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CENTRAL BANK BEHAVIOR AND THE STRATEGY OF MONETARY POLICY:
OBSERVATIONS FROM SIX INDUSTRIALIZED COUNTRIES

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ABSTRACT

Using a simple case study approach, this paper compares the conduct and performance of monetary policy in six industrialized countries since the breakup of the Bretton Woods system. Our purpose is to develop fruitful hypotheses that might usefully be explored in subsequent, more formal research.

From a positive perspective, a frequently observed pattern in the case studies is that central banks adopt money growth targets when inflation threatens to get out of control. Central banks appear to use money growth targets both as guideposts for assessing the stance of policy and as a means of signalling their intentions to the public; however, no central bank adheres strictly to targets in the short run. More normatively, the case studies also suggest that money growth targets might be useful in providing a medium-term framework for monetary policy, if the targeting is done in a clear and straightforward manner and if targets can be adjusted for changes in the link between target and goal variables. It appears that rigid adherence to money growth targets in the short run is not necessary to gain some benefits of targeting, as long as there is some commitment by the central bank ultimately to reverse short-term deviations from target. Finally, the choice of operating procedure seems to have little bearing on the success of policy.

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Section I. Introduction

In the United States, it has long been the practice for central bankers to meet periodically with outside consultants, including academic and business economists, in order to discuss the current economic situation. In the authors' experience as invited consultants, these meetings invariably end with a "go-round", in which each consultant is asked to give his or her views on current monetary policy. Often the go-round is prefaced by a question of the following sort: "The Federal Open Market Committee (the group that determines U.S. monetary policy) meets next Tuesday. What actions do you recommend that we take?"

We have each found it quite difficult to give a good answer to this type of question, and not only because, as ivory-tower academics, we tend to have a less detailed knowledge of current conditions than do the central bankers. The larger problem is that the question lacks context: Implicitly, it asks for advice on tactics without specifying the strategy. Probably the most enduring lesson of Lucas's (1976) famous critique is that the effects of any given policy action depend greatly on the expectations it engenders: Is the policy intended to be temporary or permanent? Under what circumstances will it be changed? Expectations about policy in turn depend on the public's perceptions of the authorities' policy strategy, as determined both by policy-makers' explicit choices and by deeper political and institutional factors. Thus, if we hope ever to give a really satisfactory answer to the central banker's question, we must first develop some clear views about monetary

policy strategy as well as tactics. These concerns motivate our paper.

What is the optimal strategy for the monetary authorities to follow? There is a large and venerable academic literature on this question, which has tended to cast the central banker's options rather starkly as following either rules or discretion. A monetary rule specifies future monetary actions as a simple function of economic or monetary conditions¹; at least in principle, monetary rules do not allow the monetary authorities to respond to unforeseen circumstances. Examples of rules are Milton Friedman's money growth rule and (strict) nominal GNP targeting. Fischer (1990) describes the rationales that have been advanced for rules: The most compelling is probably Kydland and Prescott's (1977) argument that rules increase the central bank's ability to precommit to avoiding monetary surprises, which in turn permits a lower steady-state rate of inflation.

In contrast to rules, the strategy of discretion² puts no prior restrictions on the actions that the central bank can take at each date. The basic rationale for discretion, as discussed by Fischer (1990), is that the benefit of allowing the central

¹ The requirement of simplicity is essential. Any monetary strategy at all could in principle be specified as a sufficiently complex contingent rule.

² In what sense is discretion a strategy, rather than the absence of a strategy? If we interpret discretion as the best time-consistent (no-precommitment) policy, then it is a strategy in the formal sense, since in principle one could calculate the policy action to be taken in every future contingency. In practice, of course, such a calculation would be difficult or impossible to carry out, so that the strategy implied by discretion is much less transparent than the strategy implied by rules.

bank to respond flexibly to unanticipated contingencies is greater than any advantage gained from precommitment.

The debate about rules and discretion, although motivated by real policy concerns and some (mostly American) experience, has been cast largely in abstract and ahistorical terms. An alternative, and complementary, research strategy is simply to observe what central bankers at different places and times have actually done, and to see what results they have obtained. This more flatly empirical approach is taken by the present paper: We use a simple case study methodology to analyze the conduct and performance of monetary policy in six industrialized countries for the period from the breakup of the Bretton Woods system until the present. In doing so, we hope to gain some insight into the objectives and constraints that determine central bank behavior and--at this stage, in a very tentative way--to develop some hypotheses about the attributes of successful monetary strategies.

The case study method has a poor reputation in economics, largely because of the tendency of its users to treat anecdotes as evidence. We fully agree that case studies are not a substitute either for more systematic empirical work or formal theoretical modelling. However, in our opinion, this approach can be a valuable preliminary to the more standard types of research: First, case studies can help establish the historical and institutional context, an essential first step in good applied work. Second, historical analysis of actual policy experiences is a natural way to find substantive hypotheses that

subsequent work can model and test more formally. We believe that the method of developing initial hypotheses exhibited here is superior to the more typical, implicit method of developing hypotheses which relies on introspection or on knowledge of only a few episodes.

The bulk of our paper consists of brief narrative discussions of recent monetary policy-making in the United States, the United Kingdom, Canada, Germany, Switzerland, and Japan. From these case histories, as well as from our reading of central bank reports and the commentaries of observers, we distill a number of hypotheses--candidate empirical regularities, if you will--about central bank behavior, policy strategies, and policy outcomes. These hypotheses are of two types: Positive hypotheses, which receive most of our attention, are based on observations that hold for all or nearly all of the cases examined; to the extent that these observations are confirmed by additional research, they need to be explained by positive theories of central bank behavior. Normative hypotheses, in contrast, are about differences in the characteristics of monetary policy strategies between more and less successful economies. We call these hypotheses normative because--despite the great difficulties involved in inferring causation from correlation--we believe that these cross-sectional differences ultimately may help to provide useful lessons about the design of monetary policy. We emphasize again, though, that at this stage both the positive and normative hypotheses are to be treated not

as conclusions but as suggestive propositions which are advanced for further discussion, analysis, and testing.

Of the various positive hypotheses that we extract from the case studies, three of the most important are the following:

First, in their conduct of monetary policy, central bankers appear to be pursuing multiple economic objectives; they care not only about the behavior of inflation and unemployment but sometimes also, independently, about the behavior of variables such as exchange rates and interest rates. Further, central bankers' objective functions sometimes look to be almost lexicographic: A large part of the monetary policymaker's attention at any given time is devoted to the variable that is currently "in crisis", to the neglect of other concerns.

Each of the central banks we consider has employed official money growth targets over all or a substantial part of the recent period. A second positive hypothesis is that--consistent, perhaps, with their "crisis mentality"--central bankers are more likely to adopt targets for money growth, or to increase their emphasis on meeting existing targets, when inflation is perceived as the number one problem.

This tendency of central bankers to retreat to money growth targets when inflation increases is something of a puzzle. For example, as we discuss below, this behavior is not easily explained by Poole's (1970) classic analysis of target choice. We conjecture (based in part on what the central bankers themselves say) that there are two reasons why central bankers cling to money targets when inflation threatens: 1) High

inflation causes policy-makers to become less confident in their ability to assess the stance of policy; intermediate targets such as money growth targets are perceived to be useful as guideposts or compasses which aid in choosing the appropriate policy setting. 2) Perhaps more importantly, money growth targets may be particularly useful as signals of the monetary authorities' intention to get tough on inflation. As we explain below, signalling its anti-inflationary intentions may help the central bank both to manage the public's expectations and to defend its policies against political pressures for more expansionary policies.

A third positive observation is that--although central banks occasionally conduct policy using a strategy approaching pure discretion--they never adhere to strict, ironclad rules. Indeed, a common strategy resembles most nearly a hybrid of rules and discretion, in which the central bank attempts (with varying degrees of success) to apply rules to its medium-term and long-term policies, while retaining "flexibility" or discretion to respond to developments in the economy in the short run. We view this observation as quite interesting, as it challenges the simple view of much of the received literature that pure rules and pure discretion are the only policy strategies available.

Perhaps the most intriguing normative hypothesis suggested by our case studies is that--contrary to what might be inferred from Kydland and Prescott (1977)--hybrid monetary strategies of the type just described appear to be consistent with low and stable inflation rates. For example, as we will see, Germany and

Switzerland--and to a lesser extent, Japan--have been able to pursue money growth targets as an intermediate-term objective, while at the same time maintaining considerable short-run discretion to meet objectives such as exchange rate stabilization. Several factors seem to be associated with successful use of a hybrid strategy, each of which can be construed as helping to make credible the central bank's claim that it will follow rules in the medium run though not in the short run:

First, we observe particularly in the German and Swiss cases that the central bank's intermediate targets are explicitly linked, via a simple and public calculation, to the ultimate goals of policy (e.g., the desired inflation rate). In principle, this explicit linkage of targets to goals allows the central bank to adjust its targets when the target-goal relationship changes, without compromising its credibility.

Second, the central banks who successfully use the hybrid strategy tend to conduct policy in a more straightforward and transparent way, avoiding devices such as multiple targets, "base drift", and irregular changes in targets or target growth rates.

Finally, achieving low inflation via the hybrid strategy seems to require some commitment by the central bank to reverse short-term deviations from its rule over a longer period. In the case of a money growth rule, for example, periods of above-target money growth tend to be compensated for (in low-inflation countries) by subsequent money growth reductions.

The rest of the paper is organized as follows: Section II, the bulk of the paper, presents the six case studies of monetary policy-making. Section III lists and discusses our positive hypotheses about central bank behavior. Section IV both discusses our normative hypotheses and addresses important issues that remain unresolved.

Section II. The conduct of monetary policy in six industrialized countries, 1973-1991

To provide some empirical basis for discussing the conduct of monetary policy, this section provides brief narrative descriptions of monetary policy in six industrialized countries over the period since the breakdown of the Bretton Woods system. The countries discussed include the United States, the United Kingdom, Canada, Germany (representing the EMS bloc), Switzerland, and Japan. These six countries represent "independent" observations in the sense that, for most of the period, no two of them belonged to a common system of fixed exchange rates.³ Other countries with independent monetary policies, such as Sweden and Australia, would be interesting to study but are excluded because of space and data limitations.

Our focus here is on general strategies and approaches used by monetary policy-makers; where possible, we abstract from the

³ On this basis we exclude France and Italy, whose exchange rates are tied to the deutschemark through the Exchange Rate Mechanism (ERM). (The U.K. did not join the ERM until 1990). Of course, attempts to stabilize nominal exchange rates have affected monetary policy at various times in all of these countries; as we discuss below, Canada in particular has often subordinated its monetary policy to exchange rate objectives.

fine institutional details of monetary policy operations in the various countries, except as they impinge on the broader issues⁴. In discussing the experiences of the various countries, however, it is useful to draw the familiar distinctions among policy goals, instruments, and intermediate targets (see, e.g., McCallum, 1989, or Friedman, 1990): Goals are the final objectives of policy, for example price stability and economic growth. Instruments are variables that the central bank controls closely on a daily or weekly basis, such as nonborrowed reserves or the interbank lending rate; the choice of instruments and the mechanisms by which they are controlled determine the central bank's operating procedure. Intermediate targets--monetary aggregates are the most common example--are variables that are neither under the direct day-to-day control of the central bank nor are the ultimate goals of policy, but that are used to guide policy. Values for instruments are usually set so that, given estimates of behavioral parameters such as the interest elasticity of money demand, intermediate targets for variables such as M1 growth are reached in the longer term (quarter-to-quarter or year-to-year). In turn, intermediate targets are set or re-set periodically so as to be consistent with the central bank's ultimate economic objectives.

The narrative discussions that follow are supplemented by two types of more quantitative evidence: First, Tables 1-6 present, for each country separately, the record of announced

⁴ Excellent discussions of the "microstructure" of monetary institutions and policy operations can be found in Kneeshaw and Van den Bergh (1989), Batten et al. (1990), and Kasman (1991).

targets for money growth, the actual money growth outcomes, and the implied excess money growth (actual growth less the midpoint of the target range). Second, comparisons across countries of the behavior of several key monetary and macroeconomic variables are provided by Figs. 1-7 at the end of the paper. The monthly data shown in the figures are as follows:⁵

(Fig. 1) money growth rates (from one year earlier) of both the narrow and the broad monetary aggregate focused on by the central bank in each country (M0, M1, M2 or M3).

(Fig. 2) the variability of narrow and broad money growth (e.g., SDM1 or SDM2); measured as the standard deviation over the previous twelve months of the money growth rates in Fig. 1.⁶

(Fig. 3) interest rates on overnight interbank loans (RS) and on long-term government bonds (RL).

(Fig. 4) the variability of changes in overnight interbank and long-term interest rates (SDRS or SDRL); measured using the same twelve-month moving-average procedure as in Fig. 2.

(Fig. 5) indices of nominal exchange rates (ER); measured as the Federal Reserve's effective exchange rate index for the U.S. and as the value of the currency in U.S. dollars for other countries (an increase in the index always implies an appreciation).

⁵ See the notes to the figures for details and sources.

⁶ Huizinga and Mishkin (1986) have pointed out potential problems with moving-average measures of volatility. Thus we have also calculated volatility measures using a procedure suggested by Pagan (1984), which effectively assumes an autoregressive conditional heteroscedasticity (ARCH) specification for the variability of money growth. The results using this procedure yield similar conclusions to those provided by Figs. 2 and 4.

(Fig. 6) inflation rates (PI); measured as the log-change of consumer prices over the last twelve months.

(Fig. 7) unemployment rates (UN); civilian labor force, national definitions.

The United States.⁷ We begin with the U.S. because it is the best-documented case and because the American experience has played an important role in setting the agenda for previous analyses of monetary policy.

The conduct of monetary policy in the U.S. since the early 1970s is conventionally divided into three regimes. During the first regime (approximately 1970-79), the federal funds rate--the interbank lending rate--was the primary instrument of monetary policy, serving in various degrees as a target of policy as well. Open market operations were used to keep the funds rate within a narrow target band (usually on the order of 50 - 75 basis points); over time, the band was adjusted smoothly (usually in 25 or 50 basis point increments) in response to general macroeconomic conditions.⁸

Numerous sources discuss recent monetary policy and the policy process in the U.S. See for example Lombra (forthcoming), Karamouzis and Lombra (1989), Friedman (1988), Poole (1988), and Heller (1988). For a longer-term overview, see Meulendyke (1990). In this and all subsequent case studies we also made use of the OECD's Economic Surveys.

⁸ Bernanke and Blinder (forthcoming) present evidence for the view that, during this period, changes in the funds rate (or the spread between the funds rate and other rates) were the best signal of a changing stance of monetary policy. Cook and Hahn (1989) provide a record of funds rate target changes and show that, during the 1975-79 period, open-market interest rates responded sensitively to changes in the Federal Reserve's target for the funds rate.

In principle, during this period the Fed paid attention to money growth as well as to interest rates: Beginning in 1970, the FOMC selected weekly tracking paths for M1 and indicated its preferred behavior for M2 (Meulendyke (1990)); and in 1975, in response to a congressional resolution, the Fed began to announce publicly its targets for money growth (Table 1). In practice, however, the Fed did not consider meeting money growth targets to be of high priority, placing greater weight on reducing unemployment while maintaining a relatively smooth path for interest rates. Devices employed by the Fed to avoid being overly constrained by money growth targets included the setting of targets for more than one aggregate, which usually allowed it to claim that it was hitting at least some target; and the frequent resort to "base drift", that is, the ignoring of past deviations of money growth from target when setting new targets.⁹

As can be seen from Table 1 or Fig. 1a, M1 growth had an upward trend after 1975 despite declining target ranges. With hindsight, the monetary expansion of 1975-78 appears to have been excessive: Unemployment came down steadily during the 1975-78 period (Fig. 7a) but the dollar fell (Fig. 5a) and inflation heated up sharply (Fig. 6a), even in advance of the second oil shock.

⁹ Walsh (1986) defends base drift as the correct response to non-stationary shocks to money demand. It seems to us that this case requires that the central bank clearly identify--and explain to the public--the source of these non-stationary shocks, else base drift will be perceived as a ploy. The fact that inflation rose significantly in the late 1970s is evidence against the view that the Fed was optimally offsetting non-stationary money demand shocks.

**Table 1. Money Growth Targets and Outcomes
UNITED STATES**

Year	Aggregate	Target	Outcome	Outcome less target
1975	M1	5.0-7.5	5.3	-1.0
	M2	8.5-10.5	9.7	+0.2
	M3	10.0-12.0	12.3	+1.3
1976	M1	4.5-7.5	5.8	-0.2
	M2	7.5-10.5	10.9	+1.9
	M3	9.0-12.0	12.7	+2.2
1977	M1	4.5-6.5	7.9	+2.4
	M2	7.0-10.0	3.8	-4.7
	M3	8.5-11.5	11.7	+1.7
1978	M1	4.0-6.5	7.2	+2.0
	M2	6.5-9.0	8.7	+1.0
	M3	7.5-10.0	9.5	+0.8
1979	M1	3.0-6.0	5.5	+1.0
	M2	5.0-8.0	8.3	+1.8
	M3	6.0-9.0	8.1	+0.6
1980	M1	4.0-6.5	7.3	+2.1
	M2	6.0-9.0	9.6	+2.1
	M3	6.5-9.5	10.2	+2.2
1981	M1	3.5-6.0	2.3	-3.0
	M2	6.0-9.0	9.5	+2.0
	M3	6.5-9.5	11.4	+3.4
1982	M1	2.5-5.5	8.5	+4.5
	M2	6.0-9.0	9.2	+1.7
	M3	6.5-9.5	10.1	+2.1
1983	M1	4.0-8.0	10.0	+4.0
	M2	7.0-10.0	8.3	-0.2
	M3	6.5-9.5	9.7	+1.7
1984	M1	4.0-8.0	5.2	-0.8
	M2	6.0-9.0	7.7	+0.2
	M3	6.0-9.0	10.5	+3.0
1985	M1	4.0-7.0	11.9	+6.4
	M2	6.0-9.0	8.6	+1.1
	M3	6.0-9.5	7.4	-0.4

[Table 1 continued next page]

Table 1. Money Growth Targets and Outcomes [continued]
UNITED STATES

Year	Aggregate	Target	Outcome	Outcome less target
1986	M1	3.0-8.0	15.2	+9.7
	M2	6.0-9.0	8.9	+1.4
	M3	6.0-9.0	8.8	+1.3
1987	M2	5.5-8.5	4.3	-2.7
	M3	5.5-8.5	5.6	-1.4
1988	M2	4.0-8.0	5.2	-0.8
	M3	4.0-8.0	6.1	+0.1
1989	M2	3.0-7.0	4.7	-0.3
	M3	3.5-7.5	3.3	-2.2
1990	M2	3.0-7.0	3.8	-1.2
	M3	2.5-6.5	1.5	-3.0
1991	M2	2.5-6.5	2.7	-1.8
	M3	1.0-5.0	1.5	-1.5

Notes: Growth rates (%) are measured fourth quarter to fourth quarter. Outcome less target equals the outcome less the midpoint of the target range. Data reflect definitions of aggregates current at times of announcements. Target ranges are those announced at the beginning of the year (midyear changes occurred in 1979, 1983, 1985, and 1990). Target and outcome for 1981 M1 growth are adjusted for shifts into NOW accounts.

Sources: Isard and Rojas-Suarez (1986) and Fischer (1987); updates from annual "Monetary Report to Congress", March or April issues of Federal Reserve Bulletin.

The funds rate targeting regime--or its first act--came to an end with the dramatic news conference of Fed Chairman Paul Volcker on October 6, 1979, in which Volcker signalled a new commitment to reduce inflation by a change in Fed operating procedures. The new regime that followed the 1979 announcement was described by the Fed as targeting nonborrowed bank reserves, an operating procedure sometimes characterized (e.g., by Lombra (forthcoming)) as intermediate between the perfectly elastic supply of reserves associated with an interest rate target and the inelastic supply of reserves associated with a strict money target. Under a system of targeted nonborrowed reserves, increases in the overall demand for reserves, arising for example from an increase in money demand, are reflected both by an increase in the money stock (as banks increase borrowed reserves) and by an increase in the funds rate (which must increase to make banks indifferent between borrowing more from the discount window and purchasing more federal funds on the interbank market).

Since nonborrowed reserves targets were not set far in advance and were often adjusted, however, the 1979 change in operating procedure did not in itself necessarily require a major change in the conduct of U.S. monetary policy, except perhaps at very high (daily or hourly) frequencies. For example, nonborrowed reserve targets could in principle have been set week to week to keep the funds rate from straying far from a preferred range. However, the change in operating procedures seems to have been accompanied by a decision by the Fed to place greater weight on monetary targets and to tolerate high and volatile interest

rates (see Figs. 3a and 4a) in order to bring down inflation.¹⁰ The change in interest rate behavior was particularly dramatic: Instead of smoothing the funds rate in its customary way, after the October 1979 announcement the Fed whipsawed the financial markets; the funds rate rose by more than 500 basis points to exceed 17% in March 1980, fell to below 10% after real GNP declined in the second quarter, and then rose to nearly 20% in 1981. M1 growth was noticeably lower during the 1979-81 period than in previous years, but there also was a significant (and permanent) increase in the volatility of M1 growth (Fig. 2a).¹¹

What are we to make of the sharp changes in Fed operating procedures that occurred during and after 1979? The most likely explanation of these changes is political rather than technical. The Fed had decided that inflation had reached crisis levels and had to be controlled at almost any cost. As many authors have noted¹², the new operating procedures and the greater (putative) attention to monetary targets were a useful smokescreen that obscured the link between the Fed's actions and the painful increases in interest rates. At the same time, the changes in

¹⁰ Fed reaction functions estimated by McNees (1986) and by Karamouzis and Lombra (1989) show that the Fed placed a greater weight on deviations of the money supply from target during 1979-1982, relative to earlier and later periods. Cook (1989), in an excellent discussion of 1979-1982 policy, argues that high interest rates were not an accidental byproduct of the nonborrowed reserves procedure but that nonborrowed reserves targets were intentionally adjusted so as to produce high interest rates.

¹¹ Added complexity in the use of M1 as a policy guide was created by a redefinition of M1, to include other checkable deposits such as NOW accounts but to exclude foreign-held deposits, in 1980.

¹² For example, see Greider (1987), Mussa (forthcoming), and Mishkin (1992).

procedure signalled to the public that they should not expect business as usual with respect to the Fed's attitude toward inflation.

Volcker's policy shift achieved its disinflationary goals but contributed to a deep recession in 1981-1982. Velocity instability associated with financial innovation and other factors also raised concerns (based on the traditional Poole (1970) analysis) about whether monetary targets would continue to be of any value for guiding policy. In the fall of 1982 the Fed switched tactics again, this time to a borrowed reserves operating procedure. Simultaneously, it adopted a decidedly easier policy, despite the fact that money growth was above its targeted range (Table 1). Money targets were de-emphasized after 1982. In particular, M1 was allowed to deviate quite far from its targets and after 1986 was no longer targeted at all.

Because there is a close link between desired borrowed reserves and the funds rate, the borrowed reserves procedure adopted in 1982 is, in practice, quite similar to funds rate targeting.¹³ Thus the third regime of post-1973 monetary policy in the U.S. is a return to an emphasis on interest rate smoothing, as in the pre-1979 monetary regime (note from Fig. 4a

¹³ The demand for borrowed reserves is usually taken to be an increasing function of the spread between the federal funds rate and the discount rate, reflecting the equilibrium condition that banks must be indifferent between obtaining funds from the federal funds market and from the discount window. If this demand function is stable, then targeting borrowed reserves is equivalent to targeting the excess of the funds rate over the discount rate. See Thornton (1988). Thornton also presents evidence that, on those occasions when the demand for borrowed reserves appeared to shift, the Fed typically shifted its borrowed reserve target so as to stabilize the funds rate.

that after 1982 interest rate volatility returned to pre-1979 levels). During the 1990-91 recession, the degree to which Fed policy has been guided by and expressed in terms of interest rate targets rather than money or reserve growth targets has been particularly striking. For example, the Fed's "shock treatment" of December 1991 was couched solely in terms of funds rate and discount rate reductions.¹⁴

While the Fed concentrated relatively more on stabilizing interest rates after 1982, it also pursued several other goals. One key objective during the latter part of the 1980s was exchange rate stabilization: The sharp appreciation of the dollar during the Volcker regime (Fig. 5a) had contributed to a massive increase in the U.S. current account deficit. Beginning in early 1985, the Fed attempted to bring down the dollar by driving up both M1 and M2 growth rates (Fig. 1a). By 1987, policymakers at the Fed agreed that the dollar had fallen enough, and money growth rates were brought back down. These actions by the Fed were supported by attempts at international policy coordination embodied by the Plaza Accord in September 1985 and the Louvre Accord in February 1987.

Other objectives that influenced monetary policy during the 1980s included financial market stability (particularly following the October 1987 stock market crash; see Brimmer (1989) and Mishkin (1991)) and the maintenance of Volcker's inflation gains.

¹⁴ A principal reason for the de-emphasis of money growth was the perception that the "credit crunch" in banking had interfered with the normal relationship between aggregates such as M2 and nominal GNP; see Bernanke and Lown (1991) for a discussion of the credit crunch and its implications for monetary policy.

On the price stability front the Fed was particularly successful, as for the first time since the early 1960s inflation in the latter part of the 1980s remained low and stable. Whether the good inflation performance of recent years was due primarily to good luck (e.g., falling oil prices) or agile policy is controversial.

The United Kingdom.¹⁵ As has often been discussed, there are some broad parallels between the recent histories of British and American monetary policies, as there were for general economic policies under Thatcher and Reagan.

As in the U.S., the British introduced money targeting in the mid-1970s in response to mounting inflation concerns. Also as in the U.S., the Bank of England used interest rates as operating instruments and was committed to interest-rate smoothing during this period. Informal targeting of a broad aggregate, sterling M3 (hereafter M3), began in late 1973, and formal publication of targets began in 1976 (Table 2), following a spike in inflation and in conjunction with an IMF support arrangement. To help ensure that M3 targets were met, the Supplementary Special Deposits Scheme--the infamous "corset"--was introduced in December 1973. The corset scheme attempted to reduce M3 growth essentially by taxing a component of M3, high-interest bank deposits.

¹⁵ Good recent descriptions of U.K. monetary policy are to be found in Fischer (1987), Minford (forthcoming), and Temperton (1991).

Table 2. Money Growth Targets and Outcomes
UNITED KINGDOM

Period	Aggregate	Target	Outcome	Outcome less target
Apr 1976-Apr 1977	M3	9-13 ¹	8.0	-3.0
Apr 1977-Apr 1978	M3	9-13	15.1	+4.1
Apr 1978-Apr 1979	M3	8-12 ²	11.4	+1.4
Oct 1978-Oct 1979	M3	8-12 ³	13.7	+3.7
Jun 1979-Oct 1980	M3	7-11 ⁴	17.2	+8.2
Feb 1980-Apr 1981	M3	7-11 ⁵	19.4	+10.4
Feb 1981-Apr 1982	M3	6-10	12.8	+4.8
Feb 1982-Apr 1983	M1	8-12	12.4	+2.4
	M3	8-12	11.2	+1.2
	PSL2	8-12	11.6	+1.6
Feb 1983-Apr 1984	M1	7-11	14.0	+5.0
	M3	7-11	9.5	+0.5
	PSL2	7-11	12.6	+3.6
Feb 1984-Apr 1985	M0	4-8 ⁶	5.4	-0.6
	M3	6-10	11.9	+3.9
Mar 1985-Mar 1986	M0	3-7	3.4	-1.6
	M3	5-9 ⁷	16.7	+9.7
Mar 1986-Mar 1987	M0	2-6	4.4	+0.4
	M3	11-15 ⁸	19.0	+6.0
Mar 1987-Mar 1988	M0	2-6	5.6	+1.6
Mar 1988-Mar 1989	M0	1-5	6.1	+3.1
Mar 1989-Mar 1990	M0	1-5	6.3	+3.3
Mar 1990-Mar 1991	M0	1-5	2.6	-0.4
Mar 1991-Mar 1992	M0	0-4	---	---

Notes to Table 2: M3 refers to sterling M3, or M3 less residents' deposits abroad. PSL2, private sector liquidity, is a broader aggregate than M3. Outcome less target equals the outcome less the midpoint of the target range.

¹ Target of 12% growth for M3 set in July 1976 superseded by 9-13% target for M3 in December 1976 'letter of intent' to IMF.

² New target after six months.

³ New target after eight months.

⁴ Original target was to April 1980. Target was extended in October 1979 for one year, but then new target was set for period beginning February 1980.

⁵ From 1980 to 1986, target ranges for M3 were also set for a three-to-four-year horizon.

⁶ Beginning in 1984, target ranges for M0 were also set for a four-year horizon.

⁷ Target suspended in October 1985.

⁸ Target suspended in October 1986.

Sources: Temperton (1991), supplemented by OECD Economic Surveys, various issues.

Elementary economic analysis suggests that a scheme to reduce the growth rate of a monetary aggregate artificially through tax policy would also distort the relationship between that aggregate and macroeconomic variables such as nominal income and inflation. Thus the reliance on the corset is evidence that, during the pre-1979 period, the British monetary authorities were like their American counterparts in not taking their money growth targets very seriously. It is interesting that, despite the assistance of the corset, the Bank of England had great difficulty in meeting its M3 growth targets during this period: Not only were announced targets consistently overshoot, but the Bank of England frequently revised its targets midstream or abandoned them altogether (Table 2). One result of these policies was that British monetary aggregates had greater volatility than even those in the U.S. (Fig. 2b). For example, the volatility of U.S. monetary base growth (not shown in the figures) was on average well less than half that of British monetary base growth in the pre-1979 period, and the same is true for M3 growth.

Although inflation fell subsequent to the 1973 oil price shock, beginning in 1978 prices in the United Kingdom began to accelerate again, with inflation ultimately reaching nearly 20% by 1980. As in the United States, the perception of an inflationary crisis led to a change in strategy in 1979. Prime Minister Thatcher's Medium-Term Financial Strategy (MTFS, formally introduced in the government's second budget in March 1980) included three main components: a gradual deceleration in

M3 growth, elimination of various controls on the economy (including the corset, exchange controls, and incomes policies), and a reduction of the PSBR (the public sector borrowing requirement, or deficit). A central goal of this program was the restoration of credibility for the government's anti-inflationary policies; it was in order to enhance the credibility of proposed reductions in money growth that the government opted for reduced government deficits instead of lower taxes, a la Reagan.¹⁶

Unfortunately, the British disinflationary strategy in the 1979-82 period ran into a technical problem similar to that experienced in the U.S., namely that the relationship between the targeted aggregate and nominal income became very unstable. M3 velocity fell sharply and M3 grew at rates well above the target ranges (Table 2, Fig. 1b), even as other indicators--the value of the pound, the growth rates of narrower money aggregates, and the unemployment and inflation rates--all began to signal that monetary policy was very tight (Figs. 1b-7b). In retrospect, the instability of M3 is not surprising, as the removal of the corset induced banks to market high-interest deposits aggressively. Other factors, such as the phasing out of exchange controls and an increased pace of financial innovation, also affected the growth rate of M3. The monetary authorities tried several strategies in response to this instability, including the setting

¹⁶ Another difference with the American approach was that the British did not significantly reduce their commitment to interest rate smoothing with the change in strategy in 1979 (Fig. 4b). This confirms the earlier point that there is no necessary connection between the operating procedure and the general stance of monetary policy.

of multi-year target ranges (which for the most part were not met) and the targeting of several aggregates simultaneously.¹⁷

Subsequent to 1983, arguing that financial innovation was wreaking havoc with the relationship between broad money and income¹⁸, the Bank of England began to deemphasize M3 in favor of narrower aggregates, particularly M0 (the monetary base). The target for M3 was temporarily suspended in October 1985 and finally dropped in 1987, leaving M0 as the only money aggregate to be targeted. Generally, the attempt to target M0 was more successful than earlier attempts to target M3: Target ranges have been announced on a regular basis and have been gradually reduced over time. Also, since 1984, actual M0 growth has generally fallen within or close to the target ranges, with under- or overshootings tending to be reversed in subsequent years.

The major exception to the assertion that M0 growth has been on target occurred in the 1987-88 period, during which the authorities became concerned about appreciation of the pound and informally "capped" sterling at 3.00 DM to the pound, resulting in more rapid money growth (see Fig. 1b and Table 2). Some economists, such as Belongia and Chrystal (1990), have argued that this episode was less an attempt to manage the exchange rate per se than it was an attempt to find a new nominal anchor for monetary policy, given the problems experienced with monetary aggregates. If so, in this instance the Bank of England backed

¹⁷ Besides M0 and M3, the Bank of England also targeted a broad measure of private sector liquidity, PLS2; see Table 2.

¹⁸ Leigh-Pemberton (1986).

the wrong horse, because following the period of the cap inflation rose sharply, a development that was predicted by rapid growth of the monetary base during the period of the cap. Whatever interpretation one places on the "capping" episode, however, in October 1990--after much debate--the U.K. decided to accept the discipline of a fixed nominal exchange rate by joining the European Exchange Rate Mechanism (ERM).

Overall, a comparison with the U.S. and the other countries examined here does not put British monetary policy in a favorable light. As Figs. 6 and 7 indicate, not only has British inflation had the highest mean and the greatest volatility of any of these countries, but the unemployment rate has also been high and variable. However, in the 1980s British inflation performance did improve considerably, remaining well below the 1970s level and becoming significantly less variable.

Canada.¹⁹ Recent Canadian monetary experience bears some close parallels to that of the U.S. and Britain. This parallel experience is not purely a coincidence, of course, as Canadian monetary policy has often--although not always--been driven by the goal of maintaining a stable exchange rate with the U.S. (Fig. 5c). As a result, interest rates (Fig. 3), interest rate volatility (Fig. 4), and inflation (Fig. 6) have followed generally similar patterns in the two countries.

¹⁹ Principal sources for this section are Howitt (forthcoming), the OECD Economic Surveys, and various issues of the Bank of Canada Review.

Table 3. Money Growth Targets and Outcomes
CANADA

Announce- ment date	Base period	M1 growth target	Outcome	Outcome less target
Nov 1975	May-June 1975	10-15	9.2	-3.3
Aug 1976	Feb-Apr 1976	8-12	15.9	+5.9
Oct 1977	June 1977	7-11	14.9	+5.9
Sept 1978	June 1978	6-10	5.1	-2.9
Dec 1979	Apr-June 1979	5-9	5.9	-1.1
Feb 1981	Aug-Oct	4-8	0.5	-5.5
Nov 1982	M1 target withdrawn			

Notes: Outcomes are annualized growth rates (%) of seasonally adjusted M1 between the base period and the next announcement of new targets; e.g., the outcome corresponding to the November 1975 announcement is the annualized growth rate of M1 between May-June 1975 and August 1976. Outcome less target equals the outcome less the midpoint of the target range.

Source: OECD Economic Surveys and Bank of Canada Review, various issues.

Like the other countries discussed here, Canada experienced significant inflation problems in the mid-1970s, problems that were clearly exacerbated by its attempt to maintain a fixed exchange rate with the U.S. after the breakdown of the Bretton Woods system. Like the other countries, Canada responded by adopting money growth targets. In 1975, as part of a larger government initiative that included the imposition of wage and price controls, the Bank of Canada introduced a program of "monetary gradualism", under which M1 growth would be controlled within a gradually falling target range (Table 3). The change in monetary strategy did not extend to a change in operating procedures, however, which continued to emphasize an interest rate instrument.

Monetary gradualism was no more successful in Canada than were initial attempts at money targeting in the U.S. and U.K., and arguably--as in the other two countries--a lack of seriousness on the part of the central bank was a contributing factor. Announcements of new money targets were made irregularly and employed base periods for the measurement of money growth that were as much as six months earlier than the date of the announcement (Table 3). Nor was actual M1 growth often very close to target, although the goal of reducing M1 growth was achieved during the latter part of the decade. Subsequent to the adoption of gradualism, Canada suffered a sharp depreciation of its currency and, like the U.S. and U.K., a resurgence in inflation.

In defense of the Bank of Canada, many of the same problems that plagued attempts to target money growth in other countries were present in Canada as well, including financial innovation (see Howitt (forthcoming)), velocity instability of the targeted aggregate, and radically different signals of policy stance from narrow and broad money aggregates (Fig. 1c). Overlaying these standard problems were the distortions caused by the imposition and eventual elimination of wage and price controls.

By 1978, only three years after money targeting had begun, the Bank of Canada began to distance itself from this strategy. A dominant factor was concern about the exchange rate, which as we have noted had been depreciating (Fig. 5c). Exchange rate worries intensified as the U.S. dollar began its rapid appreciation of the early 1980s, threatening Canada with an inflationary shock from import prices. The Bank of Canada responded by tightening policy more than needed to meet the M1 targets; indeed, M1 growth was negative in 1981 even though the target range was for growth between 4 and 8 per cent (Fig. 1c and Table 3). Brought into unresolvable conflict with exchange rate goals, the M1 targets were canceled in November 1982. Canada thus became the only country examined here to abandon formal money growth targeting completely in the early 1980s.

The period following 1982 was one of groping. In 1984 the de facto fixed exchange rate (which had been largely unchanged since 1978) was abandoned, so that the Bank of Canada could attempt to assist recovery from the very deep recession that had begun in 1981. Unemployment did fall after 1984 (Fig. 7c) and by

1988 the Canadian "misery index" (the inflation rate plus the unemployment rate) was at its lowest point in many years. Still, inflation had begun to edge up again, to some minds threatening a possible return to the 1970s pattern.

In a rather dramatic reversal of the evolving ad hoc monetary strategy, in January 1988 Governor John Crow announced that the Bank of Canada would subsequently pursue an objective of "price stability"--that is, literal elimination of inflation.²⁰ In February 1991 the Bank and the Minister of Finance jointly announced a series of declining inflation targets. Although this strategy implied that inflation itself, not money growth, would be the target of monetary policy, it was indicated that M2 would be used to guide policy. (Attention is also to be paid to an index of inflationary pressure based on interest rates and exchange rates.) It is not completely clear to what degree this new commitment to price stability implies abandonment of other objectives, but it does seem that attention to those other goals has been reduced: For example, during 1987 through 1989, the Bank of Canada permitted a much greater increase in interest rates and appreciation of the currency than would have normally been expected under previous regimes.

²⁰ As in a similar recent debate in the U.S., advocates of "zero inflation" suggest that, because of difficulties in adjusting for quality change and other index number problems, zero inflation may be interpreted as a small positive rate of measured inflation.

Germany.²¹ Germany's central bank, the Bundesbank, also responded to rising inflation in the early 1970s by adopting a strategy of targeting money growth, with the first targets being announced for 1975 (see Table 4). The monetary aggregate chosen for targeting was central bank money (denoted as M0 in Fig. 1d), the sum of currency in circulation and bank deposits held by residents, with each category of bank deposits weighted by its 1974 required reserve ratios. As Fischer (1987) points out, central bank money can be interpreted as approximating the "required monetary base", and for convenience we label it as a narrow money aggregate in Fig. 1d. However, the Bundesbank has noted that it views central bank money as a broad rather than narrow measure of money, arguing that the required reserve ratio weights are reasonable proxies for the relative liquidities of the various components.

Monetary targets have been announced annually and are reviewed at mid-year in light of macroeconomic developments, although mid-year revision of targets has been extremely unusual. (The usual function of the mid-year review is to use interim information to reduce the size of the target range.) The method by which the Bundesbank's monetary targets are set is particularly interesting: The calculation of target ranges is a public rather than a clandestine exercise. The setting of targets explicitly takes into account the Bundesbank's long-term inflation goal, estimated potential output growth, and expected

²¹ This section draws on Fischer (1987), Kahn and Jacobson (1989), von Hagen (1989), and Neumann and von Hagen (forthcoming).

Table 4. Money Growth Targets and Outcomes
GERMANY

Year	Aggregate	Target	Outcome	Outcome less target
1975	CBM	8.0	9.8	+1.8
1976	CBM	8.0	9.2	+1.2
1977	CBM	8.0	9.0	+1.0
1978	CBM	8.0	11.5	+3.5
1979	CBM	6.0-9.0	6.4	-1.1
1980	CBM	5.0-8.0	4.8	-1.7
1981	CBM	4.0-7.0	3.6	-1.9
1982	CBM	4.0-7.0	6.1	+0.6
1983	CBM	4.0-7.0	7.0	+1.5
1984	CBM	4.0-6.0	4.6	-0.4
1985	CBM	3.0-5.0	4.5	+0.5
1986	CBM	3.5-5.5	7.7	+3.2
1987	CBM	3.0-6.0	8.0	+3.5
1988	M3	3.0-6.0	6.8	+2.3
1989	M3	5.0	4.7	-0.3
1990	M3	4.0-6.0 ¹	5.5	+0.5
1991	M3	4.0-6.0 ²	---	---

Notes: Growth rates are measured year-over-year for 1975-78 and fourth quarter to fourth quarter thereafter. Outcome less target equals the outcome less the midpoint of the target range. CBM is central bank money.

¹ The target was lowered to 3-5% in July.

² As of 1991, targets apply to all-German M3.

Source: Kahn and Jacobson (1989), updates from OECD Economic Surveys, various issues.

velocity trends, which are combined using the quantity-theory equation to determine the desired money growth rate. In theory, this explicit linkage of targets to goals has the important benefit of allowing targets to be adjusted when the target-goal relationship changes, without compromising the central bank's commitment to meeting its targets.

"Short-term" considerations such as the unemployment rate and expected transitory deviations in inflation or velocity are not formally included in the Bundesbank's target-setting exercise. Nevertheless, there is some scope for shorter-term considerations to affect monetary policy. For example, the Bundesbank freely acknowledges that one purpose of specifying target ranges²², rather than single numbers, is to give itself some scope for short-run discretionary activism. The size of the target range has varied over time--it was zero in 1989--indicating changes in the amount of short-term flexibility the Bundesbank thinks it needs.

The Bundesbank has also shown that it is willing to accept money growth outside of the target range for periods of two to three years. In principle, deviations of money growth from targets are supposed to be reversed subsequently, so that short-term considerations do not detract from the Bundesbank's pre-eminent goal of low and stable inflation in the long run. Table 4 shows that periods of money growth over target, such as 1975-78, have tended to be followed by periods of slower growth, as in

²² In 1975-78 targets were expressed as single numbers. Since 1979 targets have been set as ranges of varying size (see Table 4).

1979-81. In general, though, Table 4 suggests that the Bundesbank has not always succeeded in fully reversing short-term deviations from the money growth targets.

Over the last two decades, the principal object of short-term discretionary policy by the Bundesbank has been the exchange rate. In particular, money growth targets were exceeded during 1975-78 and again during 1986-88 in order to dampen an appreciating mark. The Bundesbank's concern about the exchange rate has a number of sources: First, under international agreements including the European Exchange Rate Mechanism, the Plaza Accord, and the Louvre Accord, Germany has accepted some responsibility for stabilizing its exchange rate within agreed-upon ranges. Second, the large size of the German export sector makes the exchange rate a politically sensitive variable. Finally, maintenance of a strong and stable mark is viewed as a precondition for achieving inflation goals.

Central bank money remained the money target through 1987. In 1988, the Bundesbank adopted simple-sum M3 (the equal-weighted sum of currency in circulation, demand deposits, time deposits less than four years, and savings deposits). The rationale for the switch was that central bank money put too much weight on a rapidly-growing currency component and thus overstated monetary ease--the so-called "currency bias" problem. Despite the switch in targets, Germany has not experienced nearly as much instability in the relationship between targeted aggregates and nominal income as have a number of the other major countries.

In achieving short-run money control, the Bundesbank has typically relied heavily on interest rate indicators (including the call, or overnight, rate and the repurchase rate), much in the spirit of the Federal Reserve's use of federal funds rate targeting as a mechanism for hitting monetary targets in the medium term. However, while the Bundesbank has attempted to keep interest rates stable in the short run, it has not gone so far as to set explicit targets for interest rates (Batten et al., 1990, p. 11). It is notable that the Bundesbank has consistently achieved very low variability of both interest rates (Fig. 4d) and money growth rates (Fig. 2d), contrary to the simple view that suggests a tradeoff between these two quantities.

German monetary policy has been quite successful in maintaining a low and stable inflation rate (Fig. 7d), but, unlike Switzerland and Japan, Germany has not avoided a serious and persistent unemployment problem (Fig. 7d). Fischer (1987) and others have pointed to inflexibilities in the labor market (relative to, say, Japan) as a potential cause of persistent German unemployment.

Most recently, the reunification of Germany has posed some novel problems for the Bundesbank. The exchange of West German currency for East German currency at reunification at rates favorable to the East has created nascent inflationary pressures, at the same time that the tremendous uncertainties created by the reunification have made the forecasting of prosaic items like velocity quite tricky. In addition, the political pressures to support strong real growth at the early, delicate stages of

reunification are strong. It remains to be seen how well the Bundesbank's traditional policy strategy can deal with this new set of circumstances.

Switzerland.²³ The fixed-exchange-rate regime ended in Switzerland in January 1973. The Swiss National Bank began to announce money stock targets, with M1 the targeted aggregate, at the end of 1974. Like the Germans, the Swiss set money growth targets based on explicit inflation goals and forecasts of potential output and velocity growth. Announced targets were and have continued to be single-valued rather than ranges, a practice based on the interesting rationale that "from a psychological point of view, missing a target band is worse than missing a point target" (Schiltknecht (1982, p. 73)).

An unusual feature of the conduct of Swiss monetary policy has been the Swiss National Bank's consistent use of the monetary base directly as an operating instrument. Control of M1 during the early years of targeting therefore required the central bank to predict the value of the money multiplier (the ratio of M1 to the base). Perhaps because of the use of the monetary base as an instrument, Switzerland has generally had higher volatility in short-term interest rates than have other countries (Fig. 4). However, this volatility has not carried over to long-term rates, as Switzerland has had the lowest volatility of long-term interest rates of the six countries studied here (again see Fig.

²³ Historical discussions of Swiss monetary policy may be found in Schiltknecht (1982), Beguelin and Rich (1985), Rich (1987), and Yue and Fluri (1991).

Table 5. Money Growth Targets and Outcomes
SWITZERLAND

Year	Aggregate	Target	Outcome	Outcome less target
1975	M1	6	4.4	-1.6
1976	M1	6	7.7	+1.7
1977	M1	5	5.5	+0.5
1978	M1	5	16.2	+11.2
1979	--	--	---	---
1980	M0	4 ¹	-0.6 ¹	-4.6
1981	M0	4	-0.5	-4.5
1982	M0	3	2.6	-0.4
1983	M0	3	3.6	+0.6
1984	M0	3	2.5	-0.5
1985	M0	3	2.2	-0.8
1986	M0	2	2.0	0.0
1987	M0	2	3.0	+1.0
1988	M0	3	-3.9	-6.9
1989	M0	2	-4.9	-6.9
1990	M0	2	-2.6	-4.6
1991	M0	1	---	---

Notes: Growth rates are measured as mean of monthly year-on-year growth rates until 1988; after 1988 growth rates are measured fourth quarter to fourth quarter. M0 is the monetary base adjusted to exclude end-of-month bulges in Swiss National Bank credit to banks.

¹ Average percentage increase over the November 1979 level.

Source: Rich (1987), with updates from OECD Economic Surveys, various issues.

4). Presumably, the low volatility of long-term rates reflects Switzerland's success at keeping its inflation rate low and stable in the longer term.

As in other countries, the idea underlying money targeting in Switzerland was to reduce money growth gradually in order to eradicate inflation over the longer term. However, according to the Director of the Swiss National Bank:

"... the policy of well controlled, stable monetary growth was never viewed as a policy which should be adhered to rigidly year after year, or even month after month, at all costs. Rather, it was viewed as a medium- to long-term constraint, with the necessity for short-run flexibility, especially in view of exchange rate developments." (Schiltknecht, 1982, p. 72)

This approach to targets as a medium-term to long-term constraint but not an impediment to short-term discretion is similar to the approach taken in Germany. Indeed, in practice the Swiss have been even more successful than the Germans in reversing deviations of money growth from target: Between 1975 and 1986, the cumulative excess of money growth over target in Switzerland (the sum of the "outcome less target" column in Table 5) was only about 1.6%.

An example of short-run monetary "flexibility" occurred in 1978, when the Swiss franc began to appreciate (Fig. 5e). In response, the Bank eased monetary policy significantly: M1 growth in 1978 was above 16% (Fig. 1e and Table 5), compared to a target of 5%. While rather an extreme episode, the 1978 actions illustrate the general willingness of the Swiss National Bank to subordinate money targets, at least in the short run, to exchange rate considerations. Swiss concern about the exchange rate

reflects not only the extreme openness of the Swiss economy, but the fact that a stable franc is an important component of Switzerland's prominence as an international financial center.

After containment of the 1978 exchange rate emergency, the Bank returned to an (unannounced) policy of money targeting in the spring of 1979. However, because of problems with forecasting the money multiplier, beginning in 1980 the monetary base rather than M1 became the targeted aggregate (as well as the policy instrument).

In 1980 and 1981 money growth was low and below target, in reaction to increased inflation and the overshooting of money targets in the previous few years. The period from 1982 to about 1987, though, was remarkably halcyon: Money growth targets were routinely met (Table 5). The short-term volatility of Swiss money growth remained comparatively high (Fig. 2), however, implying that the Swiss were acting quickly to offset high-frequency deviations of money growth from target. Inflation fell to low levels (Fig. 6e), and unemployment remained insignificant (Fig. 7e).²⁴ Monetary policy was assisted considerably during the early 1980s by the fact that the link between money growth and nominal magnitudes in Switzerland appeared stable, despite transient velocity fluctuations.

In 1986 there was a significant decline in the inflation rate (from over 3% almost to zero) and in 1989 a sharp increase in inflation (from about 2% to nearly 5%), neither of which was

²⁴ However, the Swiss reliance on "guest workers", who are repatriated when labor market conditions worsen, makes Swiss unemployment data more difficult to interpret.

predicted by the behavior of the monetary base (see Yue and Fluri, 1991, for a discussion). Swiss central bankers have suggested that the problem is a structural break in the demand for base money, brought about by the introduction of an electronic interbank payments system and a reduction in legal reserve requirements. In attempting to offset this fall in base money demand, the Swiss National Bank permitted negative money growth for three years (Table 5). The instability in the demand for base money has led the Swiss National Bank to de-emphasize money base targeting and, recently, to contemplate fundamental changes in its monetary strategy.

Japan.²⁵ The increase in oil prices in late 1973 was a major shock for Japan, with substantial adverse effects on inflation, economic growth, and the government's budget. In response to an increase in the inflation rate to a level above 20% in 1974 (Fig. 6f)--a surge facilitated by money growth in 1973 in excess of 20% (Fig. 1f)--the Bank of Japan, like the other central banks we have considered, began to pay more attention to money growth rates. In 1978 the Bank began to announce "forecasts" at the beginning of each quarter for the growth rate of M2 (changed to the growth rate of M2+CDs when CDs were introduced in 1979) from one year earlier to the current quarter (Table 6).

The use of the word "forecast" rather than "target" suggests that the Bank of Japan was committed only to monitoring rather

²⁵ Among the many useful general sources on Japanese monetary policy are Cargill and Hutchison (1987), Dotsey (1986), Hutchison (1988), Batten et al. (1990), Kasman and Rodrigues (1991), and Ueda (1991).

Table 6. Money Growth Targets and Outcomes
JAPAN

Year	Aggregate	Target ¹	Outcome	Outcome less target
1978	M2	12-13	12.6	+0.1
1979	M2+CD	11	10.3	-0.7
1980	M2+CD	8	7.6	-0.4
1981	M2+CD	10	10.4	+0.4
1982	M2+CD	8	8.3	+0.3
1983	M2+CD	7	6.8	-0.2
1984	M2+CD	8	7.9	-0.1
1985	M2+CD	8	9.0	+1.0
1986	M2+CD	8-9	8.3	-0.2
1987	M2+CD	11-12	11.8	+0.3
1988	M2+CD	10-11	10.6	+0.1
1989	M2+CD	10-11	10.6	+0.1
1990	M2+CD	ca. 11	10.0	-1.0
1991	M2+CD	ca. 4	---	---

Notes: Growth rates are measured fourth quarter to fourth quarter. Outcome less target equals the outcome less the midpoint of the target range.

¹ Announced at the beginning of the fourth quarter and are referred to as forecasts rather than targets by the Bank of Japan.

Source: Fischer(1987) and Bank for International Settlements, Annual Report, various issues.

than to controlling money growth.²⁶ However, after 1978 there did appear to be a substantive change in policy strategy, in the direction of being more "money-focused". Particularly striking was the different response of monetary policy to the second oil price shock in 1979: Instead of allowing extremely high money growth, as occurred in 1973, the Bank of Japan quickly reduced M2+CDs growth in 1979 and 1980 to quite a low level (Fig. 1f). The difference in the inflation outcome in this episode was also striking, as inflation increased only moderately with no adverse effects on the unemployment situation. More generally, the Bank of Japan's forecasts and actual money growth followed a declining trend into the mid-1980s (except in 1981; see Table 6). Thus, in contrast to the German and Swiss practice of clearly specifying central bank intentions in advance, the Japanese seemed to follow an "actions speak louder than words" approach. As we discuss further below, however, in recent years both forecasts and actual money growth in Japan have become much more variable, weakening the presumption that the Bank of Japan practices "closet monetarism".

From an institutional point of view, it was no doubt fortunate that the Bank of Japan began to focus on money at the time that it did. Traditionally, Japanese central bank policy had emphasized the control of bank credit, which proved an effective instrument in a highly regulated financial environment in which borrowers had few substitutes for bank loans. However,

²⁶ Much has been written on whether and to what degree the Bank of Japan implicitly targets money growth. See, e.g., Hutchison (1986), Ito (1989), and Ueda (1991).

a slow but steady process of liberalization of financial markets began around 1975, resulting ultimately in the introduction of new financial instruments and markets and a weaker tie between bank lending and economic activity.²⁷

In a financial environment that over time has become more and more similar to that of the United States, the Bank of Japan's methods of conducting monetary policy have also evolved in the direction of the American example.²⁸ Abandoning quantitative credit controls, the Bank of Japan has moved gradually to a system emphasizing open-market operations in the interbank market²⁹, more attention to money growth, and the use of interbank interest rates as the primary instruments of monetary control. However, unlike the U.S., Japan has always used interest rate instruments of some type and has never experimented with targeting of bank reserves. The outcome of these operating procedures is that the volatility of interest rates in Japan has generally been low in relation to other countries (Fig. 4), while the volatility of the M2+CDs aggregate focused on by the Bank of Japan has been comparable to the volatility of U.S. M2 (Fig. 2).

Also in parallel to the United States, ultimately financial innovation and deregulation in Japan began to reduce the

²⁷ Kasman and Rodrigues (1991) provide an excellent discussion of Japanese financial liberalization and its effects on monetary policy.

²⁸ The similarity of Japanese and American central bank operating procedures is discussed by Dotsey (1986).

²⁹ Open-market operations are supplemented by discount window lending, as in the U.S. Unlike the U.S., in Japan open-market operations are conducted in a number of other financial markets, including the CD market and (recently) the commercial paper market.

usefulness of the broad money target: In particular, introduction of money market certificates and large time deposits in 1985, and the repeated reductions in the minimum denominations of these assets over 1986-1989, led to increases in the demand for M2 (see, e.g., Yoshida and Rasche, 1990). In response to increased money demand, and also because of concern about appreciation of the yen, the Bank of Japan significantly increased the rate of money growth in 1987-89 (Table 6).

Beginning in 1989, monetary policy became oriented toward trying to arrest what many Japanese policy-makers considered to be a bubble in land and stock prices, without causing a crash that might have disastrous financial consequences. Asset prices did come down as money growth slowed, but economic activity weakened also. Another factor that has recently complicated monetary policy is a slowdown in lending by Japanese banks associated with the increase in bank capital requirements mandated by the Basle Accord. In responding to these developments, as we have mentioned, the Bank of Japan has permitted a considerable increase in the variability of broad money growth since late 1990 (Fig. 2f), and in general has engaged in a much more "discretionary" style of policy-making.

Section III. The conduct of monetary policy in six countries: some positive hypotheses

What do we learn from these case studies of monetary policy-making? In this section we discuss some positive hypotheses, so called because they seem to apply generally across the case

studies. We state these hypotheses as if they were conclusions but remind the reader once again that they (as well as the more normative observations discussed in Section IV) are intended only as propositions worthy of further examination.

1. Central bankers have multiple objectives and a "crisis mentality". It is a commonplace that central bankers care about both economic growth and inflation, which may force them to confront difficult tradeoffs. But the behavior of central bankers suggests that other variables enter their objective function as well. The leading example from the case studies is the nominal exchange rate: In all six cases examined, central bankers modified their policies in order to arrest what they considered to be undesirable exchange rate trends. Arguably, in some of these cases (when the U.K. "capped" the pound in 1987, for example) the exchange rate played the role of an intermediate target; that is, the central bank's intervention reflected concern not about the exchange rate per se but about what the exchange rate was signalling about the stance of monetary policy. However, in many of the cases, the exchange rate clearly functioned as a goal of policy, reflecting central bank concerns about the health of the traded goods sector or international commitments to meet exchange rate targets.

Interest rate stability has also in many cases been an independent objective of policy. For example, in the 1970s the Federal Reserve chose to tolerate high rates of money growth in order to avoid sharp increases in interest rates (a policy that

was dramatically reversed in 1979). Japan, Germany, and to some extent Great Britain have all attempted to keep interest rate volatility low even as the economic environment and monetary policy strategies have changed (Fig. 4). Several writers (e.g., Goodfriend 1987, Howitt (forthcoming)) have suggested that central banks view interest rate stability as important for maintaining "orderly" financial markets free from excessive speculation.

Although they have multiple objectives, over time central bankers do not devote constant proportions of their attention to each objective. Rather, at any given time, the lion's share of the central bank's attention is typically devoted to the one or two objectives that are furthest from desired levels. A possible explanation of this "crisis mentality" is that the marginal social cost of, say, high inflation really does increase sharply with the inflation rate. Alternatively, central bankers may feel that their independence and perquisites are threatened more by a public perception that some aspect of the economy is "out of control" than by a record of generally mediocre performance.

The fact that central banks have multiple objectives creates obvious tensions in the monetary policy process. For example, as Goodfriend (1987) has pointed out, the preference of the central bank for maintaining a stable nominal interest rate may lead to nonstationarity in money and prices. Multiplicity of objectives and the crisis mentality can also make even the most competent and purposeful central bank appear at best to be muddling through, or at worst to be lurching from one strategy to another.

As we discuss further below, the complexity of central bank objectives and behavior may increase the value of clear communication with the public about the goals and direction of monetary policy.

2. The greater is the central bank's concern about inflation, the stronger will be its tendency to employ monetary aggregates as intermediate targets. All six of the countries discussed here adopted monetary targeting in the 1970s in response to a worldwide increase in inflation and persisted with money targets until disinflation was achieved.³⁰ The central banks most "hawkish" on inflation, such as those of Germany and Switzerland, have been the most consistent in maintaining a money targeting strategy, while more "dovish" monetary authorities like those of the U.K., Canada (before 1988), and the U.S. have been the least consistent.

The natural first place to look for an explanation for this aspect of central bank behavior is Poole's (1970) well-known theory of target choice, which argues essentially that the optimal intermediate target is the one with the most stable relationship with the goal variables. Unfortunately, Poole's model is of limited help in this instance, since it predicts that money targets will be preferred over interest rate targets during

³⁰ This statement requires that we interpret the Japanese "forecasts" as indicating a targeting strategy. It should also be noted that several central banks (notably the U.S. and U.K) initially adopted money targets only under some external pressure; in both the American and British cases, however, the seriousness with which money targets were treated increased markedly when the second oil shock worsened the inflation problem.

periods when money demand is relatively stable. What we observe is the reverse: In the halcyon pre-1974 days of stable money demand, central banks were more likely to focus on interest rate targets, while in many countries the switch to money targets occurred and persisted during a period of severe velocity instability. Further, central bankers have typically reacted to unstable velocities not by reverting to interest rate targeting but instead by changing the particular monetary aggregate that they target--in some cases switching from a narrower to a broader aggregate (the U.S., Germany) and in others from a broader aggregate to a narrower one (the U.K., Switzerland).

Why then do central banks adopt money growth targets when faced with inflationary crises? The next two points discuss possible reasons.

3. One function of an intermediate target such as money growth, as perceived by central bankers, is to act as a guidepost or compass for monetary policy. Central bankers face considerable uncertainty not only with regard to the state of the economy and the nature and timing of the monetary transmission mechanism, but also about the stance of policy itself. In pursuing intermediate targets the policymakers hope to improve their measurement of their policy stance and thus reduce the probability of inadvertently choosing the wrong settings for their instruments. Thus the adoption of money growth targets in the late 1970s by many central banks was intended to help avoid the over-expansionary tendencies of the earlier part of the decade. In

particular, it was hoped that money growth would prove a more reliable indicator of monetary conditions than variables that had been employed earlier, such as interest rates³¹ and free reserves.

The use of monetary aggregates as guideposts has been problematic in practice, however, and for some of the same reasons suggested by Poole's original analysis: The relationship between individual aggregates and macroeconomic variables has often been unstable, and different aggregates have as often as not given conflicting information, as for example in the U.K. in the 1979-82 period when narrow and broad aggregates gave very different readings of the tightness of policy.

There is still a deeper question about the use of monetary aggregates as guideposts, however, which also follows from the logic of the Poole model: If the central bank is searching for a guidepost for monetary policy, why confine the search to one or two economic variables? Why not instead use a forecast that optimally weights all available information about the likely effects of policy on the economy? As we discuss further below, the answer to this question may be that there is a complementarity between using a money growth target as a guidepost and using it as a signal to the public about monetary policy intentions.

³¹ One might construct an argument on Poole-like grounds that nominal interest rates are a bad target during periods of unstable inflation, since high nominal interest rates could indicate either too tight or too easy money.

4. The second and probably more important reason that central bankers adopt money growth targets is to signal the central bank's goals and intentions--particularly those concerning inflation--to the public. Both central bankers and the public consider the control of inflation to be one of the most important objectives of monetary policy. Yet of central banks' many objectives, inflation is perhaps the one related to policy actions with the longest lag. Thus it is particularly difficult for the public to evaluate the inflationary impact of current policies. An advantage of money targeting is that--because of the simple and widely understood quantity-theory prediction that money growth and inflation will be proportional--money growth targets may be perceived as being informative about the central bank's goals and intentions with respect to inflation.³²

Central bankers see several potential benefits to using money growth targets to signal medium- and long-term inflation strategy. One potential benefit is that explicit targets for money growth may aid the management of inflationary expectations. If the central bank can reassure the public through a targeting procedure that it is committed to controlling inflation in the longer run, it may reduce financial market volatility and conceivably (although we have no evidence on this point) improve short-run policy tradeoffs.

Another potential benefit to the central bank of emphasizing money growth targets is that this practice keeps the central

³² The empirical fact of velocity instability implies, of course, that the relationship between money growth and inflation is really not so simple. We return to this issue in Section IV.

bank's inflation objectives "on the front burner" and makes the central bank more accountable to the public for keeping inflation low. Theories of bureaucratic behavior might seem to imply that a bureaucracy like a central bank will want to avoid accountability. But in fact, a central bank may want to make itself more accountable for achieving price stability because it values the price stability goal more than do politicians in the legislative and executive branches.³³ For example, if the central bank is able to point to money growth above target (with its implied inflationary consequences), it may be able to enlist public support in resisting political pressures for excessive short-run expansion. Elements of this strategy can be seen in almost all the major disinflations of the early 1980s, in which central bankers emphasized the importance of meeting money growth targets in order to deflect political demands for rapid reflation.

The notion that central banks seek to bind their own hands is of course closely related to Kydland and Prescott's (1977) seminal argument for rules, with the difference that we here

³³ Differences in the horizons of politicians and central bankers are sufficient to create this difference in preferences. For example, as suggested by work of Rogoff and Sibert (1988), in order to signal their economic competence politicians may have an incentive to create an inflationary boom prior to an election. If the central banker is not up for re-election and fears that the central bank will be blamed for long-run increases in inflation, he will resist political demands for pre-election increases in money growth. In a Rogoff-Sibert-style game, all the central banker needs to do to diffuse the pressure from the politicians is to give the public full information about monetary policy--e.g., announce the money growth targets consistent with noninflationary growth--thereby ensuring that the politicians receive no credit for output increases arising from excessive monetary expansion.

emphasize an intra-governmental variant of Kydland and Prescott's precommitment game. However, as the next point emphasizes, in practice central bankers reject the notion of rigid rules in favor of looser types of precommitment.

5. Central banks never and nowhere adhere to strict, ironclad rules for monetary growth. Central banks' attachments to specific targets for specific monetary aggregates is at best modest and is always hostage to new developments in the economy.

As is evident from the case studies and Tables 1-6, all central banks deviate significantly from their monetary targets to pursue short-term objectives, and most are explicit about their willingness to be "flexible" and "pragmatic" in the short run. Further, money growth targets and the targeted aggregates themselves may be changed fairly often.

Clearly, central banks have never taken seriously the literal "precommitment through rules" strategy implied by Kydland and Prescott's analysis of the time inconsistency problem. If money growth rules are adopted at all, they are intended to apply only in the medium and long term. Of course, as it has been said, the long term is just a succession of short terms. Thus, for a longer-term money growth target to be meaningful, the central bank must at some point demonstrate its willingness to offset short-term deviations from the target path.³⁴ The

³⁴ The basic Kydland-Prescott (1977) analysis suggests that central bank promises to meet money growth targets in the long run but not the short run would never be credible. However, this conclusion is dependent on the assumption that the central bank values unemployment below the natural rate. If the central bank does not view its mandate as reducing unemployment, or is content

feasibility and value of "hybrid" strategies, containing elements of both rules and discretion, is discussed further in the next section.

Section IV. What works? Some normative hypotheses and issues for future research

The case studies showed that, although national experiences with monetary policy in the last two decades are diverse, a dominant theme is the adoption of money targeting strategies as a response to increased inflation. In the last section we argued that central bankers adopted money growth targets for two reasons: as guideposts, helping them to measure policy stance; and as signals, communicating to the public the medium-term goals of policy. Despite what was to some degree a common approach to monetary policy, however, some central banks have fared much better than others in meeting their ultimate policy objectives, particularly in achieving low and stable inflation.

Why have some central banks been more successful in their use of money growth targets? The case studies provide some clues that may help answer this question. We list some hypotheses suggested by the case studies that we view as being worth serious exploration in future research.

with unemployment at the natural rate, then it may be possible to make credible promises about future money growth. Further, the central bank may be able to develop a reputation for meeting its medium-term targets; see Rogoff (1987) for a comprehensive discussion of reputation and central bank credibility.

1. Successful use of money growth targets in conducting monetary policy seems to require that the central bank does not "play games" with its targeting procedures. A major reason for using money growth targets, we have seen, is to communicate with the public. Hence, clarity, openness, and consistency in the targeting procedure are potentially almost as important as whether the targets are met. Central bank actions that increase the clarity of its policies include: targeting only one aggregate at a time; announcing targets on a regular schedule for a specified horizon; being as consistent as possible in the choice of aggregate to be targeted; and giving clear explanations of the reason for and expected duration of deviations of money growth from target.

A particularly interesting way in which central banks can clarify their intentions is by means of a public calculation of target ranges that makes explicit the central bank's goals and its assumptions about how the target is tied to those goals. In principle, this explicit linkage of targets to goals might have the important benefit of allowing the central bank to adjust its targets when the target-goal relationship changes, without compromising its credibility.

Generally, Germany and Switzerland did well on the above criteria over the last two decades, while the U.S., the U.K., and Canada did less well. The most egregious game-player was the Bank of England, with its multiple targeted aggregates, extreme base drift, erratic changes in targets and target horizons, and its use of artificial means (the corset) to bring down the growth

of a targeted aggregate. The American Fed and the Bank of Canada also did not take their targets very seriously, at least at first, as evidenced by the Fed's multiple targets and base drift and the Bank of Canada's practice of announcing targets at random dates for horizons that were not clearly specified.³⁵ Improved inflation performance in a number of the countries studied here coincided with the adoption of more serious and straightforward targeting procedures: The clearest example is Britain, which achieved more stable inflation after it abandoned the corset and multiple targets to focus on a regularly announced target for a single aggregate.

Japan is an interesting intermediate case, in that it has had a very successful monetary policy despite the opacity of its targeting (or non-targeting) procedure.³⁶ On the other hand, Japan is the only country to have focused on a single monetary aggregate (M2+CDs) over the entire period; it has announced its money growth "forecasts" on a consistent and regular basis; and it achieved a relatively steady slowdown of money growth between the mid-1970s and mid-1980s, despite the occurrence of a second oil shock in 1979. Thus--at least prior to its recent switch to a more discretionary mode--the Bank of Japan created a degree of predictability about its medium-term policies.

From the perspective of the literature on central bank credibility it is not surprising that game-playing in targeting

³⁵ We should be careful of attributing the relatively less good performance of Canadian monetary policy solely to such game-playing, however; as we have noted, the degree to which Canadian monetary policy is independent from U.S. policy is problematic.

³⁶ At least it is opaque to American academics. Perhaps it is clearer to Japanese business and financial leaders.

procedures--which leads the public to believe the central bank is not serious--is counterproductive. A straightforward approach to conducting monetary policy appears to be quite useful to increasing the central bank's credibility and improving policy outcomes.

2. Short-run adherence to money growth targets may not be necessary for successful use of a money targeting strategy, as long as there is some commitment by the central bank to reverse deviations of money growth from target over the longer term. As the example of Switzerland most clearly illustrates, a money targeting strategy apparently can be used successfully even if money growth rates have large fluctuations and are frequently outside of target ranges. However, the success of Swiss monetary policy in keeping inflation low seems to have required a commitment by the Swiss National Bank to compensate for high rates of money growth in one period by subsequent offsetting low rates of money growth in future periods. In other words, it looks as if the Swiss have successfully used a hybrid strategy, in which rules are used to guide policy in the long term but not in the short term. The German and Japanese central banks have similarly demonstrated their willingness to make up for periods of excessive money growth by subsequent periods of slow money growth, although to a lesser extent than the Swiss. Again the worst record belongs to the British, who consistently missed targets in the same direction.

A cynic might ask, "What is the difference between a policy of reversing deviations from target and the highly criticized 'stop-go' policies of the 1960s and early 1970s, which also involved alternating periods of low and high money growth?" The difference, which is admittedly subtle, is that the policy of reversing deviations from target takes place in a larger framework, one that provides a basis for expecting that short-term expansions or reductions in money growth will be subsequently offset. In contrast, although the earlier regime sometimes involved reversals ex post (stop-go policies), there was no basis for people to expect ex ante that such reversals would occur. Thus--as again is consistent with the literature on credibility--it is the nature of the expectation engendered by a policy that appears to be critical to its success.

Complementary to a strategy of reversing short-term deviations from target is a policy of adjusting targets when their relationship with goal variables changes, as is practiced (in principle at least) by Germany and Switzerland. It would not be desirable to offset a deviation in money growth arising from a permanent shock to velocity, for example. Under the German-Swiss method of setting targets, a permanent shock to velocity would result in a change in the money growth target. In an unconditional money targeting scheme, in contrast, the central bank could accommodate the velocity shock only by sacrificing its commitment to the target.

3. The outcomes of monetary policy do not appear to be dependent on the details of the operating procedure or the choice of instruments. A wide variety of operating procedures has been observed across the six countries studied here, but there is no evident correlation of type of procedure with monetary policy effectiveness. For example, the most common procedure--using the interbank interest rate as an instrument for achieving medium-term targets for money growth--seemed to work poorly for the United States in the 1970s but has been used quite successfully by Japan and Germany.

In addition, as a comparison of operating procedures between Switzerland and Germany indicates, focus on a monetary aggregate as an operating instrument does not guarantee a more successful adherence to monetary targets. Indeed, Switzerland (which has used the monetary base as its operating instrument) has had among the most variable rates of money growth, while Germany (which employs an interbank interest rate as its instrument) has had among the lowest money growth variability (Fig. 2). It is also interesting that, although the Swiss operating procedure has resulted in high volatility of short-term interest rates, Swiss long-term rates have shown less volatility than in any of the other countries studied here (Fig. 4). Since it is the volatility of long-term interest rates that would seem to be the more relevant to the stability of the financial system, the Swiss example suggests that the use of the monetary base as an operating instrument need not create problems even with respect to the goal of interest rate smoothing.

This irrelevance of the operating procedure is not surprising from a theoretical viewpoint, because any of a number of procedures can be used to achieve any given set of values for the central bank's targets and goals--and it is the latter which should matter for the macroeconomy. If operating procedures are macroeconomically unimportant, why then do central banks pay so much attention to them? The "smokescreen" argument may be relevant here: For example, by focusing on the change in operating procedure in 1979, Fed Chairman Volcker partly diverted attention from a more fundamental change in policy. Also, the Swiss example notwithstanding, the details of operating procedures may have important effects on certain segments of financial markets (banks, bond traders) which the central bank considers to be an important part of its clientele.

Although these observations about what works well in promoting a successful monetary policy are suggestive, further research on several problematic points is needed before these observations can be taken completely seriously.

A first troublesome issue turns on the nature of the empirical relationship between money and other economic variables. Our review of central banks' experience suggests that money growth targeting, if treated as a flexible constraint on medium-term policy, can be a useful tool. However, even the best-handled money targeting strategy requires that there be some predictable relationship between money growth and the goal variables of policy; and it has been argued (most persuasively by

Friedman and Kuttner, 1990) that the relationship between money and the economy is empirically so unstable that monetary aggregates are of essentially no value in guiding monetary policy. Isn't this instability fatal to the case for any type of money targeting?

This issue is of first-order importance and needs further investigation in a cross-national context. Several responses can be made at this point, however:

First, it is possible that the velocity instability that has plagued the monetary policy of countries such as the U.S. and the U.K. is itself partly endogenous, a result of erratic monetary policies which have created highly variable inflation and interest rates. Our case studies show that countries with more stable monetary policies, while not immune to velocity instability, do suffer from it to a smaller degree. In particular, Japan's ability to provide monetary stability despite major changes in its financial institutions is striking. Thus longer-run money growth targeting might also lead to a more stable relationship of money to other variables.

Second, as we have already discussed, there are reasons to believe that the German-Swiss technique of adjusting money growth targets for expected changes in velocity is preferable to unconditional money growth targeting. If adjustments for expected velocity changes are made, then stability of velocity is not a prerequisite for successful policy, only some degree of conditional predictability of velocity. Of course, it may be

that even conditional prediction is not possible; empirical work should be directed toward finding out.

A third response that can be made to the Friedman-Kuttner objection is that it does appear to be useful to central bankers to have some variable or variables to signal the medium-term stance of policy; and for reasons of both theory and simplicity, money growth is a natural candidate. However, if velocity unpredictability disqualifies money as an appropriate target--as might have been the case in the U.S. and Britain during 1979-82, for example--then one would want to consider alternative anchors for policy, such as the exchange rate, nominal GNP, or inflation forecasts. Unfortunately, as a large literature discusses, the obvious alternatives to money growth also have shortcomings, including unstable relationships with the economy and inadequate controllability and observability.

Besides the question of the stability of the money-output link, another broad unresolved issue concerns the degree to which successful monetary policies are the result of a more favorable political environment, rather than superior policy techniques. To ask the question more concretely: Is the superiority of German or Swiss monetary policy over, say, British policy really due to better and more coherent policies by the Bundesbank and Swiss National Bank? Or is the better German and Swiss performance a necessary consequence of institutional factors (such as greater central bank independence) and greater political support for low inflation? If the latter is true, then the features of policy that we have observed to be associated with more successful

outcomes may in fact be either endogenous to the deeper factors or irrelevant.

Despite the obvious importance of political and institutional factors, it still seems plausible that, given their environments, central banks have considerable latitude to deliver successful or unsuccessful monetary policies. Some evidence for this proposition is that the effectiveness of monetary policy within given countries has changed substantially over time. British and American monetary policies seem noticeably more successful in the 1980s than in the 1970s. Japan made the transition from high and erratic inflation in the mid-1970s to a low and stable inflation rate (despite the fact that the Bank of Japan is probably less politically independent than, say, the Bank of Canada). Political conditions (e.g., the public's aversion to inflation) can also change over time, but such changes are likely to be more gradual than the observed changes in policy outcomes. Thus, while the political dimension needs to be explored further, it remains likely that how the central bank chooses to handle monetary policy is also a major factor determining macroeconomic outcomes.

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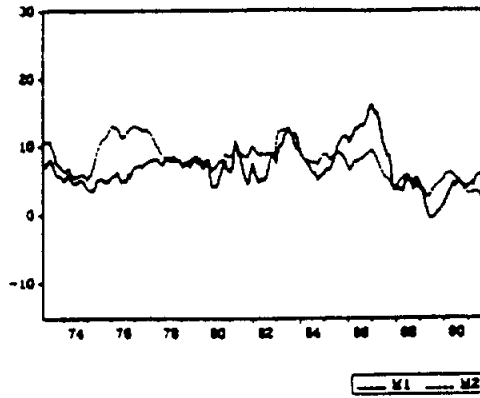
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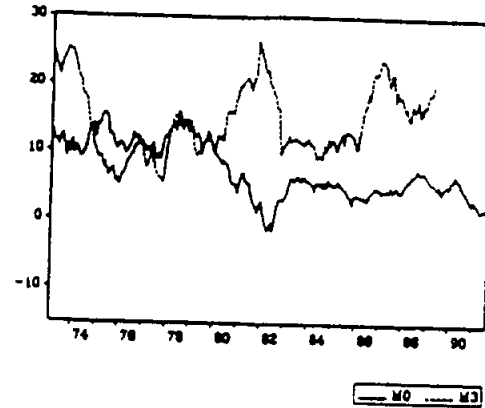
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Figure 1
Growth Rates of Narrow and Broad Monetary Aggregates
(e.g., M0, M1, M2, or M3)

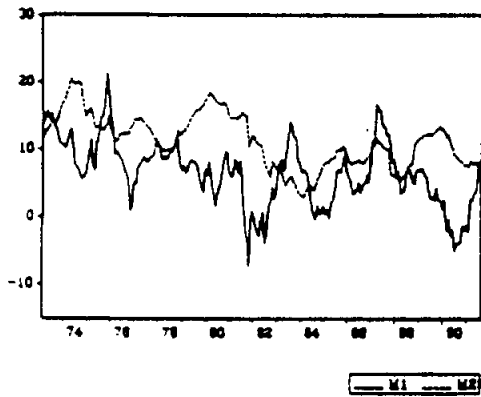
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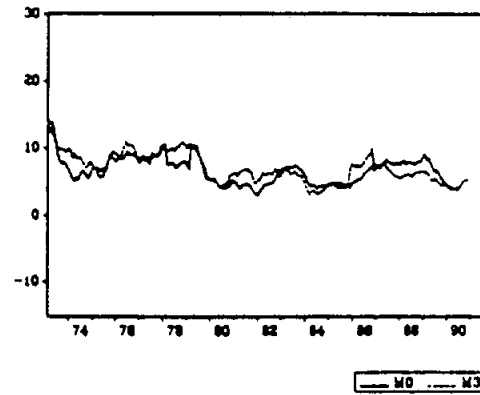
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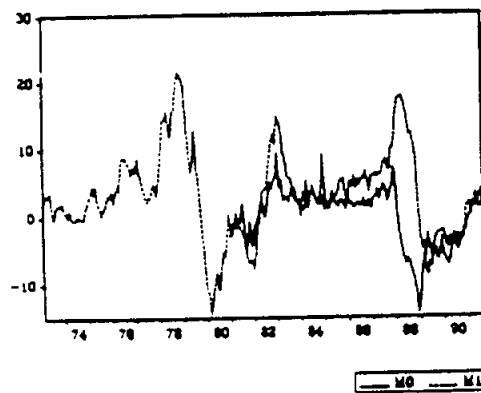
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

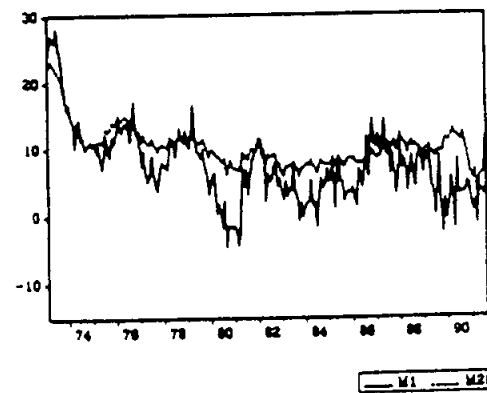
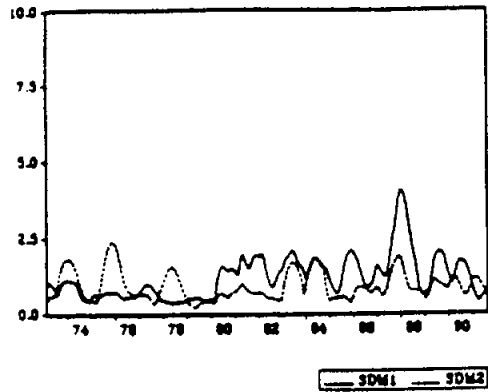
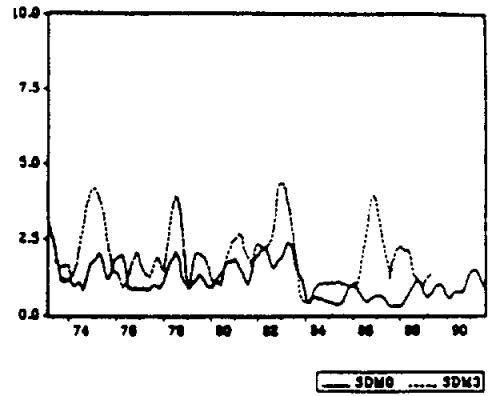


Figure 2
Variability of Narrow and Broad Money Growth Rates
(e.g., SDM1 OR SDM2)

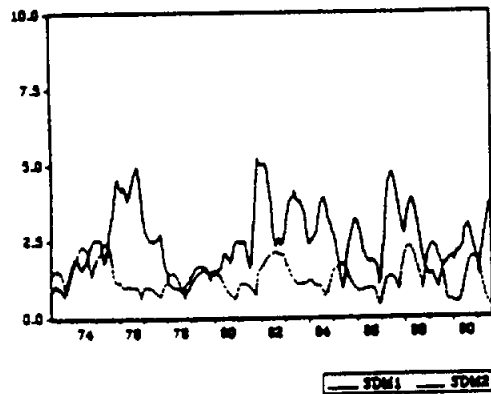
Panel A: United States



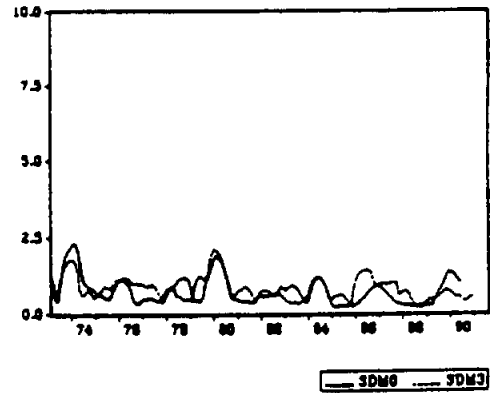
Panel B: United Kingdom



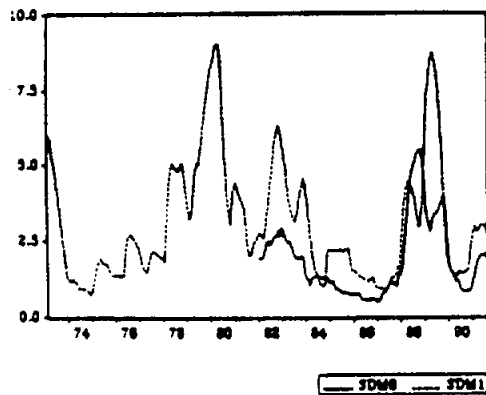
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

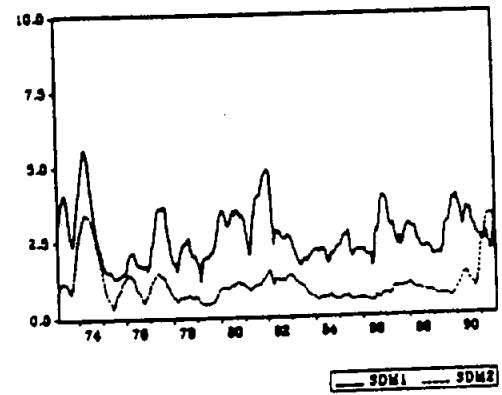
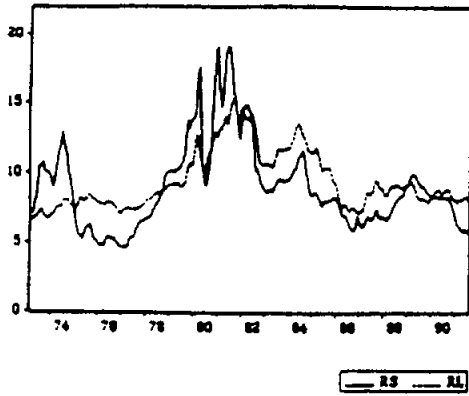
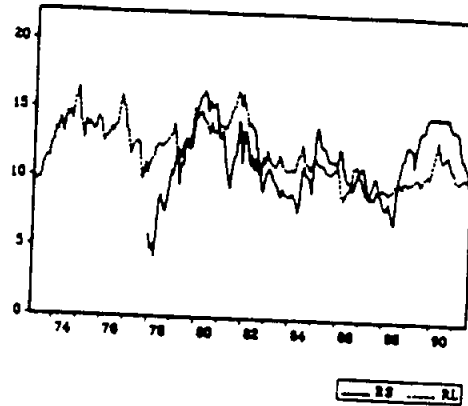


Figure 3
Interest Rates on Overnight Bank Loans (RS)
and on Long-Term Bonds (RL)

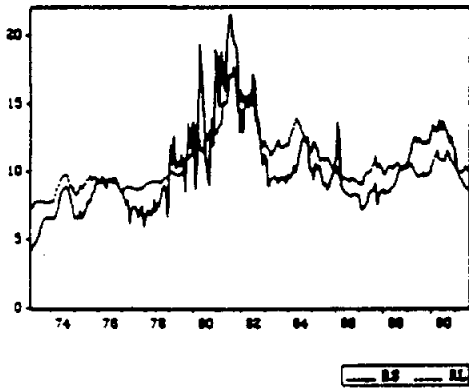
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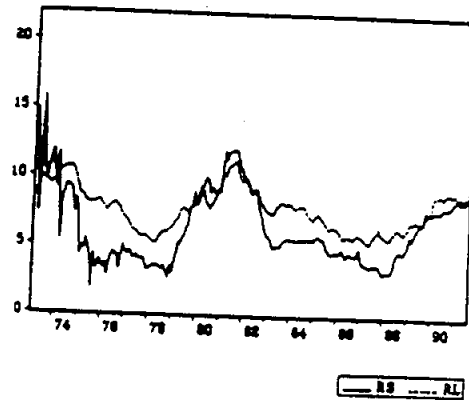
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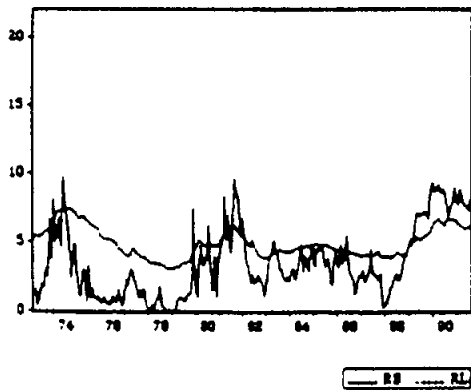
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

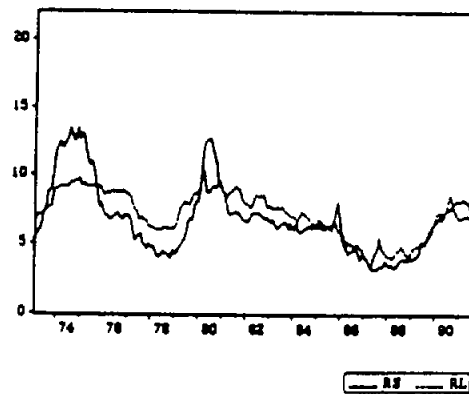
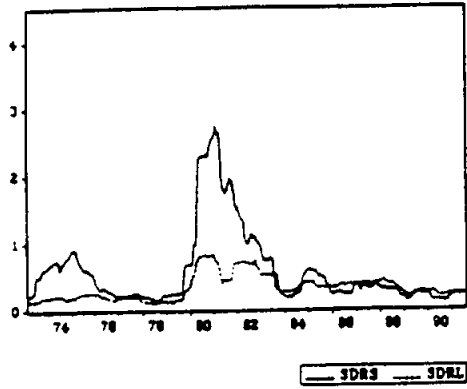
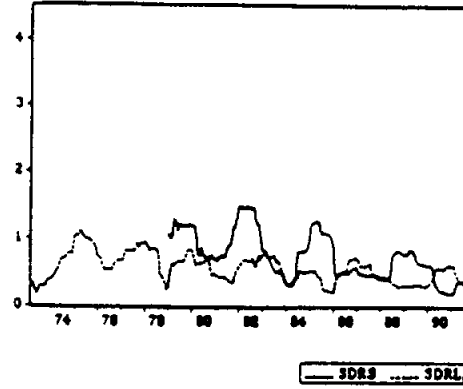


Figure 4
Variability of Changes in Short-Term and Long-Term
Interest Rates (SDRS and SDRL)

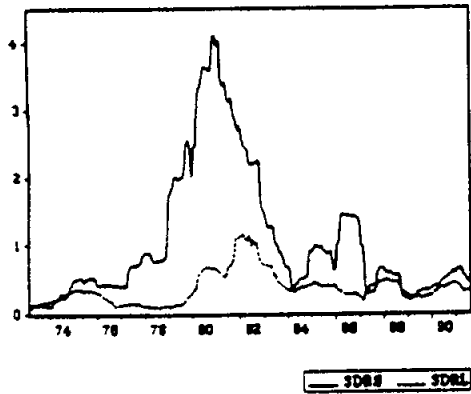
Panel A: United States



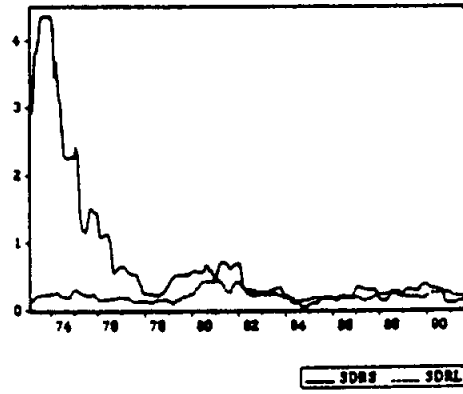
Panel B: United Kingdom



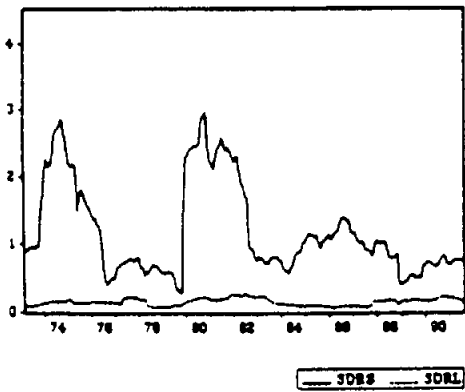
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

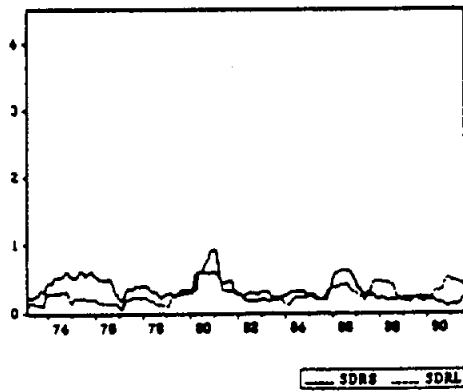
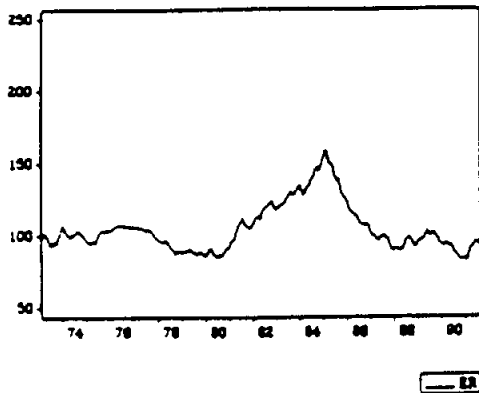
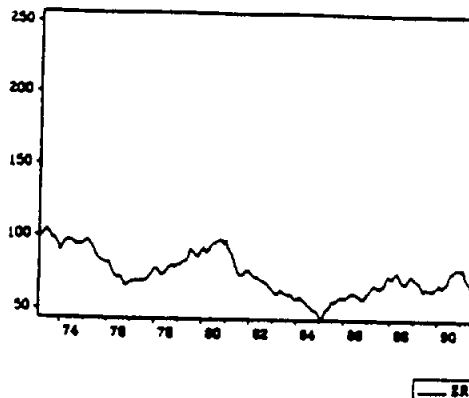


Figure 5
Indices of Nominal Exchange Rates
(March 1973 = 100)

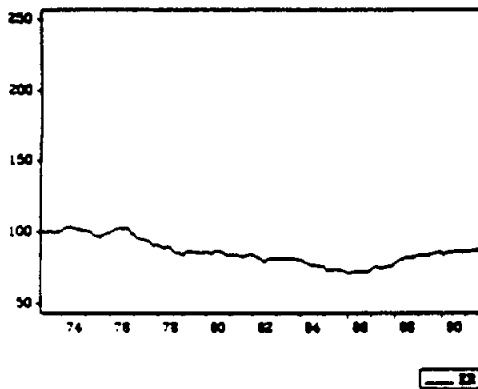
Panel A: United States



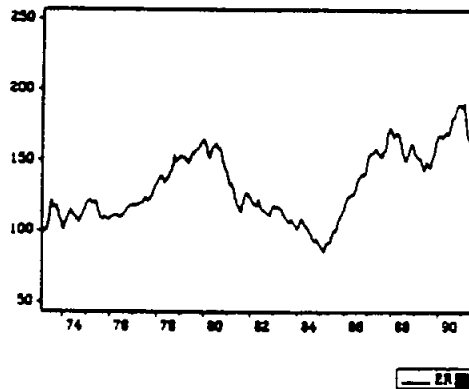
Panel B: United Kingdom



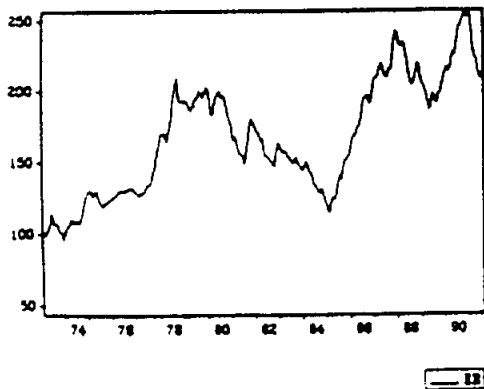
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

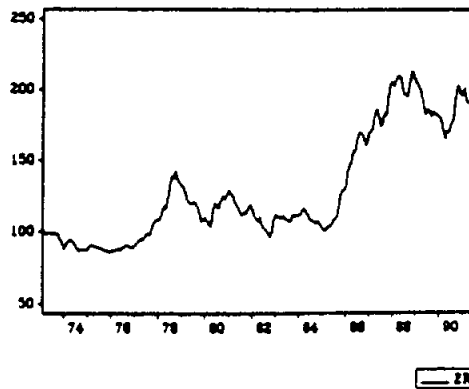
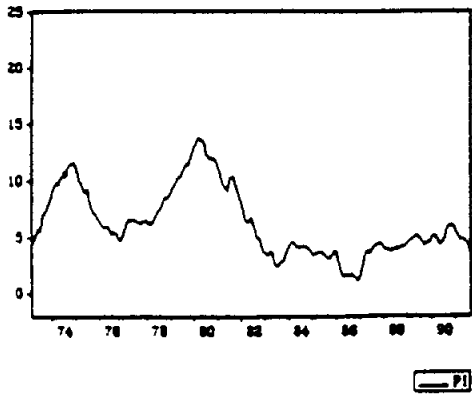
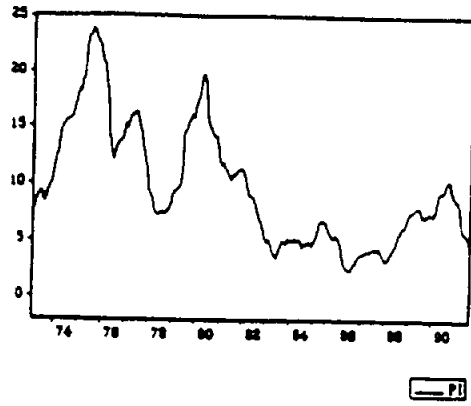


Figure 6
Inflation Rates

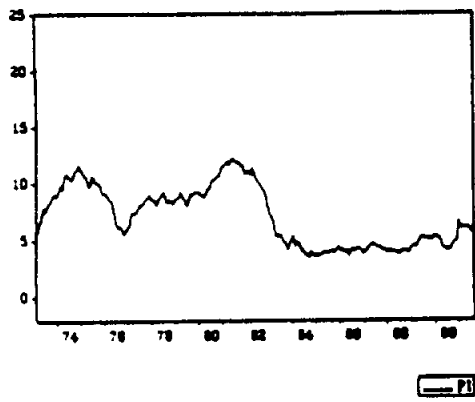
Panel A: United States



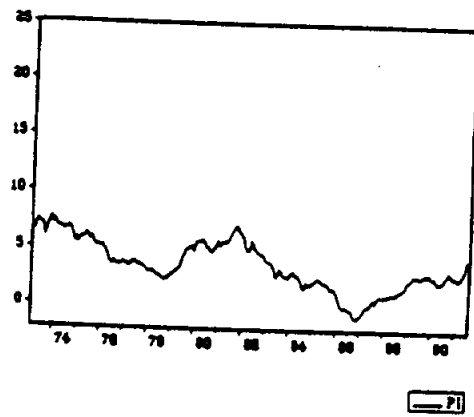
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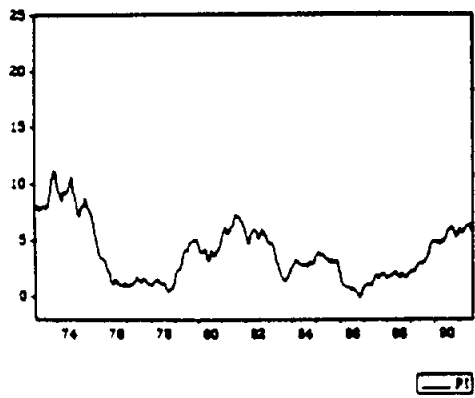
Panel C: Canada



Panel D: Germany



Panel E: Switzerland



Panel F: Japan

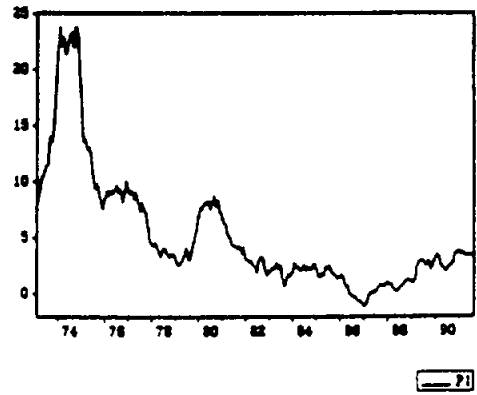
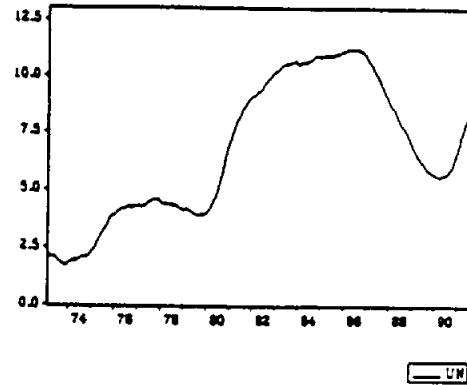


Figure 7
Unemployment Rates

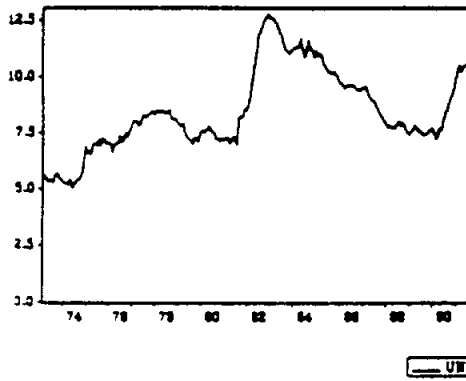
Panel A: United States



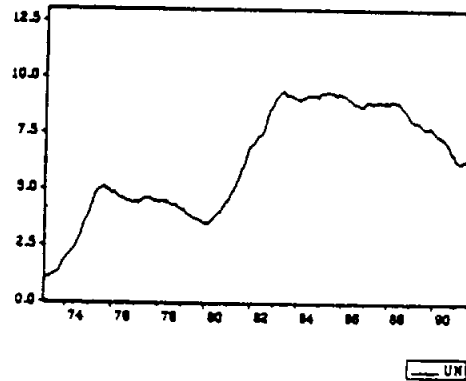
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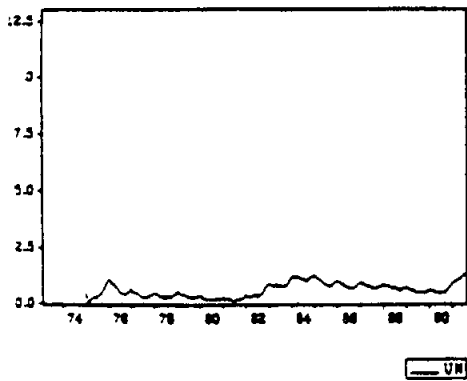
Panel C: Canada



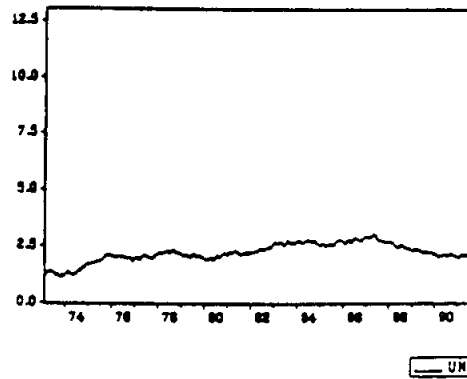
Panel D: Germany



Panel E: Switzerland



Panel F: Japan



NOTES TO FIGURES

Figure 1: Data are the growth rates (log changes) from one year earlier of monetary aggregates. M0 refers to the monetary base for the U.K. and Switzerland and to central bank money for Germany. M1, M2, and M3 refer to conventional national definitions.

Sources: Federal Reserve Bulletin and releases; Bank of England Quarterly Bulletin (Tables 11.1 and 2); Bank of Canada Review (Table E.1); Bundesbank Monthly Reports (Tables I.2, I.3; supplement 4, Table 33); Banque Nationale Suisse, Bulletin mensuel (Tables 9 and 11); Bank of Japan, unpublished

Figure 2: SDM0, SDM1, SDM2, and SDM3 are the standard deviations over the previous twelve months of the growth rates of the monetary aggregates M0, M1, M2, and M3, as shown in Figure 1. Sources: Same as Figure 1.

Figure 3: Interest data by country are as follows: U.S.--federal funds rate (RS), ten-year Treasury bonds and notes (RL); U.K.--call money with discount market (RS), medium-dated (ten-year) government bonds (RL); Canada--overnight money market financing (RS), government bonds, over ten years (RL); Germany--day-to-day money (RS), federal government bonds, all maturities (RL); Switzerland--day-to-day money (RS), confederation bonds (RL); Japan--call money (unconditional) (RS), government bonds, interest-bearing (RL). RS for Switzerland refers to euro market rate, other short rates are money market rates. Long rates are secondary market rates. Rates are monthly averages, except the U.K., Canadian, Swiss, and Japanese long rates and the Canadian short rate, which are month-end.

Sources: Federal Reserve Bulletin; Bank of England Quarterly Bulletin (Tables 9.2 and 9.1); Bank of Canada Review (Table F.1); Bundesbank Monthly Reports (Table TV.6; supplement series 2, table 8.b); Banque Nationale Suisse, Bulletin mensuel (Tables T.20 and T.24); Bank of Japan, Economic Statistics Monthly (Table 63) and Tokyo Stock Exchange, Monthly Statistics Report

Figure 4: SDRS and SDRL are the standard deviations over the previous twelve months of RS and RL, as shown in Figure 3. Sources: Same as Figure 3.

Figure 5: ER refers to indices of nominal exchanges rates, March 1973 = 100, with an increase indicating an appreciation. For the U.S. the exchange rate is the Federal Reserve's effective exchange rate index, for other countries the value of the currency in U.S. dollars is used. Source: Federal Reserve Bulletin.

Figure 6: Inflation rates are measured as the growth over the last twelve months of the broadest available measure of consumer

prices, as follows: U.S.--CPI-U, all items; U.K.--retail price index, all items; Canada--CPI, all items; Germany--cost-of-living index, all households; Switzerland--consumer prices, all items; Japan--CPI, all households, excluding farmers, fishermen, and single persons.

Sources: U.S. Bureau of Labor Statistics; U.K. Central Statistical Office, Monthly Digest of Statistics, Table 18.1; Bank of Canada Review, Table H.12; Bundesbank Monthly Reports, Table V.III; (Swiss) Dept. Fed. L'Economie Publique, La Vie Economique, Table B5.1; Bank of Japan, unpublished

Figure 7: Data are civilian unemployment rates, national definitions. U.K. rate excludes school leavers.

Sources: U.S. Dept. of Labor, The Employment Situation, Table A.1; U.K. Central Statistical Office, Economic Trends, Table 36, col. 5; Bank of Canada Review, Table H.7; Bundesbank, supplement to the Monthly Reports, series 4, Table 7; (Swiss) Dept. Fed. L'Economie Publique, La Vie Economique, p. 3; (Japan) Labor Force Survey, Economic Planning Agency, Japan Economic Indicators