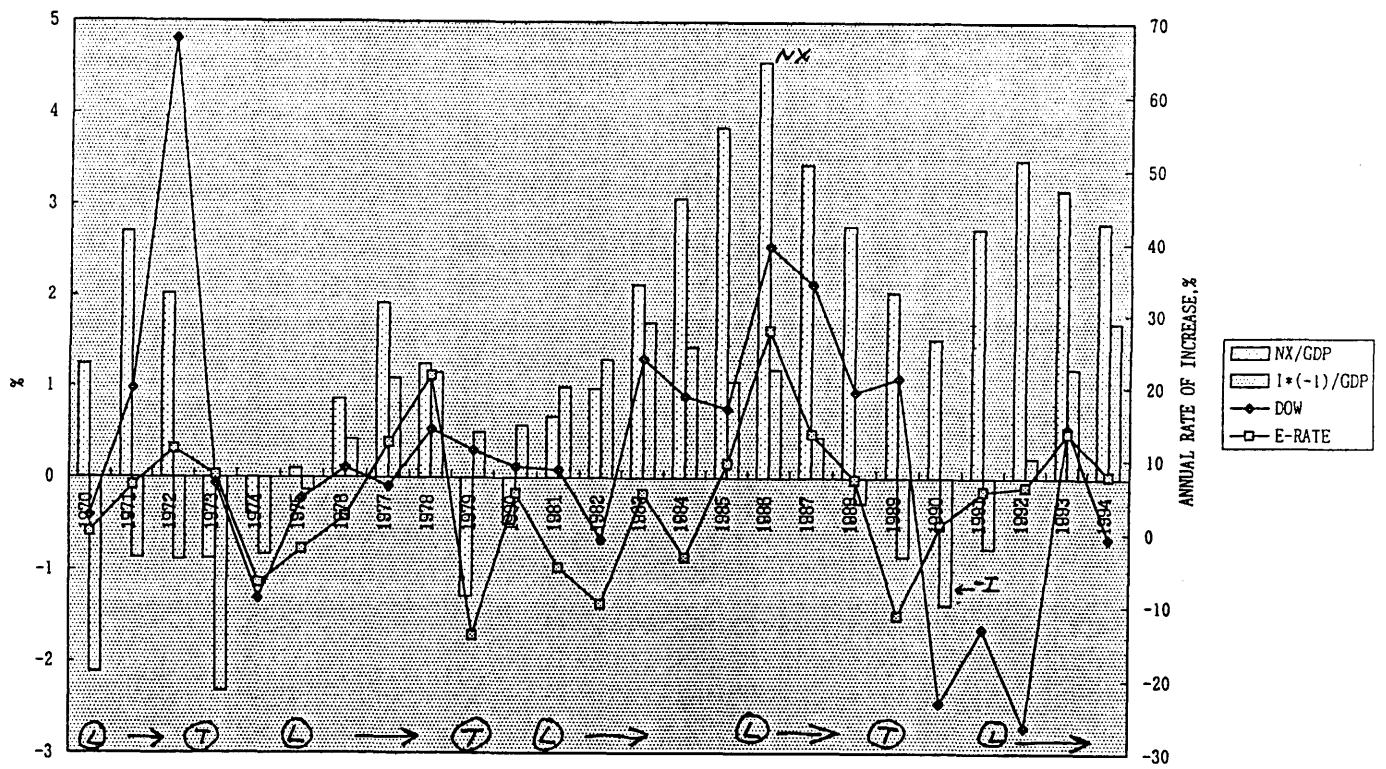Figure 1   MONETARY POLICY & MACRO-FLUCTUATIONS

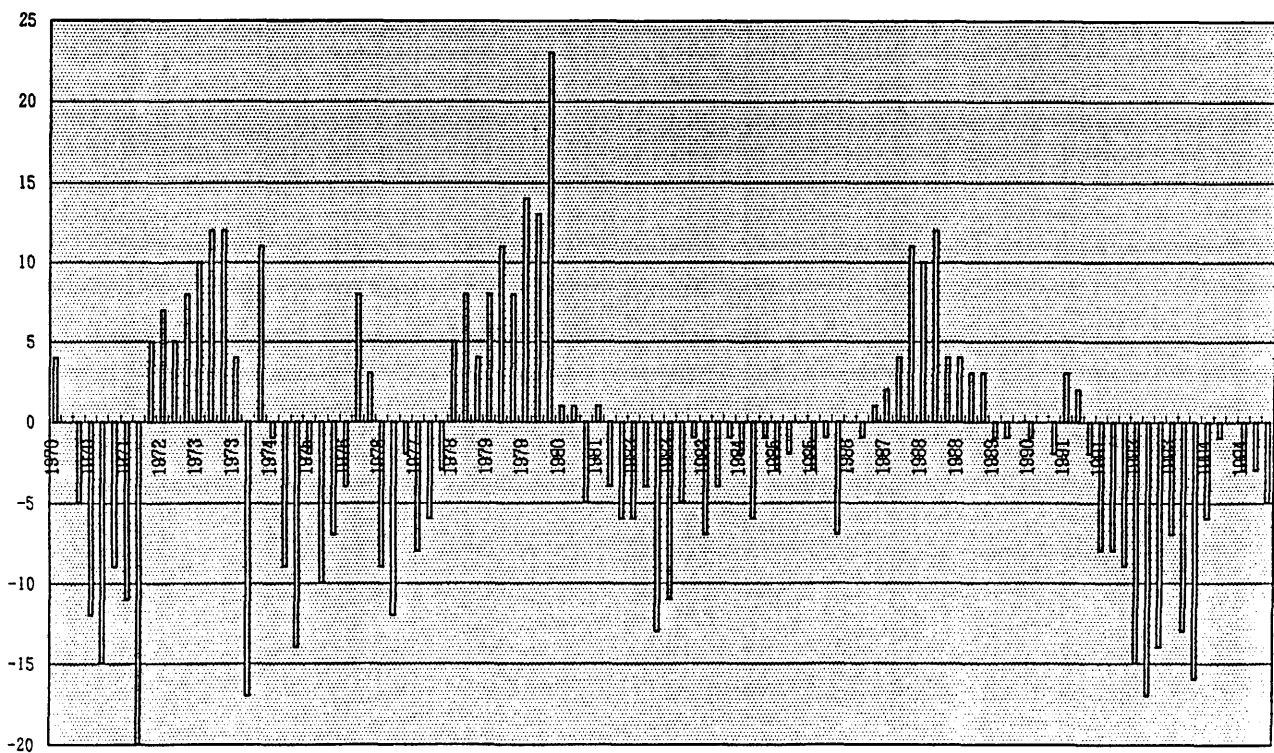Figure 2 Underestimates of Business Conditions By the BOJ Survey

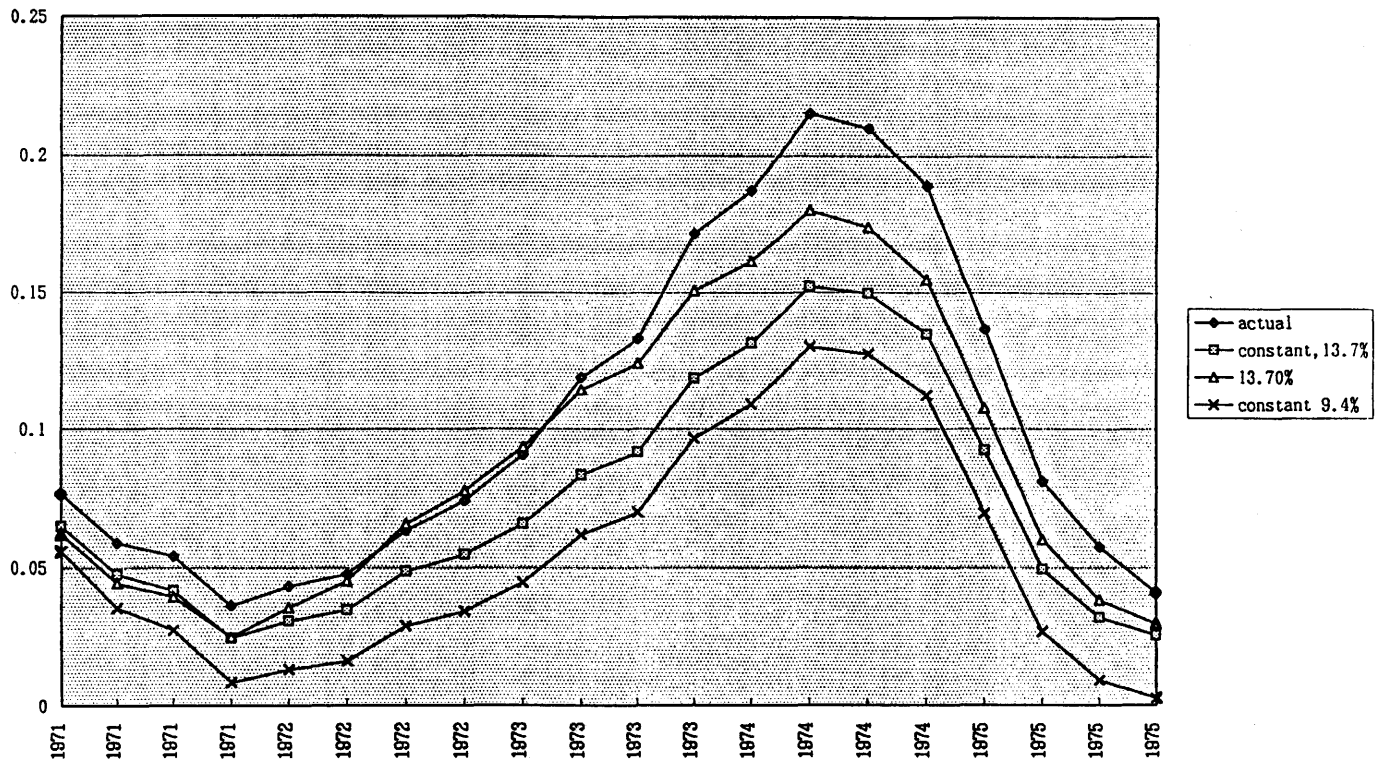Figure 3 Simulated Inflation Rates:1971-1975
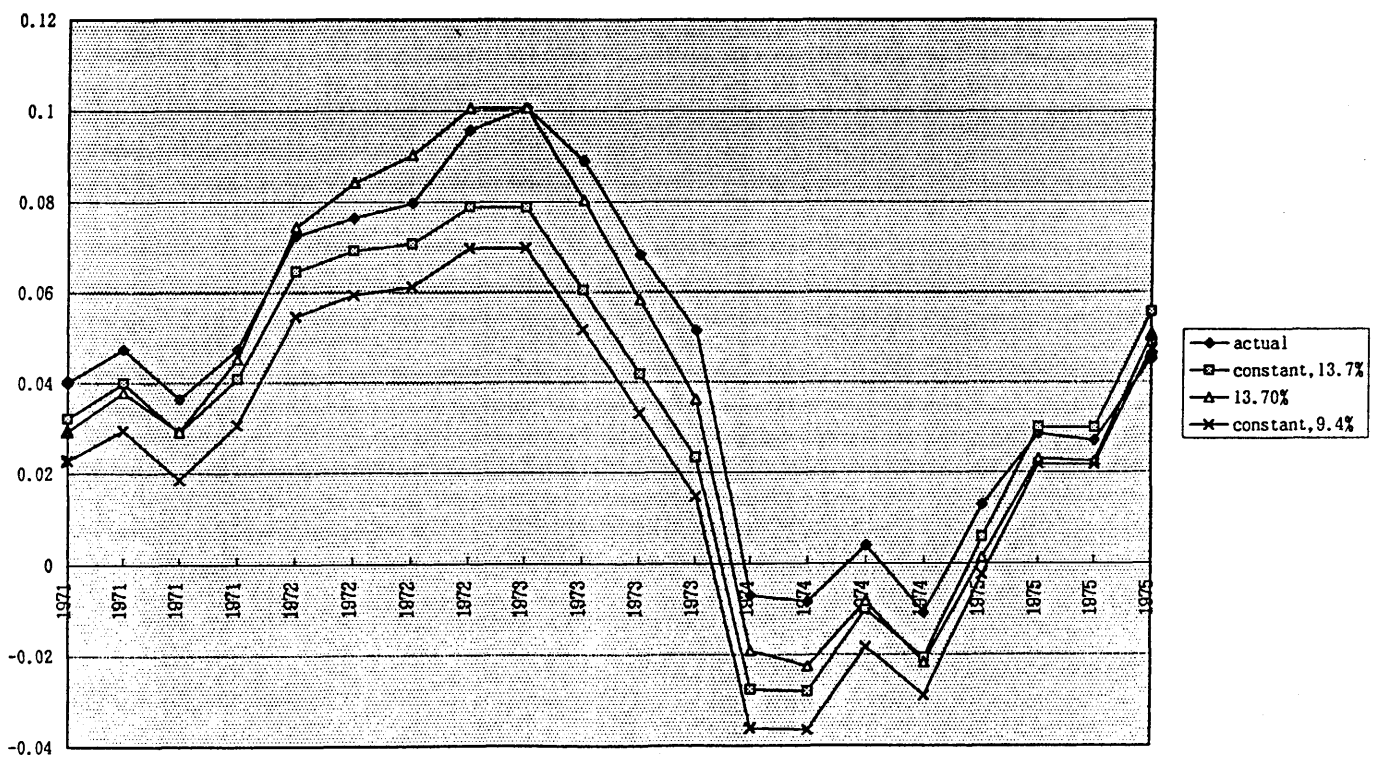

Figure 4 Simulated GDP Grwoth Rates:1971-1975

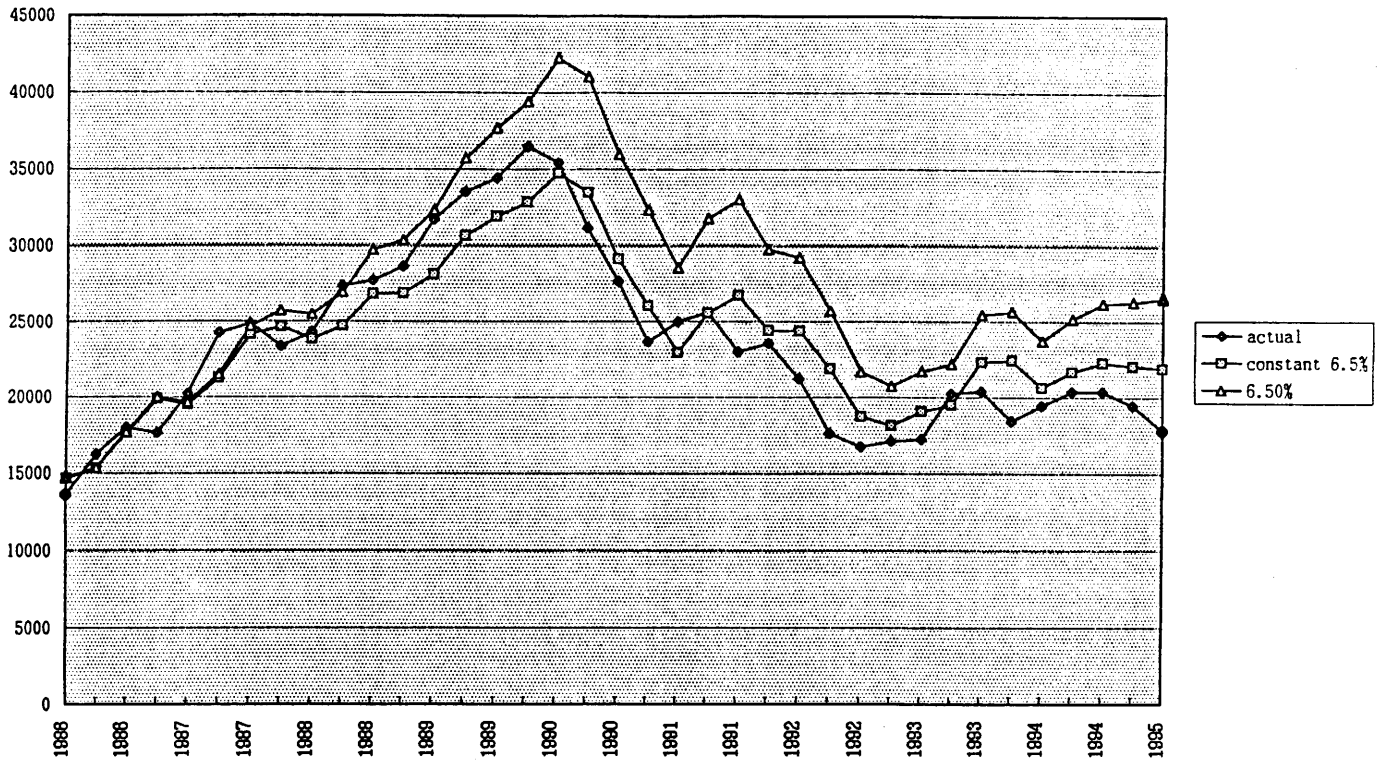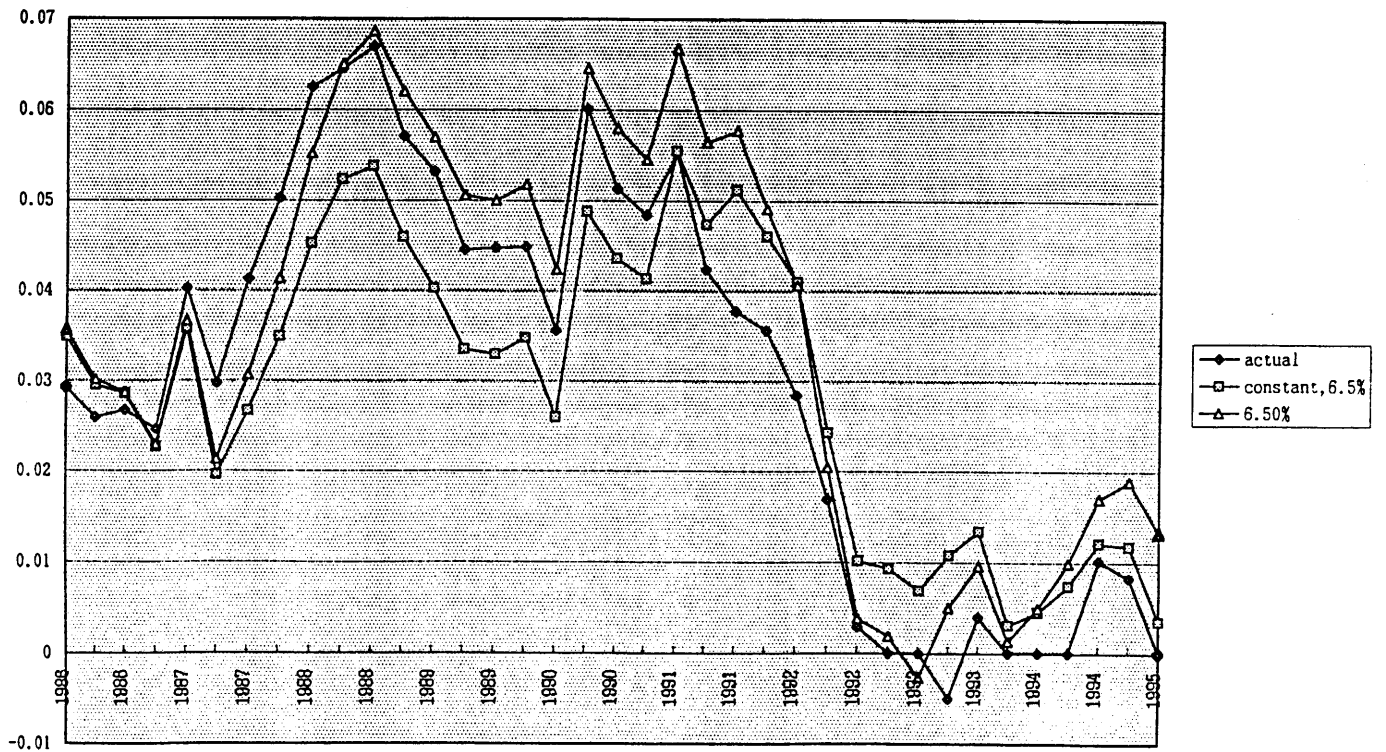Figure 5 Simulated Nikkei 225:1986-1995

Figure 6 Simulated GDP Growth Rates:1986-1995

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