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Monetary Policy in the Second Half of the 1980s: How Much Room for Manoeuvre?

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Kevin Clinton and
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Monetary and Fiscal Policy Division

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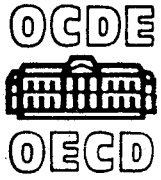

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This paper discusses how monetary policy might assist macroeconomic performance in the second half of the 1980s in the G-10 countries, without compromising the medium-term objective of price stability. From this perspective, the recent stance of monetary policy is assessed, as well as its possible effects on output and inflation. The paper also examines the gains that might be expected from a short-run monetary stimulus, internationally coordinated, against the risks that might be implied for central bank credibility.

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Ce document examine dans quelle mesure la politique monétaire pourrait contribuer à ameliorer la situation économique dans les pays du Groupe des Dix durant la seconde moitié des années 80, sans compromettre l'objectif de stabilité des prix à moyen terme. Dans cette optique, l'orientation récente des politiques monétaires est analysée ainsi que leurs effets possibles sur la production et l'inflation. Le document confronte en outre les gains éventuels de mesures d'expansion monétaire, coordonnées à l'echelle internationale, et les risques qui pourraient en résulter pour la crédibilité des banques centrales.

MONETARY POLICY IN THE SECOND HALF OF THE 1980s:

HOW MUCH ROOM FOR MANOEUVRE?

by

Kevin Clinton and
Jean-Claude Chouraqui*

Monetary and Fiscal Policy Division

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I. INTRODUCTION

The basic objective of announced monetary policy in the industrialised countries is price stability, which in practice means an acceptably low rate of increase in broad price indexes over the medium-term. For most larger economies, this objective does not imply at present any sharp reductions from the relatively low underlying inflation rates of the past year or so. In the conduct of monetary policy, targets for money growth have played, and continue to play, an important strategic role in most of the major countries (1). However, monetary targeting has generally been practised with pragmatism and, in this respect, the discretionary component of monetary policy has increased in the course of the 1980s. The central issue discussed in this paper is the extent to which there may be some flexibility for monetary policy in the short run to achieve desirable effects on the real sector, for example by less rigid adherence to monetary targets, without compromising the ultimate objective of price stability. More specifically, the paper addresses the following questions:

-- What aspects of the macroeconomic situation in the 1980s have monetary causes?

-- What is the recent stance of monetary policies? How will they affect future output, employment and price levels?

-- What can monetary policy, independent or coordinated internationally, usefully do to sustain economic growth and reduce unemployment?

-- How can the credibility of non-inflationary policies best be enhanced? Can international monetary cooperation be consistent with the maintenance of this credibility?

II. MACROECONOMIC BACKGROUND IN THE MID-1980s

a) Broad trends

Table 1 illustrates macroeconomic developments for the G-10 countries in terms of changes in a set of indicators, which broadly correspond to those contained in the communiqué of the Tokyo Summit of May 1986. The overall picture in the mid-1980s can be characterised as follows:

i) Real GNP growth during the post-1982 recovery has averaged about 3.3 per cent per annum for the whole group of countries. This is less than the rate of growth observed in the 1975-1980 upswing. The current recovery has been more pronounced in the United States than in other countries, especially in terms of domestic demand.

ii) Unemployment persists at high levels and is arguably the most important economic problem of the day, particularly in Europe.

iii) Rates of inflation have declined on average from around 10 per cent in the late 1970s and early 1980s to around 3 per cent in the mid-1980s.

iv) The terms of trade of the OECD area, which reached a low in 1980-81 as real prices of oil and other imported raw materials rose, improved subsequently as commodity prices fell. As well as having a direct impact on standards of living in industrialised countries, these relative price changes also importantly influenced the dynamics of the inflation and disinflation process.

v) Actual budget deficits for the G-10 as a whole have been high in proportion to GNP since the early 1980s. Even on a structural (i.e. cyclically adjusted) basis, deficits are on average higher as a percentage of GNP than in the later 1970s, mainly because of increases in North America and Italy which have more than offset decreases elsewhere.

vi) Current account imbalances widened, especially for the three largest economies (namely the United States, Japan and Germany), raising the issue of their sustainability in the long run.

vii) Monetary expansion has remained relatively rapid during the period of disinflation; indeed growth in broadly defined money was not much lower on average in the 1982-86 period than in the preceding five years (Chart 1). Nominal interest rates rose steeply in the early 1980s, pushing real rates to historically high levels. Although nominal rates declined as inflation fell, real rates on available measures are still above previous norms in most countries.

viii) Exchange rate variability remained high. It became clear in the 1980s that prolonged swings in exchange rates could cause medium-term misalignments with respect to underlying economic fundamentals. Real effective exchange rates within the G-10 tended to follow nominal effective rates quite closely from year to year, as the latter varied much more than inflation differentials.

b) Monetary aspects

A difficulty for the analysis of monetary policy surfaces from this background description: in general, there has not been a close correlation between monetary aggregates and nominal income. Most importantly, in the United States and some other countries there is no clear indication from the growth rates of money stocks alone of the switch from highly expansionary policies in the later 1970s to strongly disinflationary policies in the early 1980s. In part this reflects endogeneous changes in the quantity of money demanded, as the cost of holding money rose and then fell with the inflation rate. Thus, the above-trend movement in the ratio of broad money to income since 1982 (Chart 1) can to a large extent be explained as an induced increase in the demand for liquid assets. But the real problem in assessing the growth rates of the most prominent targeted monetary aggregates has come from exogenous shifts in money demand functions, or equivalently in money velocity.

There has been abundant discussion of this phenomenon elsewhere (2); suffice it to say here that financial innovation and deregulation have caused significant changes in cash management.

Despite this difficulty, it is clear that tight monetary policy, together with the decline in commodity prices, underpinned the process of disinflation. The marked deceleration in inflation in the early 1980s followed the adoption of non-accommodative monetary policies in the OECD area generally. This was perhaps most notable in the United States, as reflected in a steep increase in nominal and real interest rates from mid-1980 through 1981. Subsequently, as U.S. fiscal policy became strongly expansionary, real interest rates reached historically high levels. Outside the United States, monetary authorities were, in large part, concerned to limit the depreciation of their currencies against the U.S. dollar, so as to avoid upward pressures on their price levels. In Japan there was additional concern about the protectionist sentiment that a low value of the yen might arouse.

c) Links between monetary and real variables

The effect of monetary policy on real variables in the medium term is generally more difficult to determine than that on inflation. While the adoption of stringent monetary policies undoubtedly contributed to the 1981-82 recession, it is more problematical to assess the role of monetary policy in the subsequent, relatively slow, recovery. In the short run, wage and price stickiness implies that a shift to tight money will reduce output, but as time passes monetary restraint should be reflected more in the rate of inflation than in the rate of economic growth. Since inflation has in fact declined considerably since 1982, it becomes less plausible that tight money combined with price stickiness continues to be a principal cause of the persistent sluggish activity and high unemployment. Moreover, during the last fifteen years OECD economies have been subject to a number of important real shocks, including the boom and bust in the relative price of commodities, especially of oil, an increased share of savings absorbed by budget deficits, an expansion in the size of the public sector and, in the 1980s, a sustained effort at fiscal consolidation in most countries. As a result, an a priori

case could be made that the causes of many current economic problems -- especially the longer lasting ones -- lie within the real sector.

In particular, it does not seem that monetary policy has been the primary cause of the large and persistent current account imbalances that developed in the 1980s. In fact, while monetary policies (unlike fiscal policies) have been broadly similar in the three largest economies, the current account position in the United States has diverged markedly from that of Japan and Germany. Under the floating exchange rate regime, monetary policies have no definite effect on current account flows. Monetary expansion in one country can cause its trade balance, in volume terms, to improve or to deteriorate depending on the values of a number of parameters such as the size of the country, the elasticity of exchange rate expectations, the mobility of capital, the degree of wage flexibility, etc. This ambiguity is not resolved by econometric estimates, which give no clear indication of the direction of the net effect of monetary policy on trade volumes. Factors which have a more direct impact on the domestic saving and investment balance, such as fiscal policy, are likely to exert the main influence over the medium term evolution of the current account.

It is probable, however, that monetary policies have had effects of some duration on real interest rates, real exchange rates, and thereby on output and other real variables. For example, studies of the causes of high real interest rates do attribute a significant lasting impact to tight monetary policies (3). A conventional explanation for this would be that wages and prices respond very slowly to monetary restraint, which would cause real money balances to decline. An alternative explanation would stress the legacy of previous inflationary policies on expectations. Given the experience of the 1970s, people might rationally attach a non-negligible probability to a future resurgence of inflation. Such a fear would be encouraged by the perception that the fragile debt positions of the developing countries and of some important sectors within the industrialised countries might not allow monetary policy in the future to put up much resistance to inflationary shocks (4). Thus, as long as expectations of inflation are above the observed performance, ex post measures of real interest rates (i.e. real returns actually realized on financial instruments) might remain unusually high for an extended period.

III. THE RECENT STANCE OF MONETARY POLICY

a) Monetary indicators

To assess the overall thrust of monetary policies over the past year or so a variety of indicators must be examined. It is common to distinguish three types of indicators: instruments, intermediate targets and ultimate objectives, respectively. Information on the stance of policy outside the very short run is not necessarily best measured by the instruments under the direct control of monetary authorities (e.g. the supply of central bank cash reserves to the commercial banks or the official lending rate). Hence most of the indicators discussed here are intermediate variables (money stocks, market interest rates and exchange rates), which are not directly controlled by the authorities. Nominal income is more in the nature of ultimate objective, although it could also be regarded as a medium-term intermediate target for policy (5). The behaviour of each of these variables might yield some information about the stance of monetary policy from mid-1985 up to the most recent period for which complete data are available.

For the purposes of the discussion here, policy can be defined to be neutral if it would allow nominal income or the price level to move along a path consistent with the ultimate objective of price stability, given the behaviour of other exogenous variables. If monetary policy imparts an upward impulse to those nominal variables, relative to the objective of price stability, it can be said to be expansionary; and in the opposite case, restrictive. In what follows this distinction is not applied rigorously. To do so would require the use of structural econometric models, but the results obtained in this way would likely be quite specific to the model chosen.

Money growth

As indicated in Table 2, the growth of the broadly defined money supply from the second quarter of 1985 to the second quarter of 1986 in the G-10 countries was on average at 8.3 per cent; more recent figures for the three largest economies suggest that this rate of growth increased in the third

quarter. Despite some deceleration from 1985, money aggregates have been either above or not far from the upper limits of target ranges in most countries that announce monetary targets (Chart 2). Thus, gauged by reference to targets and/or to broad money growth, it would seem that monetary policy has generally been expansionary in the United States, Germany and the United Kingdom, although the narrow aggregate M0 has remained within target in the last country. In Japan and most of the other European countries the stance of policy seems to have been roughly neutral over the period since mid-1985 as a whole; however, Japanese monetary policy leaned more towards expansion in the course of 1986.

The above impression for the three largest economies does not appear to be affected by any unusual behaviour in the demand for broad money in the recent period. For those three countries, it is possible to estimate a demand function for a broad money aggregate that has reasonable properties over a sample period extending to the second quarter of 1985. Estimation results of equations for M2 in the United States, M2+CD in Japan and M3 in Germany (6) are presented in Table 3; out-of-sample predictions are shown in Table 4. The equations track the growth in money in the 4 quarters ending mid-1986 quite well. A simple interpretation of this finding is that there were no unusual shifts in the money demand functions in 1986. One might suspect, since the implied long-run elasticities with respect to income are rather high, that part of the increase in money demand really due to structural factors over the estimation period is spuriously attributed to real income growth. Read in this way, the results indicate that there was no more than a regular trend in the demand functions in 1986. It seems, therefore, that over the period considered the growth rates in the broad measures of money are reasonably reliable indicators of the stance of monetary policy in the United States, Japan and Germany.

These results have, of course, to be interpreted with caution since, by the standards of current financial modelling, the specification of the money demand equations used is very simple. In particular, given the experience with this type of equation for other definitions of money and/or for other countries, it is uncertain that they will prove to be stable in the future.

Interest rates

The recent behaviour of nominal interest rates generally indicates an easing of monetary policies. This is clearest in the United States where from the second quarter of 1985 to the third quarter of 1986 short-term rates declined by almost 200 basis points. U.S. long-term interest rates declined until March 1986, but thereafter levelled off. There was then a steepening of the yield curve, as markets became nervous that the Federal Reserve might have to tighten in the future. In other countries nominal interest rates declined also, but less than in the United States. Real interest rates are more difficult to judge, especially at the long end, but measures of ex post real rates (as shown in Table 2) would have fallen by less than nominal interest rates, given the decline in inflation over the period considered.

Exchange rates

Exchange rate movements often indicate something about relative stances of monetary policies among individual countries (7). Over the period in question the sizable depreciation of the U.S. dollar was obviously in large part the result of a change in market expectations following the Plaza agreement in September 1985, and an adjustment to more sustainable exchange rates. In some degree, however, the changes in exchange rates can be attributed to shifts in interest rate differentials. For example, the narrowing of the differential between the United States and Germany could, according to some estimated exchange rate equations (8), account for as much as one-third of the decline in the mark value of the dollar. In the United States, the United Kingdom and Canada, exchange rate depreciation would of itself impart an upward impulse to the price level and to activity, while the sharp appreciations of the yen and mark have deflationary effects in Japan and Germany.

Nominal income

Over time, nominal income is importantly influenced by monetary policy. However, the link between nominal income growth and monetary policy over a period as short as a year is liable to be obscured by the effects of other

exogenous influences on aggregate demand, as well as by lags in the effects of monetary policy on prices and output. In 1986 one has in particular to contend with the impact of the steep drop in energy prices, as well as large adjustments in exchange rates, shifts in consumers' expectations and some changes in fiscal positions. While these factors did not have a uniform impact, nominal income decelerated from mid-1985 to mid-1986 in the OECD area as a whole, reflecting both lower output growth and reduced inflation (9). Among the major countries, this deceleration was most marked in the United States, Japan and the United Kingdom, while Germany experienced an acceleration.

Although it is difficult to draw any definite inferences from this about the current stance of monetary policy, nominal income movements are useful in assessing the behaviour of other monetary indicators, especially in countries where money demand functions appear to be stable. Thus, for example, the decline in interest rates in the United States and Japan during 1986 seems consistent with the deceleration in nominal income against the background of a sustained monetary expansion in these two countries. Likewise, in Germany, the relative stability of interest rates over the same period would reflect the fact that increased monetary growth has gone together with the acceleration of nominal income.

Assessment

In the three major countries monetary growth seems to have been a fairly reliable indicator of the recent stance of monetary policy. Inferences drawn from monetary aggregates are generally consistent with the combined changes in interest rates, exchange rates and nominal income over the period considered. They suggest that monetary policy was relatively expansionary in the United States and Germany, while in Japan it switched from a restrictive policy in the fall of 1985 to an easier stance during 1986. It would appear from various indicators that policy was expansionary in the United Kingdom, about neutral in other European economies and moderately restrictive in Canada.

A perspective on the degree of the current monetary easing in the United States can be obtained from a comparison with the period from the

second quarter of 1982 to the third quarter of 1983, which is generally regarded as a brief phase of monetary relaxation in the context of a longer run disinflationary stance. At that time, the easing was more marked than in 1985-86 and was accompanied by an expansionary fiscal policy. This may partly explain the strong growth in domestic demand experienced subsequently. By contrast, in Japan, Germany and the United Kingdom, there was little or no acceleration in monetary growth in this earlier period.

b) Possible effects

Econometric estimates shed some light on how much the recent easing of monetary policy might ultimately be reflected in output and inflation, as well as what might be achieved through policy changes. To this end, two types of research are surveyed in Annex 1, based respectively on small reduced form and large models. Running through this research is an important distinction between models that incorporate rational expectations (RE) and those that do not; and within the RE group the degree of price flexibility embodied in a model makes a significant difference to its predictions. In particular, the combination of RE and perfect price flexibility rules out a useful role for monetary policy to influence output and employment.

However, the bulk of the evidence surveyed strongly suggests that exogenous changes in monetary policy can have significant effects both on real variables and on the price level. What is less clear are the precise dynamics of these effects. According to some estimates, money can have real effects that last for some years, whereas others suggest that such effects are strictly transitory. This difference essentially derives from the specific structure of the models. RE models typically impose more constraints on system properties than do the "mainstream" models often used by forecasters and policy analysts (such as OECD's INTERLINK) -- i.e., expectations are constrained to be consistent with the predictions of the model itself, and in various cases money is constrained to be neutral with respect to real variables in the long run.

More detail on these aspects can be found in Annex 1. Here, it is sufficient to summarise some of the results reported to the March 1986 Brookings Institution conference on multicountry models. These results refer to a 4 per cent exogenous increase in money stock in all OECD countries, a shock which is as large as most central banks would be prepared to contemplate under anything like current circumstances. The model simulations show quite a wide range of results but the median estimate suggests that, in the second year, OECD-area real GNP would be raised by less than 1 per cent. In RE models the effect after six years is negligible, whereas in the mainstream models it tends to persist, typically at around the second-year level. Simulated effects on the world price level are in general surprisingly small, but as would be expected they are larger for the RE group (10).

Two questions arise in connection with a monetary expansion confined to a single region. The first concerns the effects within that region. The model simulations indicate that the effects are larger for the United States -- both on output and price -- than for the rest of the OECD area as a whole. The second concerns spillover effects on other regions. Macroeconomic theory provides little guide as to the direction of the output spillover, since a monetary expansion in one country will tend to reduce interest rates, raise domestic demand and depreciate the exchange value of the domestic currency. This mix of effects might either raise output abroad or reduce it. Therefore, in theory, monetary expansion might have a "locomotive" effect or a "beggar-thy-neighbour" effect. In fact the median estimates of the multicountry models imply that the output spillovers are negligible. Estimated spillovers on the price level show a tendency to be negative, suggesting that monetary expansion in one region leads to an improved inflation performance elsewhere. This would happen because monetary expansion abroad tends to raise the real exchange value of the domestic currency in the short run.

In summary, the simulated output effects of monetary policy are small in most countries for increases in the money stock within a plausibly acceptable range, but there is little consensus on the likely duration of such effects. There is evidence that the effect on employment is even weaker, and more poorly determined, than that on output. Therefore, existing empirical

relationships provide no basis to suppose that policy might achieve short-to-medium run real objectives with a high degree of accuracy.

All this suggests that while a positive stimulus to aggregate demand might still be felt as a result of the recent easing of monetary policy, it might not be very large. Demand could however rise by more to the extent that the structural declines in velocity of money, associated with innovations and the process of disinflation, may have run their course. With respect to the objective of price stability, the risk that monetary expansion in 1986 may have been excessive would not seem very high. Whether that objective could tolerate a more sustained easing of monetary policies is considered in the next section.

IV. MONETARY POLICY CREDIBILITY AND COORDINATION

In making recommendations about monetary policy, one cannot just rely on the simulated effects of policy in econometric models. In the real world the impact of a given policy change will depend heavily on the state of expectations and the degree of confidence in the monetary authorities. In this regard, the present section considers some fundamental issues related to the credibility of non-inflationary policies that have received much attention in the recent analytical literature on economic policy. It goes on to discuss the extent to which the efficacy of monetary policy could be enhanced through international cooperation, and then draws implications for the second half of the 1980s. More details on these topics can be found in Annex 2.

a) Time consistency and central bank reputation

A number of economists have recently argued that discretionary monetary policy may be incompatible with price stability. This conclusion is derived from some strong neo-classical assumptions, including rational expectations, and the concept of time consistency. A policy is said to be "time consistent" when it takes fully into account the anticipated discretionary decisions to be

made by the authorities in the future. In this sense, a monetary policy aimed constantly at zero inflation can be said "time inconsistent", because if the public does believe that prices will remain stable, policymakers have an incentive to allow a temporary increase in monetary expansion to boost output (11). Thus a non-inflationary monetary policy may have an inherent credibility problem. If the public suspects that the authorities will renege on their commitment of price stability, expectations of inflation will cause nominal wages and interest rates to rise immediately. Assuming, however, that the authorities maintain a non-accommodating stance, inflation will turn out to be lower than expected, so that realised wage rates will prove too high for achievement of the full employment level of output and, for the same reasons, ex post real interest rates will appear surprisingly high. Consequently, the monetary authorities can get output closer to full employment only by allowing some inflation to match the expectations of the public. In other words, a time-consistent policy (12) will in general involve some inflation, unless the monetary authorities can credibly commit all their future policy decisions to the objective of price stability.

This line of reasoning has led some economists to recommend basic reforms, that would put tight legal constraints on the discretionary authority of central banks, to allow only non-inflationary policies. Such suggestions are of more interest for their audacity than their realism, since it is difficult to envisage how they might be implemented. More important are the implications of time consistency for discretionary monetary policy as it is actually practised. These implications are not novel but the notion of time consistency throws them into sharp relief. First, arguments that monetary authorities must take a long view and be concerned to build a strong reputation for resisting inflation are enhanced. A central bank that takes a short view and creates money rapidly, if only temporarily, risks permanently increasing the inflation rate and worsening the short-run output-inflation tradeoff. Second, arguments for announced monetary targets, in circumstances where money aggregates are stably linked to ultimate nominal objectives, are reinforced. The central bank is then able to prove its commitment by means of an important intermediate variable that is easily monitored.

The view that inflation could be quickly reduced with minimal output losses, as implied by some rational expectation approaches, requires absolute confidence in the monetary authorities. But once the incentive for time-inconsistent policies is taken into account, there is no reason to believe that such confidence can exist. In practice, it will take considerable time, or some very sharp shocks, for monetary authorities to establish credibility. In the 1980s credibility has rested on demonstrated resistance to inflation pressures. Monetary targets, where they have been met, have helped in this respect by providing a yardstick for proving the commitment of the authorities. While the room for discretion may appear larger in the absence of targets, the exercise of such discretion is likely to be more hazardous because the anchor for expectations is less firm. Reducing inflation expectations in the 1980s has involved reduced output and increased unemployment, which might be regarded as part of the costs of inflation, and the associated loss of central bank credibility of the 1970s.

b) Policy coordination

Several empirical studies that have attempted to evaluate the potential gains from policy coordination broadly agree on a number of important points, despite differences in models used. These points may be briefly stated as follows:

i) Small gains can be derived from coordinated vis-à-vis rational insular policies. In the conditions of the mid-1980s, the gains stem in large part from more relaxed monetary policies in cooperative solutions, which result in increased output and, in some models, in reduced trade imbalances. Inflation is higher, but not by so much to negate the net welfare benefit (13).

ii) Gains in dynamic models may arise from improved timing. Disinflationary policies would be applied less abruptly in a cooperative regime so that the present value of the welfare loss is less, although the sum of output losses over time is the same as in a non-cooperative regime to achieve a given degree of disinflation.

iii) A potentially important side benefit accrues to the developing countries, which are not assumed to be parties to the policy coordination, but which gain from increased demand and lower interest rates in the OECD area and from improved terms of trade.

There are two interacting reasons for the inference that the uncoordinated monetary policies of the 1980s have been too tight. First, policy has revealed a strong preference for price stability relative to output growth. Second, the models typically show negative short-run spillovers on the price level from monetary policy -- i.e. an easing (tightening) has a disinflationary (inflationary) effect abroad because of the depreciation (appreciation) of the domestic currency. The preference for price stability of itself would of course justify a degree of monetary restraint, but empirical estimates suggest that in conjunction with the second factor it has produced a systemic bias towards unduly tight policies.

However, important qualifications attach to the potential gains from coordination that have been found by the empirical studies:

i) The smallness of the estimated gains and their uneven distribution is a warning there may not be sufficient incentive for all countries to cooperate, in particular for the United States.

ii) The models differ and it is uncertain if any is an adequate representation of the real world. Cooperation based on incorrect models could easily be worse than non-cooperation.

iii) Recent theoretical analyses have shown that coordination may result in welfare losses, because of uncertainties and expectational factors that have not been taken into account in the empirical work.

Most important in this last respect is that the estimated gains in dynamic models often rely implicitly on time-inconsistent policies. Such policies are not necessarily more credible just because an international agreement is made, and they may be less credible. Because fear of exchange rate depreciation is reduced, international coordination could yield solutions

that are too inflationary and on balance worse for welfare over time than non-cooperative solutions. Some authors conclude that unless binding constraints or the authorities' strong reputations can make non-inflationary policies credible, cooperation is futile.

c) Implications for the second half of the 1980s

Since the recent stance of monetary policies has eased, it is not clear whether the arguments on policy coordination discussed above would imply that further easing was still needed, especially for the United States given the substantial depreciation of the U.S. dollar. However, some conjectures could be made in this respect in the light of the most recent projections of the OECD Secretariat for 1987 and the first half of 1988 (Table 5). These projections foresee a continuation of the kinds of problems that the recent proposals for cooperation have been designed to cope with, i.e. modest output growth, high unemployment and large external imbalances.

If such problems are likely to persist into the medium term, it is natural to consider the case that has been made for a temporary additional increase in monetary expansion. This proposal, which should not be seen as an argument for "fine-tuning", simply requires that monetary stimulus can increase economic activity for a period of some duration, a view for which there is much empirical support. However, one difficult question in this context would be which countries should expand. There are various approaches to this question (14), but in any cooperative arrangement of that sort a primary objective would be to avoid putting sharp pressures on exchange rates (15). This would suggest that, in current circumstances, increased monetary expansion should be avoided in countries where further currency depreciation might increase the risk of inflation. On the other hand, a one-shot monetary stimulus would appear as a less risky option in strong currency countries; but econometric estimates reviewed in Annex 1 suggest that, to achieve significant gains in world output from a monetary expansion confined to a few countries, the monetary authorities concerned might have to announce substantial upward revisions of their monetary targets for a period of time, or allow substantial overshoots of previously fixed targets.

The main disadvantage of this sort of action would be to threaten price stability, and to undermine the credibility of monetary policy. In any situation, objectives for output and employment can be most easily achieved when there is confidence in price stability. Likewise, as mentioned above, establishing this confidence is a prerequisite for any success from coordinated monetary policies. Moreover, the evidence on policy coordination suggests that if monetary authorities individually pursue policies oriented towards sound long-run internal objectives, the additional gains that might be obtained by explicit cooperation are small and uncertain.

V. SUMMARY AND CONCLUSIONS

It does not seem that monetary factors are the primary cause of the more lasting macroeconomic problems of the 1980s, which probably stem basically from some deep-seated real sector developments. However, the persistence of high unemployment and, until very recently, high real interest rates may be due to some extent to lingering effects on expectations of the burst of inflation in the 1970s, and to that extent is ascribable to inflationary monetary policies followed in the past. The solution to this problem would be to ensure that the credibility of the medium-term objective of price stability is not compromised, rather than to allow a renewed acceleration of monetary growth.

In the short run, the easing of monetary policies in 1986 may be a modest stimulus to aggregate demand in the OECD area, but of itself it is not likely to reduce unemployment by much. More generally, a wide range of econometric evidence suggests that while monetary expansion can increase output and employment, perhaps for several years, the estimated effects on these variables of acceptable increases in the money stock are quite small.

It appears then that there is not much room for monetary policies on their own to alleviate current economic problems, whether or not these policies are coordinated internationally. On the other hand, there is always the danger that inappropriate monetary action could make things much worse over the longer term. Since the inflationary excesses of the 1970s are far

from forgotten, the public's faith in the commitment of monetary authorities to non-inflationary policies is not unconditional. Any sizable monetary expansion, even if temporary, would come under close scrutiny as to its longer term implications for the stance of policy. If, in consequence, the public was led to fear a recrudescence of inflation, the main result of further monetary growth would not be a stimulus to output but a persistent worsening of the output-inflation tradeoff.

This is not to argue that there is currently a high risk of a rebound in inflation. If policies in 1986 were expansionary with respect to the medium-term objective of price stability, the evidence does not suggest that they were so by very much. Therefore, the most that would seem to be required for the time being to bring policies into line with longer-run objectives would be some caution in countries where monetary easing has been most evident.

In conclusion, it does not seem that the time is ripe for dramatic monetary policy initiatives in either direction. The kind of temporary monetary expansion that has been advocated in recent debates on international policy coordination might become appropriate if hard evidence of a significant economic downturn were to present itself, but not before. Although the post-1982 recovery in most countries has been weak, it would be all too easy to repeat the frequent previous mistake of "too much monetary support for too long" (16). There is a danger that any vigorous attempt to stimulate in current circumstances would threaten the underlying objective of providing a stable monetary framework. In the long run, prospects for employment are best when the monetary authorities have established a strong reputation for price stability. The costly investment that central banks have made in restoring reputation in the 1980s must weigh very heavily in deciding the future course of monetary policy.

NOTES

1. A discussion of the role of money stock targets in the formulation and conduct of monetary policy is found in Atkinson and Chouraqui (1986).

2. E.g. Atkinson and Chouraqui (1986). The problems with narrow definitions of money have been as least as severe as those for the broad definitions used in this paper.

3. See, e.g., Atkinson and Chouraqui (1985) Blanchard and Summers (1984) and Huizinga and Mishkin (1985).

4. Some of the risks of the growth of indebtedness in the United States are described in Volcker (1986) and Friedman (1986).

5. This is discussed in Atkinson and Chouraqui (1986).

6. In Germany the official target is expressed in terms of CBM, not M3. Over time, however, the two variables have tended to grow at approximately equal rates.

7. This point is discussed in OECD (1985).

8. For example, those in Sachs (1985). A substantial proportion of the decline in the effective value of the dollar against major currencies can also be accounted for by the relative decline in U.S. interest rates, on the basis of equations presented in Hooper (1985).

9. However, because of the large changes in relative prices in international markets, readings on price level movements in 1986 depend very much on the price index observed.

10. There is one outlier in each group with respect to the price effect. The project LINK model has strong negative own-area price level effects, apparently because a lower interest rate reduces inflation. The LIVERPOOL model has very large negative spillovers from other-OECD monetary policy to the U.S. price level. In both cases this results in negligible or perverse effects on world inflation rates from a coordinated monetary expansion.

11. See Kydland and Prescott (1977).

12. Therefore, a "time-consistent policy" has a different meaning than that generally attributed to "consistent policy". Consistency is usually regarded as a virtue, implying constancy and, in the context of monetary policy, a willingness to persist with a non-inflationary stance so as to enhance its credibility. This type of policy is defined as precommitted in the technical literature. A precommitment solution thus represents a situation in which the public expects, and the monetary authorities allow, no inflation. But while this would be

the best long-run solution, it may not be compatible with the incentives offered to policymakers.

13. Welfare is assumed in these studies to be a function of variables such as output, inflation and current account balances. The precise form of the function can affect the particular mix of policy recommendations that is derived.

14. For example Williamson (1986), in a discussion of the exchange rate target zone proposal, distinguishes four approaches to the burden of adjustment: discretion, a McKinnon Rule, a nominal income rule and a commodity standard. The argument considered in the present discussion is consistent with the first two of these approaches.

15. This assumes that exchange rates are not currently "misaligned" in some sense. According to the estimates of "fundamental equilibrium exchange rates" calculated by Williamson (1985), the yen by late 1986 would have already appreciated above its "equilibrium" value against the dollar, while the mark/dollar rate might have been around its "equilibrium" value.

16. As discussed in Atkinson and Chouraqui (1984).

TABLES AND CHARTS

Table 1

A MEDIUM-TERM PERSPECTIVE ON MACROECONOMIC PERFORMANCE IN THE G-10 COUNTRIES (a)
(In per cent)

	Broad money(b)	Nominal GNP/GDP	Price deflator	Real GNP/GDP	Unemployment rate	Interest rates: Nominal short	Interest rates: Nominal long	Interest rates: Real(c) short	Interest rates: Real(c) long	Budget balance (d)(e): Actual	Budget balance (d)(e): Structural	Current account(f)	Terms of trade 1981=100	Exchange rate variability(g)
	(Annual rate of change)									(ratio to GNP/GDP)				
ALL G-10 COUNTRIES														
5-year averages														
1982-1986	9.0	7.0	4.4	2.5	7.8	8.7	10.7	5.0	7.5	-3.8	-1.9	1.8	109.1	38.7
1977-1981	10.6	11.3	8.2	2.8	5.6	9.4	10.4	1.2	2.7	-2.3	-1.6	0.4	109.6	37.2
1972-1976	13.1	12.3	8.9	3.1	4.6	7.2	8.9	-2.1	-0.4	-1.7	-0.6	0.7	124.8(h)	24.1
Subperiod averages														
1983-1986	8.9	7.2	3.8	3.3	7.8	8.2	10.2	4.8	7.2	-3.7	-2.0	2.1	110.4	33.9
1980-1981	9.7	10.4	9.1	1.2	6.2	12.4	12.5	3.8	5.9	-2.6	-1.7	0.7	101.2	31.1
UNITED STATES														
5-year averages														
1982-1986	9.4	6.7	4.0	2.6	8.2	8.4	11.8	4.9	8.5	-3.4	-1.5	-2.2	108.6	38.1
1977-1981	9.4	11.4	8.3	2.8	6.7	9.6	10.5	1.2	2.6	-0.6	0.1	-0.2	106.8	39.7
1972-1976	10.1	10.1	7.3	2.6	6.4	5.9	8.1	-1.6	0.3	-1.2	0.1	0.3	123.9	22.2
Subperiod averages														
1983-1986	9.4	7.5	3.5	3.9	7.8	7.9	11.3	4.6	8.2	-3.3	-1.8	-2.6	109.9	40.5
1980-1981	8.7	10.3	9.4	0.9	7.4	12.7	13.1	3.8	6.5	-1.1	0.0	0.1	98.2	28.1
JAPAN														
5-year averages														
1982-1986	8.3	5.2	1.5	3.6	2.6	6.2	7.0	4.8	5.7	-2.5	-2.1	2.6	113.5	41.6
1977-1981	10.6	9.1	4.1	4.7	2.1	6.9	7.9	3.2	4.9	-4.5	-3.9	0.4	118.8	42.3
1972-1976	17.7	15.6	10.7	4.4	1.6	8.4	9.1	-2.7	-1.0	-1.1	-0.1	0.3	146.6	16.2
Subperiod averages														
1983-1986	8.0	5.3	1.5	3.7	2.7	6.0	6.8	4.5	5.4	-2.2	-1.8	3.1	116.6	37.6
1980-1981	9.1	7.6	3.5	4.0	2.1	9.2	8.8	5.8	6.8	4.1	-3.9	-0.3	99.0	28.9

Table 1 (continued)

	Broad money(b)	Nominal GNP/GDP	Price deflator	Real GNP/GDP	Unemployment rate	Interest rates: Nominal short	Interest rates: Nominal long	Interest rates: Real(c) short	Interest rates: Real(c) long	Budget balance (d)(e): Actual	Budget balance (d)(e): Structural	Current account(f)	Terms of trade 1981=100	Exchange rate variability(g)
	(Annual rate of change)									(ratio to GNP/GDP)				
GERMANY														
5-Year averages														
1982-1986	5.8	4.8	3.0	1.8	7.8	6.1	7.5	3.6	5.5	-2.0	0.6	1.6	107.2	32.5
1977-1981	8.1	6.5	4.2	2.3	3.8	7.3	7.9	3.0	3.7	-2.8	-2.0	-0.3	111.8	36.2
1972-1976	10.3	8.4	5.7	2.6	2.4	5.5	9.0	1.9	3.9	-1.9	-0.8	1.2	111.2	31.3
Subperiod averages														
1983-1986	5.6	5.2	2.6	2.5	8.1	15.4	7.1	3.1	5.2	-1.6	0.8	1.9	108.1	27.7
1980-1981	5.8	5.2	4.4	0.7	4.0	10.8	6.5	5.6	6.3	-3.3	-2.4	-1.3	103.6	46.6
OTHER G-10 COUNTRIES														
5-Year averages														
1982-1986	9.7	8.9	6.8	2.0	10.0	11.3	11.9	5.8	7.5	-5.7	-3.3	0.9	107.8	40.0
1977-1981	13.0	13.6	11.4	2.0	6.2	11.1	12.4	-0.4	1.2	-3.8	-3.0	0.8	108.2	31.1
1972-1976	15.9	15.0	11.4	3.3	4.1	8.4	9.9	-3.8	-2.5	-2.7	-1.9	1.2	110.7	28.9
Subperiod averages														
1983-1986	9.6	8.4	5.9	2.4	10.2	10.7	11.2	5.8	7.3	-5.7	-3.4	0.7	108.3	23.8
1980-1981	12.6	13.5	13.0	0.5	7.0	14.2	14.4	1.9	4.4	-4.1	-2.9	1.6	106.3	32.3

a. The G-10 consists of the United States, Japan, Germany, France, the United Kingdom, Italy, Canada, Belgium, the Netherlands, Sweden, and Switzerland. Country data are weighted by 1982 GNP shares. Data for 1986 are Secretariat estimates.

b. M2 except for Japan (M2+CD), Germany (M3), France (M3) and the United Kingdom (£M3).

c. Real ex post short-term rate is equal to nominal short-term rate minus 2-quarter-ahead over 1-quarter lagged change in price deflator (at a per cent per annum rate). Real ex post long term rate is equal to nominal long-term rate minus 2-year ahead change in GDP or GNP deflator. Recent values derived from Secretariat projection.

d. Balance for general government. The structural balance corresponds to the cyclically-adjusted position.

e. Excludes Switzerland.

f. Averages across countries use the absolute mean of the country ratios.

g. Weighted average of variance of individual bilateral exchange rates in each period. Formula available from Secretariat.

h. Excludes France, Sweden and the United Kingdom.

Table 2

INDICATORS OF MONETARY POLICY
Per cent

	Period ending		Broad money(a)	Nominal GDP or GNP	Price deflator	Interest rates quarterly average				Effective exchange rates	
			Four quarter change			Nominal short	Nominal long	Real short(a)	Real long(a)	Four quarter change Nominal	Real(b)
All G-10 countries	1986 Q2		8.3	6.1	3.4	6.6	8.2	3.8	5.8		
	1985 Q2		8.7	6.7	3.6	8.2	10.3	4.5	7.4		
	1985 Q4		8.9	6.8	3.8	7.9	9.6	4.8	7.1		
	1984 Q4		7.9	7.8	3.7	8.8	10.8	5.3	7.4		
	1983 Q4		10.2	9.1	4.3	8.9	11.3	4.9	7.5		
	1982 Q4		9.2	4.9	5.3	8.9	11.5	4.8	7.5		
United States	1986 Q2		7.8	5.3	2.6	6.1	9.0	3.0	6.1	-20.0	-22.2
	1985 Q2		8.8	5.9	3.5	7.5	11.6	4.3	8.8	9.5	11.0
	1985 Q4		8.7	6.3	3.3	7.2	10.6	4.5	7.7	-9.5	-10.0
	1984 Q4		8.0	8.5	3.7	8.8	12.4	5.3	9.2	8.6	10.2
	1983 Q4		12.2	10.4	3.6	8.8	12.4	4.7	8.9	1.7	-1.3
	1982 Q4		9.1	3.1	5.1	7.9	11.9	4.5	8.2	12.5	10.1
Japan	1986 Q2		8.5	5.0	2.2	4.4	5.7	3.0	4.9	34.1	37.0
	1985 Q2		8.3	6.4	1.5	6.1	6.9	4.6	5.3	-2.3	-9.7
	1985 Q4		9.0	5.9	1.8	7.3	6.7	5.1	5.4	13.5	11.1
	1984 Q4		7.9	7.6	1.7	6.2	6.8	5.3	4.9	1.5	-4.6
	1983 Q4		7.2	4.6	1.0	6.3	7.3	5.0	5.6	15.6	12.0
	1982 Q4		8.1	4.3	0.5	6.8	8.2	6.7	6.8	-6.7	-10.2
Germany		CBM	M3								
	1986 Q2	5.9	7.6	7.3	3.8	4.6	5.8	2.6	4.4	8.3	7.8
	1985 Q2	4.5	5.0	5.7	2.0	5.8	7.1	3.2	4.5	-0.2	-4.8
	1985 Q4	4.5	5.6	4.7	2.5	4.8	6.6	1.6	4.8	5.8	2.9
	1984 Q4	4.6	4.1	4.6	1.7	6.0	7.2	4.5	4.7	-0.6	-3.4
	1983 Q4	7.0	5.9	6.7	3.1	6.3	8.2	5.6	6.1	2.6	-3.3
	1982 Q4	6.1	7.2	2.1	3.6	7.2	8.2	5.0	5.8	5.0	2.6
Other G-10 countries	1986 Q2		9.2	7.5	5.0	9.1	8.9	5.9	6.1	-0.5	-0.3
	1985 Q2		9.9	8.5	5.3	11.1	11.2	5.1	7.2	-0.8	-0.2
	1985 Q4		10.1	8.8	6.1	10.2	10.6	6.0	7.6	1.6	1.5
	1984 Q4		9.0	8.0	5.3	11.0	11.5	5.4	6.8	3.1	-1.9
	1983 Q4		10.0	10.4	7.3	11.1	12.5	5.0	6.8	-2.8	-1.1
	1982 Q4		10.4	8.6	8.5	12.0	13.7	4.2	7.4	-3.4	-0.3

Continued

Table 2 (continued)
Data for third quarter 1986 - Per cent

	Broad money(a)	Nominal GDP or GNP	Price deflator	Interest rate quarterly average				Nominal effective exchange rate
	Change from second quarter(b)			Nominal short	Nominal long	Real short(a)	Real long(a)	Change from second quarter
United States	11.6	6.4	3.5	5.5	8.8	2.3	5.9	-3.9
Japan	9.6	3.5	0.9	4.6	5.5	3.4	4.7	18.2
Germany	CBM 7.2 M3 8.2	7.0	4.0	4.6	5.9	3.0	4.5	4.9
France	6.7	2.4(c)	6.5(c)	7.1	8.4	5.1	6.5	0.1
United Kingdom	14.0	8.5	6.0	9.5	9.6	5.0	5.0	-3.7
Italy	8.3	4.3	2.7	12.0	9.1	8.3	5.6	0.8
Canada	11.0	6.0	4.7	8.5	9.3	5.3	6.1	-1.0
Average of 7 countries	10.5	5.7	3.6	6.2	8.0	3.4	5.5	..

a. As defined in Table 1.
b. At a seasonally adjusted annual rate.
c. Secretariat estimates.

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Table 3

ESTIMATED MONEY DEMAND EQUATIONS (a)

Estimates 1973.Q2-1982.Q5 (standard error in parentheses)

	Germany		Japan		United States	
a	-1.70	(1.4)	-4.75	(1.11)	-1.68	(0.92)
b	0.16	(0.11)	0.43	(0.10)	0.25	(0.11)
c	-0.16	(0.05)	-0.18	(0.08)	-0.38	(0.12)
d	0.90	(0.07)	0.71	(0.07)	0.81	(0.10)
RHO	-	-	0.50	(0.11)	0.48	(0.13)
H	0.13		0.19		-0.55	
SEE (%)	0.92		0.72		0.88	

a. The equations are specified as follows: $m-p = a + by_{-1} + ci + d(m_{-1}-p_{-1})$

in which: m = broad money as defined in Chart 1
y = real GDP
p = GDP deflator
i = log(1 + IRS/100) where IRS is the short-term interest rate in per cent
RHO = first order autocorrelation coefficient (Cochrane-Orcutt procedure)
a,b,c,d = estimated elasticities
H = Durbin h-statistic
SEE = standard error of estimate of the equation

The variables m, y and p are scaled in logarithms. The implied long-run elasticities are:

	Germany	Japan	United States
Real income	1.6	1.5	1.3
Interest rate (semi-elasticity)	-1.6	-0.6	-2.0
Price (constrained)	1.0	1.0	1.0

Table 4

OUT-OF-SAMPLE FORECASTS OF MONEY DEMAND FUNCTIONS

Money growth %	Germany M3	Japan M2+CD	United States M2
1985.Q2-1986.Q2			
Forecast	8.5	7.9	8.2
Actual	7.6	8.5	7.8

Table 5

SUMMARY OF SHORT-TERM ECONOMIC PROJECTIONS

Seasonally adjusted at annual rates

	1984	1985	1986	1987	1986 II	1987 I	1987 II	1988 I
	Percentage changes from previous period							
Real GNP								
United States	6.4	2.7	2¾	3	2¼	3¼	3	3
Japan	5.1	4.5	2¼	2¾	2¼	3	2½	3¼
Germany	3.0	2.5	2¾	3	5¾	2½	2	2
OECD Europe	2.6	2.5	2½	2½	3½	2¼	2¼	2¼
Total OECD	4.7	3.0	2½	2¾	2½	3	2¾	2¾
Real total domestic demand								
United States	8.3	3.4	3½	2¾	3	2¾	2½	2¾
Japan	3.8	3.6	3¾	3½	3	4	3½	4¼
Germany	1.9	1.5	4¼	4½	7½	3½	3	3¼
OECD Europe	1.9	2.3	3¾	3¼	4¼	2¾	2½	2¾
Total OECD	5.0	3.1	3½	3	3¼	3	2¾	3
Inflation (private consumption deflator)								
United States	3.8	3.5	2¼	3	2¾	3¼	3½	3½
Japan	2.1	2.2	¾	0	−¼	0	½	½
Germany	2.5	2.1	−¾	¾	−½	1	1½	1½
France, United Kingdom, Italy, Canada	6.8	6.0	3¾	3¼	3	3¼	3¼	3½
Other OECD countries	9.8	8.6	6¾	5¾	6¼	5½	5¼	5
Total OECD	5.0	4.5	2¾	3	2¾	3	3	3
	$ billion							
Current balances								
United States	−106.5	−117.7	−138	−136	−139	−138	−135	−133
Japan	35.0	49.2	82	77	88	80	74	72
Germany	7.0	13.2	32	26	34	29	24	21
Total OECD	−65.8	−57.5	−20	−34	−7	−27	−40	−47
OPEC	−9.6	−4.7	−51	−42	−57	−47	−37	−29
Non-oil developing countries	−22.2	−20.4	−7	−4	−7	−5	−4	−6
	Per cent of labour force							
Unemployment								
United States	7.5	7.2	7	6¾	7	6¾	6¾	6½
Japan	2.7	2.6	2¾	3¼	3	3	3¼	3¼
Germany	8.2	8.3	7¾	7½	7¾	7½	7½	7½
OECD Europe	10.7	10.9	11	11	11	11	11	11
Total OECD	8.4	8.3	8¼	8¼	8¼	8¼	8¼	8¼
	Percentage changes from previous period							
World trade[b]	8.8	3.7	3¾	3¾	4	3¼	4¼	4½

a) Assumptions underlying the projections include :
- no change in actual and announced policies;
- unchanged exchange rates from 4th November 1986; in particular $1 = yen 163.6, DM 2.058.
- Dollar price (OECD fob imports) for internationally traded oil of $ 15 per barrel.

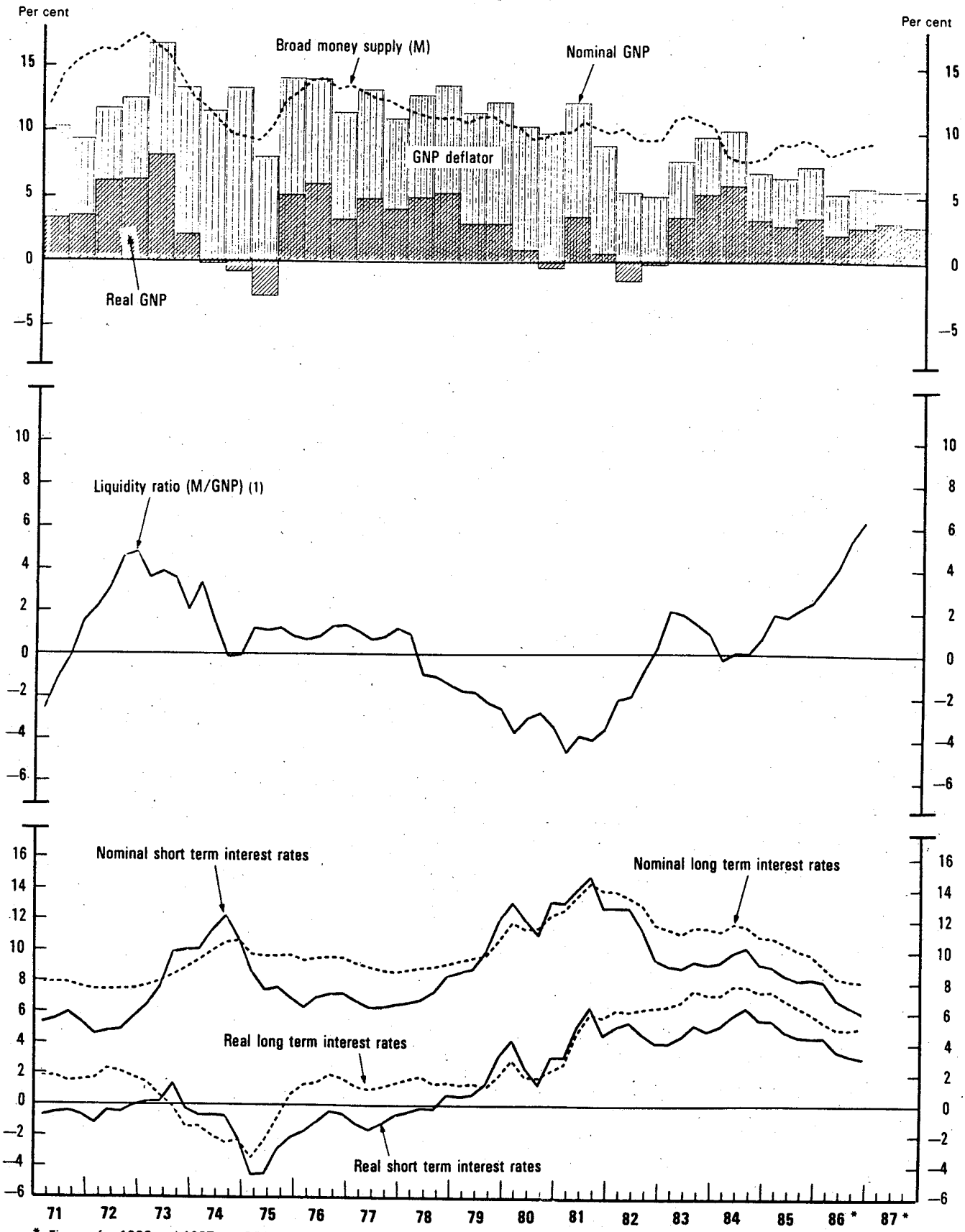
b) Arithmetic average of the growth rates of the world import volume and the world export volume.

The cut-off date for information used in the compilation of the forecasts was 17th November 1986.

Source: OECD Economic Outlook No.40, December 1986.

CHART 1

MONETARY POLICY INDICATORS
(Aggregates for major seven OECD countries)



* Figures for 1986 and 1987 are OECD projections.

1. Deviation from trend calculated from first quarter 1970 to second quarter 1986.

Note: For definitions and calculations, see following page.

Note to Chart 1

The monetary indicators are based on data for the seven major OECD countries.

Broad definitions of money are:

> M2 for the United States; M2+CD for Japan; M3 for Germany; the new aggregate M3 for France; £M3 for the United Kingdom; M2 for Italy and M2 for Canada.

Movements shown are percentage changes over the corresponding quarters of the previous year.

Movements in nominal and real GNP are shown as half-yearly percentage changes at annual rates.

The liquidity ratio is calculated for each country as percentage deviations from the trend over the period 1970.Q1-1986.Q2. Real interest rates are nominal interest rates (as shown in Table 1.2) less the percentage change in the GDP deflator from four quarters earlier.

The weights used for aggregation are 1982 GNP shares.

CHART 2

TRENDS IN MONETARY GROWTH

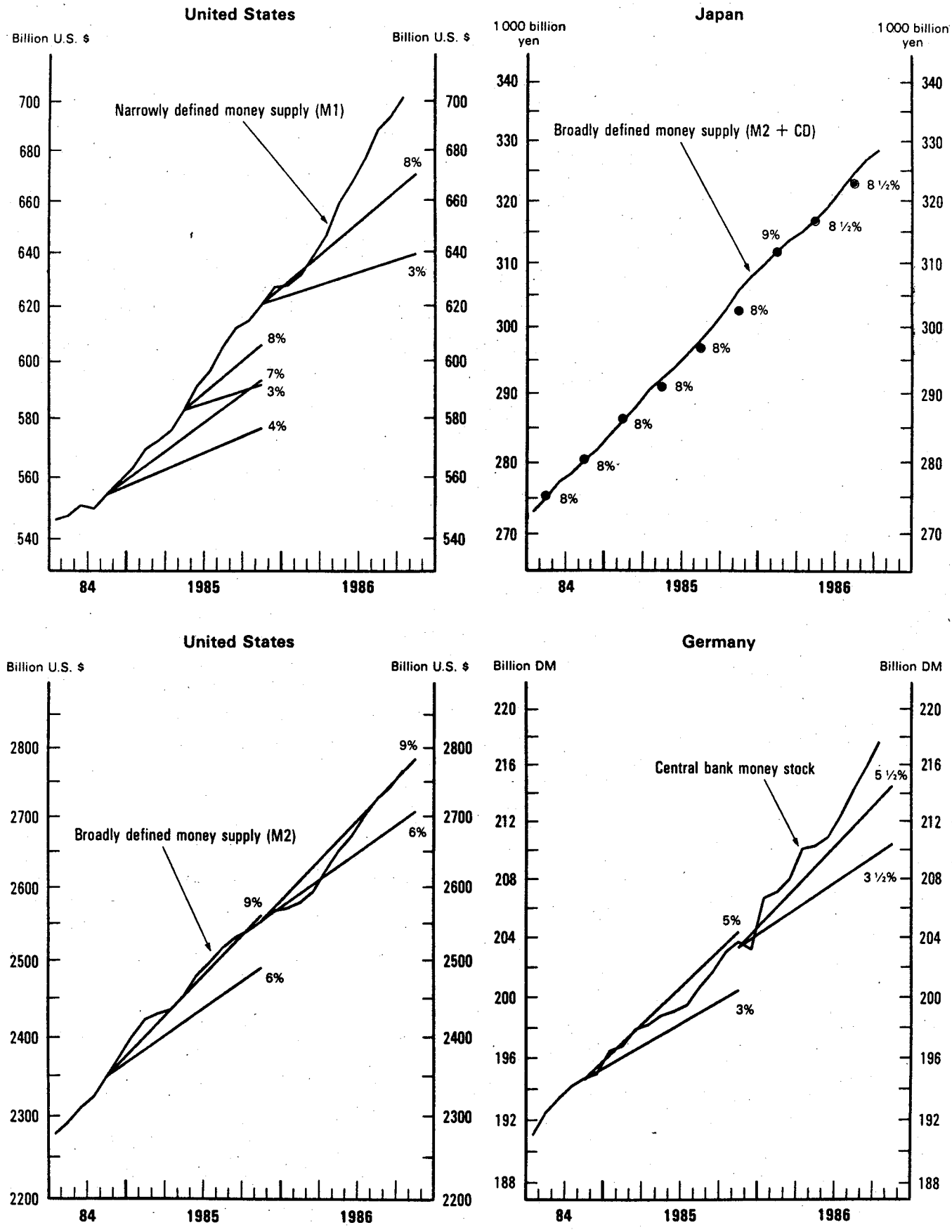
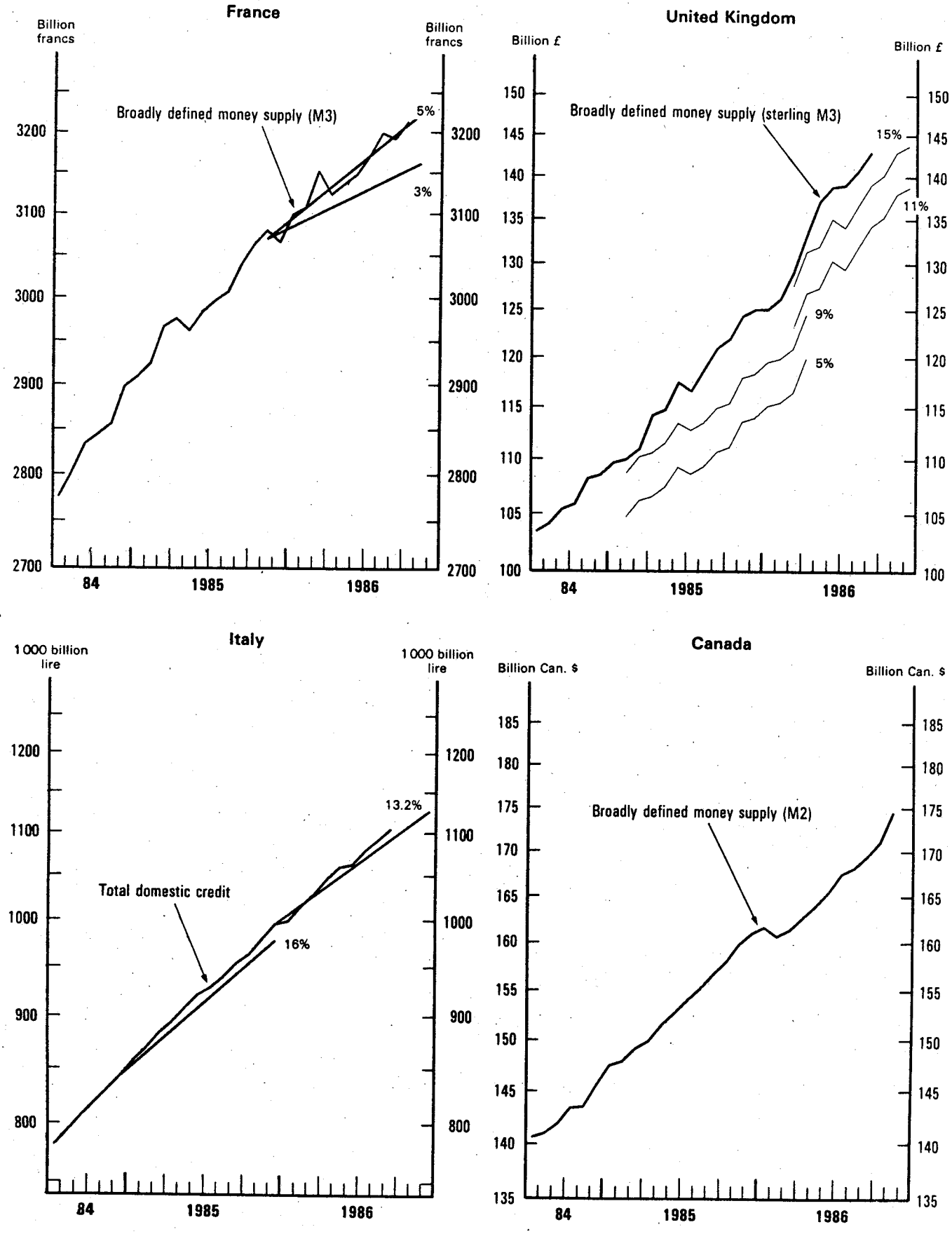


CHART 2 (continued)

TRENDS IN MONETARY GROWTH



ANNEX 1

AN OVERVIEW OF EMPIRICAL EVIDENCE ON THE EFFECTS OF MONETARY POLICY

This Annex discusses a wide range of econometric evidence of the effects of monetary policy, considering time-series tests of reduced-form models and numerical simulations from large-scale structural models. Two categories of structural models are discussed: the first relating to individual countries, the second to the international economy. Much of this discussion draws on a study of the impact and transmission channels of monetary policy, which is currently being undertaken by the OECD Secretariat (1).

A. Reduced-form tests

Models based on the joint assumption of rational expectations and market clearing (hereafter REMC models) predict that monetary policy has no systematic effect on real economic activity. At the same time they predict that both anticipated and unanticipated money will influence the price level. One class of REMC models identifies unanticipated monetary policy and the sluggishness in response of variables such as inventories as sources of the business cycle [Lucas (1972, 1975), Sargent and Wallace (1975), Barro (1977b), and Brunner, Meltzer and Cukierman (1983)]. In a more extreme class of REMC models, known as "real equilibrium business cycle" models, monetary policy -- whether anticipated or unanticipated -- is neutral with respect to real economic activity and only causes proportionate changes in the price level [see Long and Plosser (1983), Kydland and Prescott (1982)].

Since the mid-1970s there has been a vast amount of research on the REMC approach to monetary policy and on the relative importance of anticipated and unanticipated monetary policy. The findings of this research need to be interpreted with caution as it is fraught with methodological problems. Testing the joint hypothesis of REMC requires the estimation of a rational forecasting equation for monetary policy and the identification of the equilibrium level of real activity. Moreover, there is the virtually

intractable problem, known as observational equivalence, of unambiguously distinguishing the empirical predictions of REMC models from other models.

In practice the results of the empirical work are quite varied (see Table A). Recent tests tend not to be very supportive of either the rational expectations (RE) or market clearing (MC) assumptions. For example, models of exchange rates, stock prices and interest rates that incorporate rational expectations have been rejected in recent empirical work (2); and empirical wage equations invariably show significant inertia (3). Although these tests involve joint hypotheses, there is some evidence unfavourable to both components of the REMC theory [e.g. Holden, Peel and Thompson (1985), Carlton (1986)]. Many of the earlier studies found anticipated monetary policy to be neutral and the unanticipated component to have real effects [see Barro (1977b, 1978) for the U.S., Attfield (1981a, 1981b) et al. for the U.K. and Wogin (1980) for Canada]. But these results have not proved to be robust; small changes in model specification overturn these results in favour of a non-clearing markets view. Results tend to be sensitive especially to the specification of money growth equations [Small (1979), Driscoll et al. (1984)] and of response lags [Mishkin (1982a and 1982b)]. As things stand, a count of studies rejecting the hypothesis that only monetary "surprises" influence real economic activity runs well ahead of those reporting empirical support. A small number of recent studies find that neither the anticipated nor the unanticipated component of monetary policy affects real variables , but this result is typically confined to studies that model the natural rate of unemployment as a stochastic trend rather than as a deterministic trend [e.g. Haraf (1983) and Wasserfallen (1984)]. Although this finding has been interpreted by recent authors as supporting the theory of the real equilibrium business cycle it is, of course, also consistent simply with very weak effects of monetary policy on aggregate demand [see Demery (1984) and Gordon (1982)].

To sum up, arguments that monetary policy has no systematic impact on output have little or no empirical support. Both assumptions that underlie these arguments -- RE and MC -- have come under serious question in recent empirical tests. Economic models in which output prices and wage rates are assumed to adjust gradually -- assumptions which characterise most of the structural models reviewed in the next sections of this Annex -- provide the most relevant framework for the analysis of monetary policy.

B. Single country models

1. A simple case

The large-scale macroeconomic models considered here have a theoretical basis similar to that of simpler open-economy models in the Mundell-Fleming tradition (4). Monetary policy affects output and prices through two main channels. The first is via the interest rate, which influences components of domestic demand. The second is via the exchange rate, which affects international competitiveness and the trade balance and which has a direct impact on the price level. The strength of the effects of monetary policy, as well as the relative importance of the two channels, depends on a number of key parameters: the degree of wage and price flexibility; the degree of capital substitutability and mobility; and the elasticities of demand and supply of tradeables. They also depend on how expectations are formed.

In the simplest case, with rigid nominal wages and prices, perfect capital markets, and static expectations, a monetary expansion in a small country works only through the external channel, since the domestic interest rate is determined by the world rate. The currency depreciates, the real trade balance improves and output is thereby increased. However, a potentially large inflationary impact might be associated with the exchange rate depreciation. In more realistic cases, and for large countries (or large groups of countries) things are less simple. Monetary expansion can cause a decline in the domestic interest rate, and hence bring the domestic channel into operation. The induced increase in domestic demand can then partly or completely offset the positive effect of the exchange rate depreciation on the real trade balance, which thus might either improve or deteriorate. It should be noted here that, because the external channel is to some extent offset in other countries when an individual country changes its policy in isolation, the effect of a global monetary expansion cannot be derived as the sum of independent individual country experiments.

The most important implication of the Mundell-Fleming type of model is that, as long as there is some degree of domestic wage and price stickiness and regardless of changes to other assumptions, a monetary expansion (i.e. a

monetary policy innovation in RE models) will increase output and put upward pressure on the price level. One has to use empirical estimates to gauge the size of these effects.

2. Empirical results

Most monetary policy simulations of a restrictive shock listed in Table B, whether couched in terms of a permanent decrease in the money stock or in money growth or in terms of an increase in nominal interest rates, show significant changes in output in the short-to-medium run. Simulations based on changes to the level or the rate of growth of the money stock typically show output effects vanishing by the fifth to seventh year. These results tend to support the view that money is neutral with respect to output in the long run. In contrast, some interest rate simulations show output changes increasing into the medium term. However, restrictive monetary policy cannot cause a permanent increase in the nominal rate of interest in standard theoretical models, a difficulty which is reflected in the disparate behaviour of the money stock in these experiments. Framing monetary policy simulations in terms of interest rate change is reasonable only for the short run.

Quantitatively, simulation results vary considerably across countries and across different models for the same country. The results based on money stock simulations (available only for Canada and the United States) show stronger output effects in the United States than in Canada; in both countries price level effects are stronger in the medium term than in the short term. Interest rate simulations, which are more widely available, tend to show large effects for output and prices in some models (especially the MPS model for the United States). In terms of the split between output and price level effects, Japan and, to a lesser extent, Germany exhibit the strongest output response (i.e. the most favourable tradeoff) in the short run. The United Kingdom and Italy broadly display the smallest output effects relative to price effects. The United States, France and Canada lie somewhere between these extremes. These impressions from simulations based on national models correspond broadly to the simple correlations between actual output and nominal income in the different countries over the period since 1973.

Most large scale structural models predict that monetary policy has negligible effects on unemployment rates. Simulated increases in output resulting from the monetary policy experiments are never sufficient to make a significant impact on unemployment. Typically something in excess of a 5 percentage point fall in interest rates would be necessary to reduce the unemployment rate by 1 percentage point. The employment effect is especially weak in Japan, France and the United Kingdom. According to most models, the poor employment response is primarily due the weakness of the relationship between output and employment, except in the United Kingdom, where the weakness arises from the link of monetary policy to output. To explain the sluggishness of the unemployment rate with respect to monetary policy in these models is beyond the scope of this paper, but it could arise from various factors, which differ in importance across countries. Examples are real wage rigidity, "discouraged worker" effects, implicit "life-time employment" contracts, etc.

C. Multicountry models

This section describes properties of 11 empirical models of the international economy, using results presented to the Brookings Institution conference in March 1986. Again, as for the national macroeconomic models, a simple Mundell-Fleming model provides a good basis for interpreting the estimates. The new twist allowed by these models, which are of relatively recent origin, is the derivation of spillover effects from policy instruments in one country to target variables in other countries. Such spillovers are the essence of gains to policy coordination.

1. Spillovers in a simple case

In the Mundell-Fleming framework, spillover effects depend on much the same parameters as those highlighted in the discussion of transmission effects in the single-country open-economy models. The simplest version of the Mundell-Fleming model makes strong predictions about monetary and fiscal spillovers -- monetary spillovers on foreign output and prices are negative but fiscal spillovers are positive. In less simple versions, fiscal policy usually still shows a positive output spillover (although this can be

overturned, e.g., by terms-of-trade effects on real wages), while the direction of the monetary policy spillover on output is ambiguous. This ambiguity arises when the domestic interest rate can differ from the world rate, because there is then an income effect of domestic demand for foreign output, which goes in the opposite direction to the exchange rate effect. Also, monetary expansion in large countries can directly reduce the world rate of interest. Thus, in more popular language, monetary policy might be a "locomotive" instrument, or a "beggar-thy-neighbour" instrument, or it might have asymmetric effects [Canzoneri and Gray (1983)].

Asymmetries arise when structural parameters or initial conditions differ enough in different countries. For example, the degree of real wage flexibility has been found empirically to be higher in the United States than in Europe (5), and U.S. income elasticities of demand for imports may also be higher. Moreover, as custodian of the major international currency, the United States may exert disproportionately large effects on the world interest rate. These factors would tend to create a positive spillover of U.S. monetary policy on Europe, but a small, possibly negligible European spillover on U.S. output.

It has become popular in international macro models to assume that rational expectations and rapid price adjustment characterize financial and exchange markets but that adjustment in labour and product markets is sluggish [e.g. Dornbusch (1976), Buiter (1985)]. This combination of assumptions is arguably a good way to characterise the real world, and it has relevance to many actual policy problems, such as the impact of policy announcements. It also captures the tendency for exchange rates to overshoot in response to monetary initiatives, a factor strengthening some of the spillover effects of monetary policy.

The main implications of the theory for monetary policy spillovers can be summed up as follows: (i) the output spillover of monetary policy is ambiguous in direction and could be negligible; (ii) the output spillover is more likely to be negative when capital mobility is high and the real exchange rate very sensitive to monetary policy; (iii) the output spillover is more likely to be positive when the monetary expansion occurs in a large country or

large group of countries; (iv) there may well be asymmetries in spillover responses; and (v) price spillovers are likely to be negative.

2. Empirical estimates

Median estimates from two groups of multicountry models, presented in Table C, give some idea of the central tendency of the quantities and dynamics implied by recent structural modelling. But it is important to realize that the median estimates are drawn from a widely dispersed set; there is no more uniformity at the international level than at the national level (6). However, to illustrate the discussion in the text, the median results are as good as are available.

Two groups of international models are considered: the mainstream group, which includes the Secretariat's INTERLINK, and which is composed of traditional large scale macro models; and the RE group, which imposes more theoretical constraints on system properties than does the mainstream group. Expectations of some key variables in the RE models are constrained to be consistent with the predictions of the models itself; and in some cases money is constrained to be neutral (with respect to real variables) in the long run.

Results are presented for the equivalent of a once-and-for-all 4 per cent increase in the money stock above its control value. This is probably as large a shock as most central banks would be prepared to contemplate in anything like present circumstances: e.g., it would represent a big one-year overshoot of most current monetary targets. The size of the simulated effects can be gauged from the calculated impact from a simultaneous monetary expansion in all OECD countries, which is approximated in the table by the sum of the individual U.S. and "other OECD" experiments. The median for the mainstream group indicates that OECD-area output would rise by about 0.9 per cent in the first full year after the shock (year 2) and remain about that much higher through year 6. INTERLINK gives a higher 2-year effect but slightly smaller 6-year effect than the group median. The RE models typically show a smaller impact on output than the mainstream models and a negligible 6-year effect. Median effects on the world price level are surprisingly small for both types of model, but as would be expected they are significantly bigger for the RE group (7).

The simulated own-area effects are larger for the United States than for the other-OECD area, on prices as well as output. Estimated spillover effects on output are negligibly small (8). Those on price levels are larger, but not uniform: the mainstream group indicates a significant negative spillover from the United States to the other-OECD, while the RE group indicates a similar spillover in the reverse direction; but in neither group is the effect symmetric. It is surprising that the median RE model, which allows the exchange rate to jump when monetary policy changes, has no spillover from U.S. monetary policy to the other-OECD price level. However, taking the results as a whole, they suggest that inflation performance in each area might be improved if the other area expands its money supply. This is because foreign monetary expansion raises the real exchange value of the domestic currency in the short run.

A common finding (which applies more to fiscal policy than to monetary policy) is that whereas U.S. policy significantly affects output in other OECD countries, the converse does not hold (9). This is not to be explained simply by relative size, because the result is obtained even in simulations where other OECD countries are assumed to act in concert. A useful line of enquiry for further research would be to establish what parameter asymmetries are responsible for this result, and to what extent the models agree on these asymmetries [cf. Helliwell (1986)].

In sum: (i) output spillovers from monetary policy between large areas are negligible relative to own-country effects; and (ii) price spillovers are not well determined but tend to be negative and are sometimes large. With respect to policy coordination the latter effect therefore offers the most interesting possibilities.

NOTES TO ANNEX 1

1. Provisionally entitled Monetary Policy in the Changing Economic and Financial Environment.

2. See, e.g., Schiller (1979) and Longworth et al. (1983).

3. See, e.g., Branson and Rotenberg (1980), Bruno and Sachs (1985) and Coe and Gagliardi (1985).

4. The seminal articles are Fleming (1962) and Mundell (1963).

5. See the references on wage adjustment in footnote 3.

6. See, e.g., the discussions of the Brookings Conference results by Frankel (1986), Helliwell (1986) and Holtham (1986).

7. There is one outlier in each group with respect to the price effect. The LINK model has strong negative own-area price level. The LIVERPOOL model has very large negative spillovers from other-OECD monetary policy to the U.S. price level. In both cases this results in negligible or perverse effects on world inflation rates from a coordinated monetary expansion.

8. In contrast, the output spillovers from fiscal policy are estimated with a rare degree of unanimity to be positive. It is also found that the short-run effects of U.S. fiscal policy on other OECD countries are large relative to the reverse effects.

9. See, e.g., the discussion of the MCM model by Edison and Tryon (1986). An exception must be made for the Liverpool model since, as discussed in footnote 7, it shows very large effects of European monetary policy on the United States.

Table A

TIME SERIES TESTS OF THE ROLE OF ANTICIPATED AND UNANTICIPATED MONETARY POLICY IN OUTPUT AND EMPLOYMENT

COUNTRY	Both anticipated and unanticipated policy significant	Anticipated policy not significant unanticipated policy significant	Neither unanticipated nor anticipated policy significant
United States	Small (1979), Froyen (1979) Mishkin (1982a, 1982b) Boschen and Grossman (1982), Peseran (1982), Makin (1982), Marrick (1983), Cannerella and Garston (1983), Cairns and Lombra (1984), McGee and Staisiak (1985), Driscoll et al. (1983), Sheehey (1984)	Barro (1977, 1978), Sheffrin (1979) Leiderman (1980), Barro and Rush (1980) Barro and Hereowitz (1980), Fitzgerald and Pollio (1983), Neftci and Sargent (1978), Allfield and Duck (1983), Lillien (1982)	Haraf (1983), Wasserfallen (1984a, 1984b), King and Plosser (1984) Sims (1980), Litterman and Weiss (1985)
Japan	Pigott (1978), Seo and Takahashi (1981), Hamada and Hayashi (1985), Taniuche (1980), Gochoco (1986) Fitzgerald and Pollio (1983)	Parkin (1984)	
Germany	Bailey et al. (1986)	Demery et al. (1984)	Wasserfallen (1984a, 1984b)
France	Fitzgerald and Pollia (1983) Bailey et al. (1986)		Bordes et al. (1982) Wasserfallen (1984a)
United Kingdom	Symons (1983), Garner (1982) Driscoll et al. (1983) Fitzgerald and Pollio (1983) Bean (1984), Alogoskoufis and Pissarides (1983) Bailey et al. (1986)	Attfield et al. (1981a, 1981b) Attfield and Duck (1983)	Wasserfallen (1984a) Demery (1984)
Italy	Fitzgerald and Pollio (1983) Bailey et al. (1986)	Smaghi and Tardini (1983)	Wasserfallen (1984)
Canada	Jones (1985) Darrat (1986)	Wogin (1980)	

Table B
DOMESTIC EFFECTS OF MONETARY POLICY IN LARGE SCALE ECONOMETRIC MODELS(a)(b)
In per cent

COUNTRY	MODEL	Output		Price level		Effect on money stock	
		Short term(c)	Medium term(d)	Short term(c)	Medium term(d)	Short term(c)	Medium term(d)
A. A single 1 per cent reduction in the level of the money stock							
UNITED STATES	MCM 82	-0.5	-0.2	-0.1	-0.5	-0.9	-1.0
CANADA	CAND 82	-0.1	0.1	-0.4	-0.4	-1.0	-1.0
	RDXF 84	-0.3	0.0	-0.1	-0.8	-1.4	-0.9
B. A permanent 1 per cent reduction in the rate of growth of the money stock							
UNITED STATES	DRI 82	-0.7	-0.3	-0.6	-2.7	-2.0	-7.0
	CHA 82	-0.4	-0.6	-0.1	-1.0	-2.0	-7.0
	WHAR 82	-0.8	-0.5	-0.1	-2.4	-2.0	-7.0
	MPS 85	-1.2	-1.5	-0.5	-3.8	-1.9	-4.7
CANADA	RDXF 85	-0.4	-0.7	-0.2	-2.3	-1.6	-5.7
	SAM 85	-0.5	-0.2	-0.8	-5.7	-2.0	-5.4
C. A permanent 1 percentage point increase in short-term interest rate							
UNITED STATES	MCM 82	-0.8	-0.1	-0.3	-1.6	-1.9	-2.6
	MPS 1 85	-2.1	-5.9	-5.9	-7.8	-3.3	-13.2
	OECD 85	-0.3	-0.6	-0.2	-1.1	-1.1	..
JAPAN	EPA 84	-0.2	-0.4	-0.4	0.0	-3.0	-3.9
	OECD 85	-0.7	-1.3	-0.5	-1.3	-1.8	..
GERMANY	BBK 84	-0.6	-0.4	-0.1	-0.4	-1.9	-1.9
	OECD 85	-0.1	-0.4	-0.1	-1.0	-0.9	..
FRANCE	MET 81	-0.4	-0.3	-0.1	-1.5	-0.8	-2.2
	OECD 85	-0.4	-1.1	-0.3	-1.5	-1.1	..
UNITED KINGDOM	HMT 84	-0.5	..	-0.7	..	-1.0	..
	BKE 84	0.0	..	-0.1	..	-0.4	..
	NIESR 84	-0.2	-1.4	-0.8	-8.8	-3.0	..
	LBS 84	-0.4	0.0	-1.3	-2.0	0.0	..
	OECD 85	-0.1	-0.2	-0.3	-1.3	-3.8	..
ITALY	BKI 85	-0.2	-0.7	-0.6	-0.8	-0.8	-0.5
	OECD 85	-0.2	-0.2	-0.6	-2.7	-3.0	..
CANADA	CAND 82	-0.1	-0.4	-0.3	-0.4	-1.7	-1.6
	QFS 82	-0.4	-0.3	-0.5	-2.6	-2.6	-5.1
	RDXF 85	-1.0	-1.1	-0.4	-4.0	-3.0	-6.7
	SAM 85	-1.2	0.0	-3.7	0.0	-8.4	..
	OECD 85	-0.5	-1.0	-1.2	-5.8	-3.1	..

Notes to Table B

a. Percentage deviations from baseline under floating exchange rates.

b. LIST OF MODELS

Country	Model	Abbreviation (version)	Last year of simulation reported	Data Frequency*	Institution responsible
UNITED STATES	INTERLINK	OECD (85)	5	S	OECD Secretariat
	MCM	MCM (85)	7	Q	Division of International Finance, Board of Governors, Federal Reserve System
	DRI annual	DRI (82)	7	A	Data Resources Incorporated
	Chase	CHA (82)	7	Q	Chase Econometrics
	Wharton	WHAR (82)	7	A	Wharton School
	MPS	MPS (85)	5	Q	Federal Reserve System
JAPAN	INTERLINK	OECD (85)	5	S	OECD Secretariat
	World model	EPA (84)	7	Q	Economic Planning Agency
GERMANY	INTERLINK	OECD (85)	5	S	OECD Secretariat
	Bundesbank	BBK	7	Q	Bundesbank
FRANCE	INTERLINK	OECD (85)	5	Q	OECD Secretariat
	Metric	MET (85)	7	Q	INSEE
UNITED KINGDOM	INTERLINK	OECD (85)	5	S	OECD Secretariat
	H.M. Treasury (revised)	MT (84)	3	Q	H.M. Treasury
	Bank of England	BKE (84)	3	Q	Bank of England
	National Institute	NIESR(84)	3	Q	National Institute of Economic and Social Research
	LBS model	LBS	7	Q	London Business School
ITALY	INTERLINK	OECD (85)	5	S	OECD Secretariat
	Bank of Italy (provis.)	BKI (85)	7	Q	Bank of Italy
CANADA	INTERLINK	OECD (85)	5	S	OECD Secretariat
	RDXF	RDXF (82)	7	Q	Bank of Canada
	CANDIDE	CAND (82)	7	A	Economic Council
	SAM	SAM (85)	7	Q	Bank of Canada
	RDXF	RDXF (84)	7	Q	Bank of Canada

* Q = Quarterly, S = Semi-annual, A = Annual.

c. Short term = average of first three years.

d. Medium term = last year of simulation (5th to 7th year).

.. = not available or inapplicable.

Table C

SIMULATED EFFECTS OF A 4 PER CENT INCREASE IN MONEY STOCK
Median results from 7 mainstream and 4 Rational Expectations (RE) multicountry models

(Per cent)

Year after shock:	Effect on United States GNP 2	GNP 6	P 2	P 6	Effect on other-OECD countries GNP 2	GNP 6	P 2	P 6	Effect on whole OECD area(a) GNP 2	GNP 6	P 2	P 6
U.S. monetary expansion												
7 mainstream	1.2	0.8	0.3	1.8	-0.1	0.1	-0.2	-0.5	0.4	0.4	0.0	0.4
-- of which INTERLINK	1.6	0.5	0.4	1.8	0.3	0.1	-0.3	-0.2	0.8	0.3	0.0	0.6
4 RE	0.5	-0.1	1.4	3.3	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.6	1.3
Other-OECD monetary expansion												
7 mainstream	0.1	0.0	0.0	0.0	0.8	0.7	0.0	0.8	0.5	0.4	0.0	0.5
-- of which INTERLINK	0.1	0.0	0.0	-0.1	0.8	0.7	0.3	1.5	0.5	0.4	0.2	0.9
4 RE	0.1	0.1	-0.6	-1.0	0.6	0.2	0.4	1.0	0.4	0.2	0.0	0.2
Whole OECD monetary expansion(b)												
7 mainstream	1.3	0.8	0.3	1.8	0.7	0.8	-0.2	0.3	0.9	0.8	0.0	0.9
-- of which INTERLINK	1.7	0.5	0.4	1.7	1.1	0.8	0.0	1.3	1.3	0.7	0.2	1.5
4 RE	0.6	0.0	0.8	2.3	0.5	0.1	0.4	1.0	0.5	0.1	0.6	1.5

Note: As reported to Brookings Conference, March 1986. The 7 mainstream models are those of DRI, the EC, the Economic Planning Agency (EPA) of Japan, the OECD (INTERLINK), project LINK, the U.S. Federal Reserve Board (MCM) and Wharton. The 4 RE models are those of R. Haas and P. Masson of the IMF (MINIMOD), Liverpool University, W. McKibben and J. Sachs (MSG), and J. Taylor. Reported results are from simulation D (U.S. monetary expansion) and simulation H (other-OECD monetary expansion).

a. "Effect on whole OECD" is estimated as the weighted sum of the relevant entries for simulations D and H (across columns).

b. "Whole OECD monetary expansion" is estimated as the sum of experiments D and H (down rows).

ANNEX 2

MONETARY POLICY TIME CONSISTENCY AND COORDINATION: A LITERATURE REVIEW

This Annex provides a brief explanation of analytical concepts used in the main text, and highlights some of the more important findings in the recent literature on the issues of time inconsistency, credibility and international coordination (1). Although the focus is on monetary policy, the issue of cooperation necessarily involves some discussion of the monetary-fiscal mix. The analysis is limited to today's empirical setting of flexible exchange rates and high capital mobility and substitutability.

A. Policy cooperation as a strategic game

1. Game theory approach

In a non-cooperative game, countries act independently, adapting decisions to actual or expected reactions of the others. The most common assumption of non-cooperative, or competitive, behaviour among countries is that other parties' behaviour is taken as given. This is known as the "Nash assumption". An alternative concept sometimes applied is the "Stackelberg assumption" that one country acts as a leader, setting its strategy assuming that the others will respond as best they can; since it is a fairly robust finding in the multicountry models that U.S. policy significantly affects other OECD countries but not vice versa, the Stackelberg assumption, with the United States behaving as a leader, might be a more relevant assumption than the Nash. Non-cooperative games yield outcomes in which one country can usually be made better off, with no other being worse off, by a cooperative rearrangement of strategies. The gain attributed to cooperative policies can thus be calculated as the difference between a non-cooperative solution and an optimal cooperative solution (2). For any gain from cooperation to exist, three conditions must hold: (i) there must be some interdependence of the sort discussed with respect to policy spillovers in Annex 1; (ii) foreign countries' policy instruments must have an independent effect on ultimate

objectives distinct from that obtainable by mixing domestic instruments appropriately; and (iii) individual countries must not have enough instruments to achieve independently all objectives.

Niehans (1968) anticipated much of the recent research in a theoretical study of a fixed exchange rate, reserve currency system. He concluded that, without cooperation, tax policy might be too easy and monetary policy too tight, since the latter is mainly directed towards maintaining external balance and the former towards full employment [cf. Mundell (1962)]. Hamada (1974, 1976), focusing just on monetary policy, showed that non-cooperative strategies under fixed exchange rates might be too biased towards deflation or inflation, the exact bias depending on the relation between the sum of individual balance of payments objectives and the growth of international reserves (exogenously determined in his model). If the sum of of individual objectives exceeds the supply of reserves then policy will be overly contractionary, and vice versa. This is an example of conflicting country objectives. Canzoneri and Gray (1983) show that undesired non-cooperative biases can also emanate from the structure of spillovers. They consider three configurations of spillovers: symmetric-negative ("beggar-thy-neighbour" situations), symmetric-positive ("locomotive" situations) and asymmetric. In the symmetric-negative case, policies are inflation-biased as countries attempt to offset mutually negative spillovers by expansionary measures at home. A concrete example would be a round of competitive exchange rate depreciations. In the symmetric-positive case, policies are deflation-biased since no country gives enough weight to the beneficial impact abroad of expansionary measures at home. Biases from asymmetric games will depend on the precise nature of the asymmetries, but they can lead to conflicting policy mixes across countries. For example, a short-run payoff to the United States can be derived in certain circumstances from an expansionary fiscal/tight money mix [see, e.g., Sachs (1985)].

In an asymmetric situation of nominal wage rigidity in the United States and real wage rigidity in Europe analysed by Asikoglu (1986), the United States essentially has only one instrument to influence aggregate demand, while Europe has one instrument that can affect real output (fiscal policy) and another to affect the price level (monetary policy). Europe does

not need to cooperate when the two instruments are up for negotiation, while the United States does not want to cooperate if only monetary policy is on the bargaining table. This nicely illustrates the point that cooperation can be expected only if potential gains are available to all participants.

While theory tells us where to look for gains from cooperation, it does not say how large the gains might be. The next section discusses some empirical findings on this score.

2. Empirical results

The landmark study of potential gains from coordination is Oudiz and Sachs (1984), which compares a Nash solution with an optimal cooperative solution, using the EPA and MCM models (3). One novelty of this study is that it infers the characteristics of governments' objective functions from the multipliers of the models and from the assumption that each country (the United States, Germany and Japan) does the best it can without cooperating. Then, from synthetic values for the policy instrument settings and for ultimate objectives over the period 1984 to 1986, the preferences of the three governments are estimated. Preferences are "revealed" to be highly weighted against inflation in the United States and Germany, and in favour of current account surpluses in Japan. The output gap for the three countries and the trade balance for the United States are revealed, on the other hand, to have lower weights. These inferences, it must be emphasized, depend on the baseline path for the 1984-86 period as well as the structure of the models.

The gains from coordination derived by Oudiz and Sachs stem mainly from a coordinated reduction in interest rates. With both models cooperation implies increased monetary expansion everywhere, but while the EPA results also recommend more fiscal contraction in all three countries, those of MCM suggest more fiscal expansion in the United States and more fiscal restraint in Germany and Japan. This odd result from the MCM -- that countries should have done more of what they were already doing on fiscal policy -- is a consequence of the revealed preferences approach and of the fact that no consideration was given to the longer-run sustainability of the policies. If instead higher weights are attached to output and to U.S. fiscal and/or trade

deficits, the recommendation for increased U.S. fiscal expansion does not survive [Ishii et al. (1985), Sachs and McKibbin (1985)], but that for more expansionary monetary policies does. In all cases considered, the derived benefits, relative to the non-cooperative solution, of increased output and employment more than compensate for some increase in inflation, given policymakers' apparent preferences.

A common finding is that the net welfare gains, assessed from the objective functions, to the cooperating countries (invariably a goup of OECD countries) are small -- usually no more than 1 per cent or so of GNP. Carlozzi and Taylor (1985) contend that the gains from coordinated policies are empirically negligible. Since their analysis is based on neo-classical assumptions (including rational expectations) that tend to reduce policy effectiveness in the short run, and eliminate it entirely in the long run, the question is raised as to whether their conclusion merely reflects an underestimate of the effects of policy -- especially of spillovers. The answer seems to be that the small estimated gains are derived in a wide range of models. For example, results derived by Canzoneri and Minford (1986) from the Liverpool model, which has some very large monetary spillovers, agree that in many cases coordination yields only second-order benefits. Frankel (1986) allows for uncertainty as to model specification, and further subverts the positive findings. Frankel finds that even where goals are the same, use of different models by different parties, neither of which is an exact representation of the real world, would be likely to cause welfare to be lower under coordination.

Two factors, more favourable to cooperation, should not be overlooked. First, coordination can result in better timing of policies [e.g. Sachs (1983)]. If the starting point is one of high inflation, the optimal selfish policy would be a sharp tightening of monetary policy, which causes the real exchange rate to appreciate and dampens domestic inflation rapidly. Competitive selfish policies then imply a sharp international deflation. With cooperative policies, since no participant attempts to exploit the exchange rate to its own advantage, each disinflates more slowly. The cumulative output loss is the same, for a given total degree of disinflation, as with competitive policies, but is spread into the future and so, with normal rates

of time preference, the cooperative outcome yields higher welfare. Second, cooperation between the industrialised countries yields side-benefits to the less-developed countries (LDCs), favouring lower interest rates, higher demand and improved LDC terms of trade. Indeed LDCs might have more to gain from increased coordination than the participating countries themselves [e.g. Sachs and McKibbin (1985)].

3. Other approaches

i) Exchange rate and world money growth rules

McKinnon (1984) proposes a monetary agreement between the United States, Germany and Japan which would incorporate exchange rate target zones and a constant rate of growth of the combined money supply. The idea is to avoid unintended biases in the global policy stance caused by currency substitution. Although currency substitution is not important empirically [see e.g. Dornbusch (1983), Boothe et al. (1985)], McKibbin and Sachs (1986) show that McKinnon's proposal nevertheless has some merit in the context of a worldwide inflationary shock. This is because his scheme, like the full cooperative arrangements, bans attempts at competitive appreciations, which might otherwise cause the world interest rate to rise too much.

More simple proposals have been made to limit the degree of exchange rate flexibility, with the intention of encouraging a code of behaviour that could serve as a substitute for explicit policy coordination. Some authors have suggested the formation of target zones for major countries [e.g. Williamson (1985)]. Critics argue that target zones for exchange rates do little good if they direct attention away from underlying macro policies [e.g. Dornbusch (1983)]. The majority view of the G-10 study of the international monetary system (1985) was that such a proposal did not offer prospects of improvement of the present situation. Exchange rate rules are only a good substitute for explicitly coordinated policies in special cases. Although they might help avoid competitive manipulation of exchange rates, they might also lead to distortions in policy mixes, and to systemic biases in policy stance [Hamada (1974), Johansen (1982)].

The European Monetary System (EMS) has been assessed from the viewpoint of the theory of policy coordination in some recent articles [e.g. Melitz (1985), Oudiz (1985), Giavazzi and Giovannini (1986)]. The system attempts to encourage more or less symmetric policy adjustments among its members and accepts exchange rate realignments at more frequent intervals than, e.g., the Bretton Woods system in practice did. Studies of the operation of the system have explicitly concentrated on the implications for EMS countries themselves -- e.g. on the symmetry of adjustment between members -- rather than on the broader international context. No clear consensus emerges from these studies on how the rules of the system might be best modelled, or on its benefits to members.

ii) Judgemental approaches

A large number of authors have described what they see as desirable policies, arguing from their own judgement and a varying amount of explicit theory and empirical evidence. Buiter (1985) derives optimal policy responses for the rest of the world in response to a U.S. budget cutback (of the Gramm-Rudman-Hollings variety). One such response is fiscal expansion outside the United States such that the world interest rate remains unchanged. Within the United States, fiscal restraint would then be offset by a real depreciation of the dollar (improved U.S. competitiveness). Another response would be a one-shot increase in the world money supply, which would reduce real interest rates and cause a temporary increase in inflation rates. A permanent increase in the growth rate of money would also offset output effects of the fiscal restraint, but at the cost of permanently higher inflation. Some questions about confidence obviously arise from these proposals. However a similar package of measures, including fiscal restraint in the United States, fiscal expansion in the rest of the world, and some monetary expansion, has been widely advocated [e.g. Marris (1985)]. As before, the conclusion is that the gain in output and in reduced current account imbalances seems worthwhile relative to the increase in inflation.

B. Time consistent policy and central bank reputation

1. Conceptual issues

In models with the classical property of long-run monetary neutrality, an inflationary monetary policy necessarily produces worse results in the long run than a non-inflationary policy (4), since additional inflation is not accompanied by any gain in output. Therefore the best policy in the long run is one that allows no inflation. If the public firmly believes that the monetary authority is committed to such a policy, and if in addition the policymakers hold to that commitment, a favourable outcome is likely, i.e. no inflation and continuous full employment of resources (i.e. unemployment at the "natural" rate). But given public belief in their precommitment, the policymakers can achieve an even better outcome by reneging temporarily. This will be the case if there is a short-run tradeoff between unemployment and inflation, and if both society and the central bank have a preference for higher output, even beyond the full-employment rate. The central bank can then improve welfare in the short run by increasing the money stock. However this option is viable only if the public is convinced that in future periods the monetary authorities will revert permanently to the no-inflation policy. Otherwise inflation premiums will be built into wage contracts and prices, and the price level will rise at once without any increase in output.

A "time-consistent" policy can be defined as one which takes fully into account the discretionary actions by the authorities in the future [Kydland and Prescott (1977)]. In this sense, it can be said that a constant non-inflationary monetary policy is "time-inconsistent" since it involves committing authorities to actions in the future that might not be optimal when the time comes to implement them. Once a non-inflationary policy is credibly established, the central bank can in general achieve a better outcome by reneging on the commitment of price stability. For this reason, unless there are clear constraints that guarantee such a commitment the public might be sceptical about it. If the monetary authorities divert from this commitment, even though they intend to do so only temporarily, the public, which is aware of the temptation to inflate, will revise its attitude and start to expect some inflation. When no constraints are placed on the authorities, the

situation is likely to slip over time into one in which the inflation rate is just high enough that policymakers will find any further increase unacceptable. In this situation the public rationally expects just the rate of inflation that is delivered. Therefore, with no binding commitment on the part of the authorities, a time-consistent policy in general allows some inflation.

These ideas have been given a rigorous formal treatment in recent literature on the theory of economic policy, which can be illustrated as follows:

ACTUAL POLICY	EXPECTATION OF THE PUBLIC	
	No inflation (policymakers credible)	Some inflation (policymakers not credible)
No inflation (Precommitment)	*** Precommitment solution	* Time inconsistent expectations solution
Some inflation (Precommitment ignored)	**** Time inconsistent policy solution	** Time consistent solution

There are two possible expectations and two possible outcomes illustrated here, yielding four possible solutions (i.e. one outcome for each of the four possible states of the system). Policymakers may or may not stick to their declared target of no inflation; the public may or may not believe them. The asterisks (stars) indicate the ranking of the solutions in terms of social welfare; the ranking rises as the stars increase. The only two possibilities that are sustainable in the long run are the precommitment solution and the time-consistent solution, because only in those solutions are ex ante plans realized. However in any decision period the highest ranking (four stars) is awarded to the time-inconsistent policy, if it is feasible. The precommitment outcome, best in the long run, gets only three stars. At the other end of the spectrum, the worst solution (one star) is when the policymakers are committed but lack credibility -- an output loss is then caused by the central bank's refusal to accommodate the higher wages and prices built into contracts. A time-consistent policy, which just ratifies the inflation expected by the public, avoids this output loss and so receives two stars.

The illustration highlights two implications. First, whatever the true intentions of the authorities, the best outcomes can be achieved only when the public believes that they will allow no inflation. Therefore the authorities can always be expected to announce that they will follow disinflationary policies regardless of whether they have the will or the means to do so. Second, the authorities avoid the worst, and might achieve the best, by allowing some inflation in the short run. In theory it is easy to assign weights to the preferences under each solution that will guarantee that the central bank will opt for some inflation. If society values the loss of output of the precommitment/low credibility situation highly enough, then the monetary authorities may be forced into an accommodative inflationary stance against their will.

These are conclusions with wide ramifications, for they demonstrate that it might be very difficult for a central bank to establish the credibility of an anti-inflationary policy without some external constraint on its freedom of manoeuvre. In a situation where the central bank has discretion the true nature of its intentions can only be inferred by observing its actions over a period of time; and in some countries the private sector does in fact devote considerable resources to "central bank watching". Cukierman and Meltzer (1986) define credibility as the speed with which the public recognize that an announced change in policy has actually occurred. In their model reputation is a parameter which increases as the precision of monetary control in hitting announced targets increases. Backus and Driffill (1985) (5) pose the dilemma more sharply, by defining two types of policymakers -- "strong" (inflation resisting) and "weak" (inflation prone). Moreover the authors define credibility as a state that once lost cannot be regained. As long as the authorities do not inflate, the public has some confidence that the policymaker is strong. However, since the public is aware of the incentive to cheat on the announced policy, once the policymaker reveals himself to be weak he is forever perceived so.

Considerations of this kind have radically shifted the arguments for monetary rules. The required rule, it has recently been argued, must visibly and permanently bind the monetary authority to a no-inflation objective, which is a much stronger thing than a constant-money-growth rule. The debate then

centres on the proper legal and constitutional framework for the central bank, rather than on empirical arguments about the stability of demand for money. Thus, Barro and Gordon (1983) describe as discretionary a system that does not permanently constrain the central bank to price stability. In their model, which has strong classical properties, such a discretionary system inevitably produces inferior results to a system bound by law to a no-inflation rule. Since it is difficult to imagine what concrete form the binding laws could take, this argument is not very relevant to the real world.

Instead, one is led to focus on reputation, which is the practical alternative to a rigid set of external controls. If the central bank establishes a high reputation for credibility and price stability by foregoing apparently attractive short-run opportunities to inflate, it will be generally recognised that this is a very valuable asset. In this case pre-commitment solutions can be achieved through an endogenous incentive -- the concern not to worsen the tradeoff -- and external constraints on the central bank become unnecessary. Barro and Gordon (1983) show that the policymakers' concern for reputation is related to the length of the their time horizons. A central bank that takes a long enough view (i.e. has a low enough rate of time discount) will be deterred from short-run inflationary policies by the inevitable loss of reputation. It weights highly the prospect that the public can "punish" the policymakers by revising its opinion of their credibility, and hence permanently worsening the policy tradeoff.

2. Implications for policy coordination

Dynamic models that do not explicitly address the issue implicitly assume that time-inconsistent policies raise no credibility problem. If precommitment by policymakers is both possible and credible, then indeed it can be presumed a priori that cooperation is preferable to non-cooperation [e.g. van der Ploeg (1986)]. But the existence of a net gain from cooperation is not assured if only time-consistent solutions are admissible, since cooperative solutions of that kind have more inflation than non-cooperative ones. Rogoff (1985) considers that cooperation between central banks could easily worsen welfare. This is because, in a cooperative setting, the incentive to inflate the money stock is increased by reducing the fear of

exchange rate overshooting in individual countries. In Rogoff's model this raises the rate of inflation without yielding a gain in output. Oudiz and Sachs (1985) however argue that cooperation might improve social welfare, despite the higher rate of inflation if it increases the stability of exchange market speculation.

Finally, policy coordination does offer the chance of an optimistic resolution of the credibility-time inconsistency dilemma. If the perceived gains from cooperation are very high, agreement between countries might persuade the private sectors that time inconsistent policies are credible, because the cost of reneging would be prohibitive. However, the proviso here is very big in the absence of any evidence showing large gains of this kind.

NOTES TO ANNEX 2

1. This annex has benefitted considerably from the work of Agathe Côté (1986).

2. The latter is defined as a "Pareto-efficient" situation, i.e. one in which no country can be better off without some other being worse off.

3. As referenced in Annex 1.

4. It complicates the argument, but does not change its essence, to recognize that some inflation might be optimal in a world with distortions caused by non-neutral taxes, monopoly, etc. [Barro and Gordon (1983)].

5. Barro (1986) uses a similar concept.

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