Implementing Monetarism: Some Reflections on the U.K. Experience

1. Introduction

Whatever it may be *expost,* contemporary British macro-economic policy is conceived and rationalized as an exercise, defined over some "medium term" planning horizon, in "monetarist gradualism." The wisdom (or folly) of this policy is not here considered. This paper is concerned with the problem of its implementation: that is the extent to which the chosen intermediate target available, defined in the U.K. as sterling M_3 ($\equiv$ £M_3), is, in practice, a "controllable variable" in the sense required by a "monetarist" monetary policy. As we shall see, there is evidence that it has not been and some reasons for thinking that it will not be.

More specifically we look at two main issues:

(1) how effective has monetary control been in the United Kingdom, and (2) what would be involved in attempting to formulate a set of monetary arrangements more condusive to an "acceptable" degree of control of £M_3.

Because of limitations of space, the treatment of (2) is rather general and hence rather superficial in that it ignores aspects of the control problem which are specific to the United Kingdom. Our discussion, therefore, can be better regarded as an illustration of the technical difficulties of implementing effective monetary control rather than a comprehensive treatment of the difficulty of doing so in the U.K. context.[1] It is, however, our hope that it

[1] A fuller treatment will shortly be available as a Department of Economics, University of Southampton Discussion Paper.

will serve as a reminder that, away from the lecture room and the political hustings, the implementation of "monetarist policies" raises considerable theoretical and technical problems which are often overlooked.

2. Contemporary U.K. Macro-Economic Policy

The present "monetarist" gradualism adopted in the U.K. is fully described in the evidence of the Bank of England and the Treasury to the House of Commons Treasury and Civil Service Committee.[2] Put crudely it defines macro-economic policy in terms of:

(a) *one* ultimate target variable, namely the rate of inflation ($\equiv \dot{p}$)

and (b) *one* intermediate target variable, the rate of growth in sterling M_3 ($\equiv \pounds\dot{M}_3$).

Since $\pounds\dot{M}_3$ is an endogenous variable within the macro-system, it follows that both monetary and fiscal politics must be managed so that $\pounds\dot{M}_3$ tracks, with a satisfactory degree of accuracy over some relevant control horizon, the target path $\pounds\dot{M}_3^*$ which the authorities have defined.

The underlying theory, stated very crudely, is as follows:

$$\dot{E} = f(\pounds\dot{M}_3) \tag{1}$$

when $\dot{E} \equiv$ rate of growth in nominal Gross National Product.

$$\dot{E} \equiv \dot{p} + \dot{y} \tag{2}$$

when $\dot{y} \equiv$ rate of growth of real National Product so that

$$\dot{p} + \dot{y} = f(\pounds\dot{M}_3). \tag{3}$$

The last equation then yields a theory of inflation by assuming that, in the medium or long-term, $\dot{y}$ is given by "real" forces and that the economy typically operates at some "natural level of unemployment." Hence the "medium term" relationship becomes

$$\dot{p} = f(\pounds\dot{M}_3) - \bar{\dot{y}}_n \tag{4}$$

[2] Minutes of Evidence, Treasury and Civil Service Committee of House of Commons (1980).

where

$\bar{\dot{y}}_n \equiv$ the exogenously given medium term growth in real output at the "natural level of unemployment."

Because the theory is medium term, $\pounds\dot{M}_3$ in (4) really relates to the rate of growth in $\pounds M_3$ over a period sufficiently long for short-term distortions in $\pounds M_3$ — due (say) to temporary portfolio shifts — to be ignored. Unfortunately this period, whatever it is in terms of calendar time, is far longer than the "control period" over which the authorities seek to influence $\pounds\dot{M}_3$ which is typically of the order of a calendar quarter or less. This means that the observed value of $\pounds\dot{M}_3$ over say a month, may be a very poor indicator of the rate of growth in the "true medium term" $\pounds M_3$ defined by (4). There may, as a result, be non-negligible short-term "distortion errors" which make it hard to discern what is happening to the "true medium term" $\pounds\dot{M}_3$.

To see this more clearly define $\pounds\bar{\dot{M}}_3 \equiv$ the growth in "true medium term" $\pounds M_3$. We now have:

$$\pounds\dot{M}_3 \equiv \pounds\bar{\dot{M}}_3 + e \equiv \pounds\bar{\dot{M}}_3 + \text{Distortion Error} \tag{M.1}$$

The "true target rate," which is derived from (4), is correspondingly $\pounds\bar{\dot{M}}_3^*$. In interpreting short-term policy the rate is, however, usually equated with $\pounds\dot{M}_3^*$ given by the authorities. Hence

$$\pounds\dot{M}_3 - \pounds\dot{M}_3^* \equiv \text{observed short-term error} \equiv (\pounds\bar{\dot{M}}_3 - \pounds\bar{\dot{M}}_3^*) + (\pounds\dot{M}_3 - \pounds\bar{\dot{M}}_3) \equiv \text{true tracking error} + \text{distortion error} \tag{M.2}$$

The obvious consequence of (M.2) is that the authorities "success" or "failure" in terms of the "true tracking error," which is the theoretically relevant concept according to (4), cannot be established unless there is some way of quantifying the "distortion error": that is unless there is some means of eliminating, from the observed data, that element in $\pounds\dot{M}_3$, which has, according to the basic theory, little or no impact on $\dot{E}$ or $\dot{p}$. In the Treasury and Bank of England discussion of monetary control, such changes are referred to as "cosmetic".[3]

[3] Cf. *Monetary Control* Cmnd 7858 (HMSO, 1980) hereafter referred to as *Green Paper* paras B. 27, 28, 33.

The identification of "cosmetic" changes derives, of course, from the monetary transmission mechanism. Unfortunately, it is a characteristic of many versions of "monetarism" that this is not specified in a way which permits an observed change in £M_3 to be unambiguously decomposed into "cosmetic" and "non-cosmetic" components.[4] For example, suppose a change in relative interest rates induces the non-bank public to shift from holding NCD's to holding Treasury Bills. Is the resultant observed fall in £M_3 wholly "cosmetic," partly "cosmetic" or not "cosmetic" at all? We cannot say unless we have a quantitative theory of the transmission.

If these arguments are accepted:

(1) in implementing monetary policy the authorities are expected to control the non-observable variable £$\bar{M}_3$ by controlling the observable variable £M_3 in the absence of a quantifiable theory relating the two;

(2) some "distortion errors" arise because the methods of control employed by the authorities (the "Corset" was the obvious example) induce transactors to take action which reduces £M_3 below £$\bar{M}_3$;

while (3) it can be argued that short-term changes in £M_3 resulting from actions by the monetary authorities are predominantly "cosmetic" in the sense described.[5]

The first of these points suggests that we cannot expect precise short-term control of £M_3 in the sense relevant for the underlying theory — a condition which is re-enforced by the third. We therefore define the task of implementing a "monetarist" monetary policy as being:

(i) to bring about an "acceptable" degree of correspondence between £M_3 and £M_3* over the "control horizon";

by (ii) employing control techniques which minimise the likelihood of induced "distortion errors" such as those evoked by the "Corset."

[4] Cf. *ibid.* paras 1.17, 2.2, 6.1, 6.1 A. 11, B. 27-28, B. 33.
[5] This is a view which can be supported from then *Green Paper*, paras B. 27-28, B. 33.

In relation to the theory set out in (1) - (4) this is a decidedly modest task for, if non-induced "distortion errors" are significant, even equality between £M_3 and £M_3* may entail significant and cumulative errors between £$\bar{M}_3$ and £$\bar{M}_3$* with, one must assume, equally significant consequences for $\dot{E}$ and $\dot{p}$.

3. Contemporary U.K. Practice and the Problem of "Reform"

There are essentially two approaches to the control of the nominal money stock just as they are to the control of any quantity traded on a market.

The first of these is simply to set the price of the commodity in question. Given the market demand curve, the quantity demanded is then determined and, if supply is adjusted to satisfy demand, so is the quantity supplied. If this technique is applied to the money stock, the authorities set the "interest rate," the non-bank public determines the quantity demanded, the banking system supplies what is demanded and the authorities provide whatever level of base money the banking system and the non-bank public demand. In this system, in its most elementary text-book form,

(1) the exogenous policy instrument is "the interest rate";

(2) the endogenous target variable is the nominal money stock;

and (3) the relevant monetary base is an endogenous variable which is adjusted by the authorities to provide whatever amount of reserves the banking system demands.

Speaking very broadly, the U.K. system is of this type. It follows that errors in selecting "the interest rate" or in the authorities estimated money demand function are reflected in deviations of £M_3 from its target value £M_3*. So too are errors in the authorities forecasts of the value of any variable entering the money demand function in addition to "the interest rate." Unfortunately, the world is typically less simple than the text-books. "The interest rate" must, in fact, be interpreted not only to mean the level of rates in some (typically undefined) index number sense but also the structure of rates. And more particularly the relative rates

on bank liabilities included in £M₃ in relation to rates on competing short-term assets for, should these relative rates move inappropriately (let us say through an increase in the relative interest rate on bank liabilities) it is quite possible for a rise in "the interest rate" to increase rather than reduce the demand for £M₃ in the short period.[6] Since the authorities in the U.K. have no direct influence on relative rates, this constitutes an important potential source of weakness in the U.K. system of controlling £M₃.

In theory, short-run portfolio shifts of this type bring about changes in £M₃ rather than the theoretically relevant, but unobservable, £$\bar{M}_3$. They are, therefore, probably largely "cosmetic." But without an operational theory of the transmission process, this cannot be stated with confidence nor can the distortion error be measured precisely. Presumably it was because of the authorities' inability to distinguish between £M₃ and £$\bar{M}_3$ and because of their lack of confidence in others' ability to do so, that the "Corset" was introduced to minimise the risk of such "perverse" rate effects by discouraging the banks from competing aggressively for interest bearing deposits.[7] No doubt the "Corset" was buttressed by less formal procedures conveniently (and politely) described as "moral suasion."

The U.K. method of controlling £M₃ was thus, until recently, a "demand" system buttressed by the "Corset," Exchange Control and moral suasion.[8] At the moment of writing it is almost purely a "demand" system since Exchange Control has been abolished, which rendered the "Corset" ineffective and thus led to its abolition. Naturally, the "Corset" provided an incentive to evasion on the part of the banks. It hus entailed an induced distortion of unknown, but probably very considerable, magnitude in £M₃ in relation to the theoretically relevant £$\bar{M}_3$.[9]

[6] This has occurred on a significant scale. In extreme cases, the rate on NCD's has risen above the rate on advances leading to "round tripping" ie. borrowing (on overdraft) to re-lend to the same or another bank. It seems possible that this also occurs in a minor way near banks' "make-up" days.

[7] The "Corset" (officially the Supplementary Special Deposits scheme) imposed a penalty on banks which increased their Interest Bearing Eligible Liabilities in excess of a defined target. It thus raised the marginal cost of bidding for funds in the wholesale money market.

[8] The existence of Exchange Control largely restricted the banks' ability to obtain funds from the Euro-markets.

[9] The rapid expansion of £M₃ in July and August 1980 is generally attributed to the "unwinding" of transactions previously undertaken in order to evade the "Corset"; that is to a process of "re-intermediation."

Reverting to text-book simplicities, the alternative to controlling some traded quantity from the demand side by setting its price, is to operate on the supply function. Where monetary control is in issue, this entails the authorities' setting the quantity of some asset which bears a stable functional relation to the nominal money stock. This is usually taken to be the "monetary base" which, in the text-books, is defined as central bank liabilities held by the banks and the non-bank public. The money supply is then taken to be a function of the "monetary base" and, in more sophisticated versions, "the interest rate." Instead of setting "the interest rate," the authorities now set the "monetary base." Money demand and supply are equated in the market by "the interest rate" which is now an endogenous variable. Formally speaking errors in the money demand and supply functions, or in the authorities forecasts of variables other than the "monetary base" entering into both, are now not wholly reflected in £M₃ since some part will be offset by induced (but unanticipated) changes in "the interest rate." Unfortunately the apparent simplicity of this *modus operandi* is as much of an illusion as the apparent simplicity of demand side management. We shall return to this and related problems in later sections. For the present we merely note that the contemporary proposals to "reform" the system of monetary management in the United Kingdom typically propose some variant of "monetary base" control as we have described it in essentials.

4. The Record of Monetary Management

Our argument thus far requires the Bank of England to undertake a limited form of monetary control which should be interpreted as:

(i) attaining an "acceptable" degree of correspondence between observed £M₃ and £M₃* over its "control horizon";

by (ii) techniques which minimise the incentive to transactors to act in a way which increases the "distortion error" between £M₃ and the theoretically relevant £M₃*.

What meaning can we give to "acceptable"?

In terms of the underlying theory, the relationship between $\tilde{M}_3$, $\dot{E}$ and $\dot{p}$ relates to the "medium term" which, though rarely clearly defined, probably means something between 2 and 4 years. One interpretation therefore is that provided £M_3 is close to £M_3* over (say) two years the result must be regarded as "acceptable."

An alternative to this can be derived from dynamic simulations with macro-econometric models. Speaking impressionistically, these models, which are typically based upon a quarterly time period, commonly imply that "reasonable" errors in the quarterly growth of the target nominal money stock would need to persist for perhaps 2-3 quarters with the same sign for there to be any significant impact on $\dot{E}$ or $\dot{p}$. Thus control performance would be "acceptable" if the "medium term" requirement were met *and* monthly errors which were cumulatively positive or negative over (say) 5-6 months or more could be avoided.[10]

These two requirements of "acceptability" do not appear to be very demanding. Both, however, relate essentially to the "real" economy. If we now consider the financial sector, the problem becomes less tractable. For example, interest rate expectations are strongly influenced by discrepancies between £$\dot{M}_3$ and £$\dot{M}_3$* and, where £$\dot{M}_3$ > £$\dot{M}_3$* rates are commonly expected to rise.[11] In these circumstances government debt is harder to sell to the non-bank public and £$\dot{M}_3$ tends to rise further in relation to £$\dot{M}_3$*.

In short, money stock "targetry" probably increases the potential short-run instability of the markets in government debt and this tends to be accompanied by greater short-run variation in short-term interest rates. By the same token it adds to the difficulties of debt management in the short-term as the events of Autumn 1979 made clear.

It is a commonplace that, whatever the system of monetary control employed, it will involve some trade off function between the variance of the target money stock around its target value and the variance of short-term interest rates. Bearing this in mind we can regard the results of control as "acceptable" if:

[10] The relevance of such simulations is dubious since they are not only open to the criticisms made by Lucas [4] but also to the more conventional objection that they are estimated over a sample period dominated by observations before "monetary targetry" became general.

[11] Cf. *Green Paper* para 1.4.

(i) the "medium term" relationship between £$\dot{M}_3$ and £$\dot{M}_3$* is satisfactory (i.e. within the specified error range which in the U.K. is 4 per cent);

(ii) errors of similar sign do not cumulate over (say) 5-6 months or more;

(iii) the monthly variations in £$\dot{M}_3$ are not such as to obscure the "trend" — taken as an observable proxy for £$\tilde{M}_3$;

(iv) the monthly variations in £$\dot{M}_3$ around £$\dot{M}_3$* do not entail severe "expectation induced" difficulties in debt management;

while (v) the short-term variation in short-term interest rates is not so great as to impair the efficient working of financial markets.

The conditions (ii) - (iv) have been presented in terms of monthly data not because a calendar month is the relevant or optimal "control period" but simply because a month is the shortest period for which published official data for the money stock are available in the U.K. By contrast the "control period," defined as the period over which the authorities seek to modify £$\dot{M}_3$ may be greater or less than a month and will generally be considerably less than the period (defined as the "control horizon") for which a target rate of growth in the money stock is defined.

Once the problem of "acceptable" monetary control is stated in this way, the severe technical difficulties of implementing a "monetarist" monetary policy become apparent. Even if some agreed quantitative interpretation can be placed upon conditions (iv) and (v), we do not know whether the conditions as a whole can be met by *any* system of monetary control. Thus, in examining recent monetary experience, we may be able to say that performance was not "acceptable" in relation to (i) - (ii) but have no means of knowing whether a more "acceptable" performance would be technically possible.

In these circumstances, all that we can do is examine the record and try to form a "reasonable" judgement on how far performance has been "acceptable" in the U.K. We can also supplement this by looking at U.S. experience though this is a somewhat

dubious proceeding since it certainly does *not* follow that what is technically possible in the U.S. (or elsewhere) is also technically possible in the U.K., while U.S. targetting procedures differ very markedly from those presently adopted in Britain.[12]

Up to 1979.IV, the Federal Reserve's *operating target* was the Federal Funds Rate which was typically specified within a range of about 1 per cent. The target was chosen so that M_1 and M_2 followed growth paths consistent with the F.O.M.C.'s targets.[13] Very useful analyses of the Federal Reserve's control performance are given annually by the Federal Reserve Banks of New York and St. Louis and the reader who requires a detailed account should consult those journals. In the short-term, however, under the "demand side" system, the target ranges for M_1 and M_2 were frequently missed. Moreover, there is some evidence of cumulative errors of non-negligible size: for example, in terms of M_1, during June-September, 1977, March-October 1978 and again in March-September 1979.

In the U.K. there is no target growth rate defined for any period other than the "control horizon" which is usually a year or six months. Monthly growth rates in £M_3 do, however, show very large variation and typically exceed the implied target rates when the mean of the target range is taken as a monthly target. This is made clear in Chart I.

It seems, however, questionable whether the U.K. performance was due to a "bias" in favour of delay or timidity in raising short-rates as is frequently argued and, indeed, apparently accepted by the authorities themselves.[14]

Both the U.S. and U.K. data suggest very forcibly that "demand side" control is imprecise and, in terms of our conditions, not to be regarded as "acceptable." What of "supply side" control?

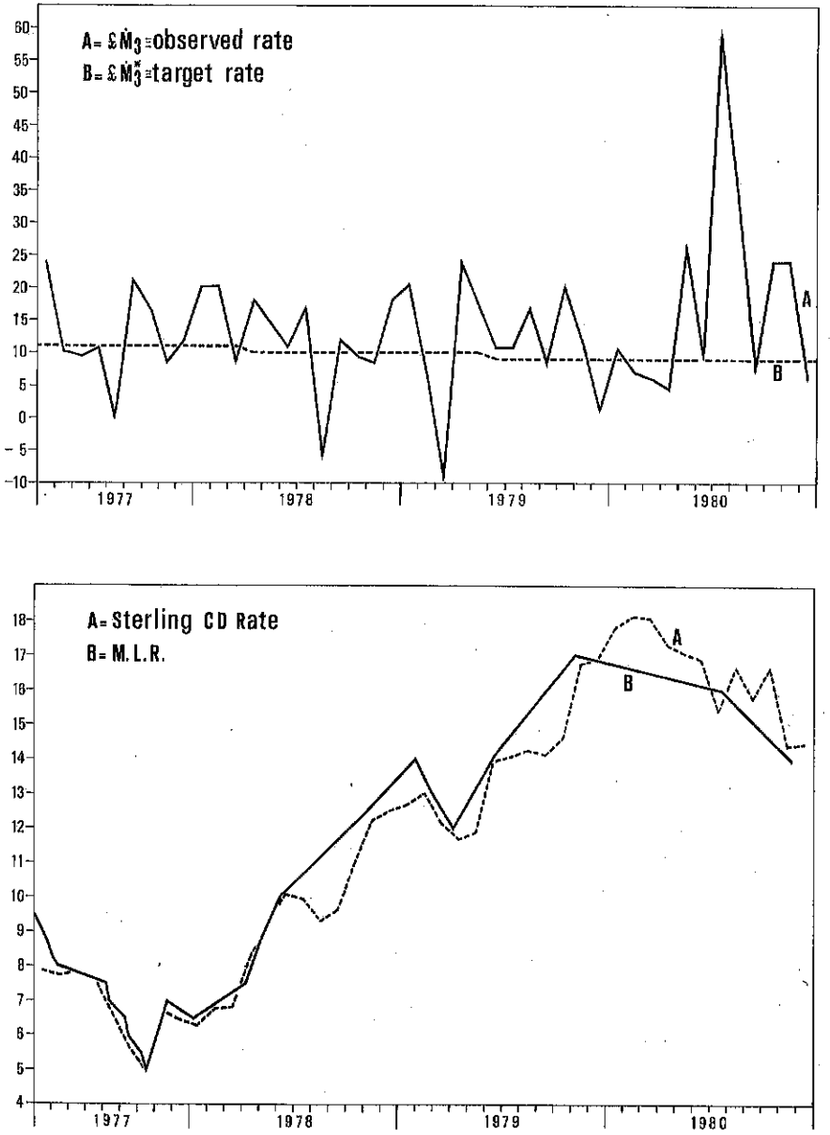
The shift in U.S. monetary control techniques occurred in October 1979 and there is, as a result, relatively little data relating to

[12] These procedures are described in detail in the *Federal Reserve Bank of St. Louis Reviews* in March of each year and in the corresponding issues of the *Federal Reserve Bank of New York Review*. The proceedings of the Federal Open Market Committee (FOMC) are reported in the *Federal Reserve Bulletin*.

[13] There is an extensive U.S. literature on the control techniques employed; cf. in particular [1] [2] and [3] and the reference there cited.

[14] Cf. *Green Paper* Chapter 5 where a quasi-automatic adjustment of rates is proposed. It seems entirely arguable that the Bank's willingness to raise rates since November 1979 has been constrained by Ministers on political grounds and not by central banking caution.

CHART 1



Definitions:

(i) £M^*_3 ≡ target rate of growth at annual rate is taken to be the mid point of the target range. Permissible error is ± 2%.

(ii) £M_3 ≡ observed percentage change in month x12.

(iii) Sterling CD Rate ≡ mid point of monthly range on 3 months Sterling CD's.

Sources: *Bank of England Quarterly Bulletin.*

Table I

U.S. MONETARY PERFORMANCE SINCE OCTOBER 1979

Year and Month		Observed Growth Rates in M_1	M_{1A}	M_{1B}	M_2	Observed Federal Funds Rate	Observed Commercial Paper Rate	FOMC Month & Date	FOMC Policy Decisions: Target Growth Rates M_1	M_{1A}	M_{1B}	M_2	Target Range Federal Funds Rate	Periods for which Targets were defined
1979	Oct.	3.1**			6.8**	13.48	13.57	Oct. 6	4.5			7.5	11½ - 15½	Oct. - Dec.
	Nov.	3.25**			6.8**	13.18**	13.24	Nov. 20	5.0			8.5	11½ - 15½	Nov. - Dec.
	Dec.		6.2	7.5	7.4	13.82	13.04							
1980	Jan		3.6	5.3	0.9	14.13	13.78	Jan. 8-9	4.5			7	11½ - 15½	Dec. - Mar.
	Feb.		9.4	9.8	9.5	17.19	16.81	Feb. 4-5		4½	5	6½	11½ - 15½	Jan - Mar.
	Mar.		− 1.9	− 0.3	4.7	17.61	15.78	Mar. 18		4½	5	7¾	13 - 20	Jan - June*
	Apr.		−17.7	−14.1	− 1,9	10.98	9.49	Apr. 22		4½	5	6¾	13 - 19	Jan - June
	May		0.7	− 1.2	9.1	9.47	8.27	May 20		7-7½	7	8	8½ - 14	May - June
	June		11.4	14.6	18.1	9.03	8.41							
	Jul.		7.8	11.1	18.1	9.61	9.57	Jul. 9		7	8	8	8½ - 14	June - Sept.
	Aug.		19.3	21.6	13.6	10.87	10.97	Aug. 12		6½	9	12	8 - 14	June - Sept.
	Sept.		12.6	15.8	8.5	12.81	12.52	Sept. 16		4	6½	8	8 - 14	Aug. - Dec.
	Oct.		9.4	11.5	9.3	15.59	15.18	Oct. 21		2½	5	7¼	9 - 15	Sept. - Dec.

* Rates defined only for first half of the year.
** Rates refer to control periods defined in last column.

Source: Federal Reserve Bulletin.

its performance. Moreover, what data there is essentially relates to a period in which the U.S. markets were in the process of adjusting to the new techniques. It is, therefore, of limited value in providing information about the characteristics of those techniques in a system which is fully familiar with them. Table I should therefore be interpreted with caution.

On the other hand, so far as it goes, Table I suggests that:

(i) the October 1979 shift to controlling bank reserves rather than the Federal Funds Rate has not provided any improvement in short-term performance;

(ii) it has entailed both a much wider target range for the Federal Funds Rate and greater variation in other short-term rates;

(iii) a significantly wider spread of daily quotations.

These consequences are not surprising since empirical estimates of money supply relations frequently suggest that the distributed lags relating the dependent money stock to current and past value of reserves are not only of a form which renders short-term control of the money stock very difficult but are also rather poorly defined statistically — a point now stressed by the Federal Reserve itself.[15] These difficulties are, of course, likely to be compounded by the technical problems associated with hitting a "reserve target."

In sum, therefore this very brief review of U.K. and U.S. data suggests only that:

(i) neither the Bank of England nor the Federal Reserve has been very successful in managing their chosen monetary aggregates over the short-period in terms of our criteria by "demand side" methods;

while

(ii) early U.S. experience with a "supply side" technique, though probably dominated by transitory adjustments by transactors, is not very encouraging;

[15] Cf. the submission by the Board of Governors of the Federal Reserve to the Treasury and Civil Service Committee of the House of Commons where this point is stressed.

though

(iii) it appears that "supply side" techniques, as their critics have suggested, do involve greater short-run variation in short-term rates.

5. A Case for Monetary Base Control?

The proposal to replace the existing "discretionary demand" system of control in the U.K. by some variant of a "supply side-monetary base" system was examined — and found wanting — by the Bank of England and the Treasury in their *Green Paper* on monetary control. This document is well known and we do not review its arguments here. We note, however, that the "monetary base" proposal remains on the table despite the fact that the two authorities preferred a modification of the existing system which introduced a measure of automaticity into this present discretionary adjustment of interest rates and related the adjustment to the observed error in tracking $£M_3$*.[16] This is generally known as the "indicator" system.

Since the "monetary base" proposal remains alive, we now examine some of the problems involved in devising a workable system of this type in the belief that, by doing so, we should obtain a fuller understanding of the technical difficulties of controlling $£M_3$.

Employing the familiar static textbook model[17] we can write two equivalent expressions for the nominal money supply thus:

$$M^s \equiv BB.K + C_{nbp} \qquad (5.1)$$

$$M^s \equiv MB.K + (1-K)\,C_{nbp} \qquad (5.2)$$

where

$K \equiv$ reciprocal of the banks' reserve ratio $\equiv \frac{1}{q}$

$MB \equiv$ monetary base

$BB \equiv MB - C_{nbp} \equiv$ Banks' reserve base

$C_{nbp} \equiv$ non bank public's demand for currency

[16] Thus using the errors in tracking as an "indicator."

[17] We consider only a system under which there is a mandatory minimum reserve ratio to deposits ($\equiv q$).

and, from the central bank's balance sheet identity

$$MB \equiv GS_{cb} + OA_{cb} - D_{g.cb} - SD_{b.cb} + Z_{cb}$$

where

$GS_{cb} \equiv$ government securities held by the central bank

$OA_{cb} \equiv$ overseas assets held by the central bank

$D_{g.cb} \equiv$ government deposits at the central bank

$SD_{b.cb} \equiv$ bankers' special deposits at this central bank

$Z_{cb} \equiv$ other net assets of the central bank

and q is constrained by a requirement to be $\geq q_{min}$ which is set by the authorities.

Suppose now that the authorities seek to set M^s by setting MB ($\equiv$ monetary base) and, simply to clarify ideas, that the authorities *can* set MB precisely equal to some target value MB*.[18] The first problem facing the authorities, neglecting the dynamic difficulties which would arise because K is not a single coefficient, but a fairly complex distributed lag, is to use (5.2) to define MB* given M^s* ($\equiv$ the target value of the money supply). This entails:

(i) forecasting C_{nbp} as (say) $\hat{C}_{nbp}$ on the basis of some currency demand function;

and (ii) forecasting the aggregate reserve ratio ($\equiv q \equiv \frac{1}{k}$) which the banks will hold.

Given the above forecasts, then, if MB is set equal to the calculated MB*, the expected value of (5.2) is M^s* and M^s will deviate from M^s* only if there are errors in forecasting C_{nbp} and/or in forecasting q.

The degree to which the authorities can forecast C_{nbp} is not known but some error is unavoidable. When MB is set, the multiplier for any such error is 1-K which exceeds unity. Alternatively if BB is set, the multiplier is unity. This suggests that, if a "base" type system is to be introduced, it may be more sensible to employ BB and not MB as the operating target. This, of course, simply amounts to:

[18] The limitations on the authorities' ability to do this are stressed in the *Green Paper*.

(*a*) substituting a Deposit target (D*) for a money supply target and (*b*) accepting whatever range of error in controlling M^s results from errors in forecasting C_{nbp} and hence deriving D* from M^{s*} by use of the definition $M^{s*} \equiv D^* + \hat{C}_{nbp}$.

Suppose now that BB is set rather than MB. The mandatory reserve requirements entails that $q \geq q_{min}$ for each bank. This aggregate q may, however, be extremely difficult to forecast not only because the banking system in the U.K. is non-homogeneous but also because, in any short period, it will not only reflect outcomes which banks planned but outcomes which some banks did not plan. This is inevitable in any system in which, within any short period, banks have imperfect control over their own portfolios.[19] These permanent characteristics will be supplemented in the early stages of any "base" system by transitory uncertainties. The forecast of q ($\equiv \hat{q}$) is thus likely to display a fair range of error and it may take some considerable time before a reasonably reliable aggregate reserve demand function emerges.

We must now recall that our simplifying assumption that BB (or MB) can be set with great precision is *not* valid.[20] The difficulties are then compounded since errors made by the authorities in setting BB will supplement those made in forecasting q thus contributing to deviations of D from D* and hence in M^s from M^{s*}.

The reasons why BB or MB cannot be set with great precision are clear from the MB identity for, of the five sources listed, the authorities have direct control over only two: GS_{cb} and $SD_{b.cb}$. The remainder must be forecast and, in any short period, any such forecasting seems sure to entail fairly sizable errors particularly in view of the fluctuations in public sector cash flows and the changes in overseas reserves which, in practice, are unavoidable even under a floating rate régime.

Since errors in setting BB or MB and in forecasting are unavoidable it seems that, if possible, any "base" control system should be set up in a form which makes it likely that errors in forecasting q and setting BB will be negatively correlated and thus, at least in part, offset each other. This in turn suggests that the rules of the game should be set up in such a way that:

[19] In an overdraft system, the banks determine limits: the customer determines advances and hence deposits.

[20] Cf. F/N (3) above.

(i) the banks are enabled to identify situations in which BB is likely to exceed BB*: that is the authorities are likely to create excessive bank reserves;

and (ii) are at the same time encouraged to set their reserve ratios, in such situations, above what they otherwise would have been.

6. A possible Modus Operandi

Our arguments suggest that the operating target of the authorities should be BB ($\equiv$ Bank reserves) and that, since there is ample evidence that banks cannot adjust quickly to changes in their reserves, BB should be set with a fairly long control period in mind. This dynamic argument is strengthened by the consideration that attempts at rapid correction of errors in $£M_3$ in relation to $£M_3^*$ may entail considerable, and even increasing, fluctuations in the rate of change of BB.[21] Our interpretation of what is practicable is, therefore, relatively modest. However, when we consider what these "relatively modest" suggestions might entail, we see once more the technical difficulties involved even in a rather unambitious control specification.

Because of the banks' inability to make rapid short-term adjustments, it would seem essential to provide them with information regarding the authorities' target value of reserves (BB*) in future periods. We thus suggest that, at time t, the authorities should publish their target figure for:

(i) BB* (t+i) i=1, 2, 3

and (ii) D* (t+i) i=1, 2, 3

The latter figure is, of course, a derivative of the officially announced target for $£M_3^*$ and forecasts of $\hat{C}_{nbp}$ (t+i). The former is derived from the latter by applying a forecast value of q ($\equiv \hat{q}$).

[21] In operational terms this implies identifying $£M_3$ with the "trend": that is the average of $£M_3$ over several months.

In a well established "reserve control system" it might be reasonable to expect q to be a close approximation to q_{min}: that is banks, in general, to have a zero demand for excess reserves. In the early stages of such a system, because of uncertainty in its operation, the banks must be expected to hold some excess reserves. Hence initially the authorities would need to work on the basis of $\hat{q} > q_{min}$. However, the aggregate $\hat{q}$ employed by the authorities would be readily calculable from (i) and (ii) and the banks would therefore be aware of the authorities forecasts of their *collective* performance.

The period of calendar time implied in (i) and (ii) has not yet been defined. It is essentially an "accounting period" in the sense that it is the period of time over which the banks are expected to maintain $q \geq q_{min}$. How long this should be, and the precise way the banks' reserve obligation should be defined are awkward matters to which we shall return later. Simply to fix our ideas we now define:

(1) the accounting period ≡ one month;

and (2) the information period ≡ one week;

where the latter is the period over which the authorities provide statistical evidence of the movements in BB and D.

Thus each information period the banks would be given details of how the reserve base has actually moved and the authorities estimate of the movement in D.[22] This would give the banks some help in calculating whether the actual reserve base was moving as the authorities planned or not. It would also be a useful indication of the overall performance of ΔD in relation to ΔD*.

It would be foolish to over-estimate the value of this information since weekly figures for total deposits are estimates the reliability of which is presently uncertain. Equally, unless the authorities felt able to transform the planned change in reserves over the accounting period, ΔBB* (t+i), into planned changes over each week, a task about which they presently have obvious misgivings, the weekly figures for ΔBB might convey relatively little

[22] It is difficult to believe that weekly deposit data could be based on returns from all banks. It is therefore likely to continue as an estimate obtained by grossing up the results of a sample of banks.

information. This situation, however, should improve with experience of the new system.

The authorities now operate, by means of open market operations, repurchase agreements and calls to special deposits with the aim of setting BB equal to BB*. Operations are, unavoidably, on a continuous daily basis. From their own books, the authorities know the daily total of D_{bcb} and the sum of (C_b+C_{nbp}). They do not, however, know $D_{bcb} + C_b \equiv$ BB. Moreover, even if they were aware of this daily figure for BB, they would be unable, as they themselves assert, to define a daily value of BB*. Since this is the case, and it is extremely difficult to make short-term forecasts of ΔD_{gcb}, ΔOA_{cb} and ΔZ_{cb}, it would be idle to expect any close correspondence between the weekly values of ΔBB and ΔBB*. At the end of each week, the authorities should have information on the discrepancy and thus some indication of the appropriate direction of adjustment. But in general, and in particular in the early stages of their operations, sizeable errors between weekly values of ΔBB and ΔBB* (assuming the latter can be defined) seem highly probable.

The object of the authorities is to bring about a correspondence between ΔBB and ΔBB* over an accounting period. How quickly should they seek to adjust errors *within* such a period?

In attempting to consider this question we need to recall the inability of the authorities, in any shorter period such as a week, to ensure that an open market purchase (or sale) will increase (or decrease) MB or BB. This, of course, is simply the counterpart of the inability to forecast ΔD_{gcb}, ΔOA_{cb} and ΔZ_{cb} at all precisely. Given their inability, and the difficulty banks experience in bringing about short-term changes in their total assets, there is obviously a strong case for rather cautious adjustments *within* the accounting period. If this is correct, then even *over* the accounting period, discrepancies in ΔBB and ΔBB* are unlikely to prove negligible. This is one reason why "monetary base" or "reserve base" control must be regarded as being concerned to bring about a rather slow process of error correction operating over a number of accounting periods rather than a rapid short-term adjustment *within* an accounting period.[23]

[23] Notice that this implies that close short-term control (i.e. over each accounting period) is not a sensible objective of policy.

This view explains, in rather more detail, the need to ensure that, if at all possible, the system should encourage $q > \hat{q}$ whenever $BB > BB^*$.

A mechanism which should offer some encouragement to the banks to hold a reserve ratio in excess of $\hat{q}$ whenever $BB > BB^*$ can be constructed by making the rate of return paid on excess reserves a function of the error $BB - BB^*$. For example, if we define excess reserves as:

$$D(t)(q(t)-q_{min})(t)) \equiv \text{Excess Reserves} \equiv ER$$

the authorities could pay a rate on excess reserves which is functionally related to the extent that the existence of these reserves is to be explained by the authorities' own error. The form of any such function is at choice but the general principle can be set out as:

$$r_r = f\left(r_{cb}, \frac{(BB-BB^*)}{ER}\right) \quad \frac{\partial r_r}{\partial r_{cb}}, \quad \frac{\partial r_r}{\partial (BB-BB^*)} > o$$

where $r_r \equiv$ rate payable on excess reserves.

$r_{cb} \equiv$ Minimum Lending rate.

One possibility would be to impose the condition $r_r = o$ if $BB = BB^*$. Thus if $BB < BB^*$ the rate payable on excess reserve would be negative.[24] Clearly the more steeply branched the chosen function around $r_r = o$ for non-zero values of $BB - BB^*$ the greater the return (or penalty for an excess reserve policy which fails to offset, at least in part, the authorities errors in setting BB).

Just how far an arrangement of this kind would, in practice, encourage banks in the U.K. to forecast $BB-BB^*$ and adjust their reserve policies accordingly, is a matter of fact about which nothing can be said with any confidence.[25] A steeply branched function should, however, offer some incentive particularly since, if the banks forecast an excess of BB over BB^* in period $(t+1)$ they must expect BB to be reduced in relation to BB^* in period $(t+2)$ so that, by holding excess reserves, they not only have the prospect of a reward in the form of a relatively high interest rate but also of avoiding a possible policy induced reversal of portfolio decisions in period $(t+2)$.[26]

[24] In the early stages of a system of "banking base" control, it might be wiser to set $r_r = o$ for all $BB \leq BB^*$. Severe penalties for holding excess reserves, given the uncertainties attaching to any new system of control, *since they fall on individual banks and not on the system as a whole,* might induce bank action which entails a short-run "distortion" error between $£M_3$ and $£\bar{M}_3$.

[25] Except possibly by those with intimate inside knowledge of contemporary banking which few academies possess.

We envisage that, under this system, negative excess reserves defined as:

$$D(t)\, q_{min} > BB(t)$$

could never arise. This implies that, if $D(t)\, q_{min} > BB(t)$ the authorities would relieve the system in the usual way via the discount market at a rate of their own choosing. On the assumption, which the authorities seem to accept, that there should be some automaticity in the response of interest rates, we now consider what sort of arrangement would be appropriate.

Under this system we have the identity that

Unplanned
Lending by $\equiv UL \equiv Dq_{min} - BB$
the Authorities

$$\equiv (Dq_{min} - BB^*) - (BB - BB^*)$$
$$\equiv (Dq_{min} - D^*\hat{q}) - (BB - BB^*)$$
$$\equiv q_{min}(D - D^*) - D^*\, q_{min}\, \emptyset - (BB - BB^*)$$

where $\hat{q} = q_{min}(1+\emptyset)$ and $\emptyset$ is the allowance for holdings of excess reserves made by the authorities. Typically, except perhaps in the very early stages of any new system, we should expect $\emptyset$ to be very small and probably zero.

The last term in this identity is positive only if $BB^* - BB > O$: that is the authorities fail (or more strictly would fail in the absence of unplanned lending) to make BB as large as their forecast target value of BB^*. The first term is the excess deposit creation by the banking system multiplied by the mandatory minimum cash ratio. It thus measures the error of the banking system in its attempt to conform to D^*.

It therefore follows that if $UL \leq BB^* - BB$, the excess demand for reserves is less than, or equal to, the authorities error in setting BB. In this case the authorities relieve the market at the current market rate. Conversely, if $UL > BB^* - BB$, the banks have over-expanded and a rise in interest rates is necessary to bring

[26] Such reversals could be costly.

about some medium term adjustments in the deposit total by (say) a reduction in the demand for bank lending to the private sector.

Retaining the assumption of a measure of automaticity in the response of the authorities' lending rate, this amounts to defining two indicators on which the response should be based namely $q_{min}(D-D^*)$ and BB^*-BB. This contrasts with the authorities' proposal to use a single indicator $£M_3-£M_3^*$.

In the *Green Paper* the authorities proposed an "indicator system" under which their "operating rate" for providing funds to the banks via the discount market would be linked by a known schedule to errors in tracking $£M_3$. Minimum Lending Rate (MLR) would be adjusted if the "operating rate" was persistently above or below it, and would thus play the part of a "base rate." There is no reason why some such arrangement could not be retained under the present proposals. For example, if we simplify our UL identity by assuming $\emptyset$ = zero, this would suggest a function of the form:

$$r_o - MLR = f\{(D-D^*), (BB^*-BB)\}$$

where

$$r_o \equiv \text{operating rate and } \frac{\partial r_o}{\partial (D-D^*)} > 0$$

The precise form of function is a matter of choice. We would also have r_o = the market rate if $D = D^*$ since, in this situation, UL occurs only because the authorities other operations failed to equate BB with BB*.

Essentially this proposal implies that if $D \leq D^*$ no upward adjustment in rates is necessary. Conversely if $D > D^*$ some upward adjustment is implied. By itself, however, UL is a poor indicator of the need for adjustment. Hence it seems only sensible that where both $D-D^*$ and BB^*-BB are positive the interest rate penalty (the excess of r_o over the market rate) should reflect the extent to which the error originates with the authorities and not with the banks. In subsequent periods it would be for the authorities to adjust BB to BB*.

This system is only marginally more complicated than the *Green Paper's* "indicator proposal" and in no way inhibits the adjustment of MLR to persistent deviations in r_o from its base value.

7. Calendar Time and the Control Problem

Whatever the "control horizon" over which $£M_3^*$ is defined, we now need to consider how the "control period" should be interpreted in terms of calendar time recalling, in doing so, the authorities' own identification of the trade-off between the *speed* of response and the *appropriateness* of response.

It is, of course, a question of fact how accurately the authorities can adjust BB to BB* over alternative periods of calendar time. Contemporaneously there is little information on which to form a view on the point. However, since very short-run adjustments seem sure to be unreliable it would seem sensible to choose not only an accounting period but also a control period which emphasizes "appropriateness" rather than "speed." We therefore suggest an accounting period and a control period of one calendar month. By this we mean that:

(1) the cash reserve requirement[27] should be defined over a month ($\equiv$ 4 weeks) in terms of the reserve and deposit position on average over the period;

(2) the averages should be calculated from the data existing on a particular day in each of the 4 weeks.

Such a system gives some possibilities for smoothing though it has the disadvantage that attempts at adjustment by banks (individually or collectively) may be particularly concentrated in the fourth week.

The "control period" we define as the period over which the authorities seek to set $BB = BB^*$ and for which, in view of (1) (2), both BB and BB* are defined as the average of 4 weekly observations. If technically feasible, BB* should be defined on a weekly basis and this exercise should certainly be attempted with a view to improving the information available to the banks as a basis for their own planning. If the calculated values of BB* on a weekly basis prove at all reliable, they should also aid the authorities in "within period" adjustments of BB.

[27] Defining q_{min} may, in practice, be complicated by the non-homogeneity of the banks. This difficulty has been neglected here.

Thus, at the beginning of each "control" and "accounting" period the authorities would announce:

(a) $D^*(T+i)$ $i=1, 2, 3$

(b) $BB^*(T+i)$ $i=1, 2, 3$

where T now denotes the period of 4 weeks.

If possible, they should also announce $BB^*(t+j)\ j=1 \ldots 12$ where $t \equiv$ a week.[28] This also implies estimates of $D^*(t+j)$.

At the end of each week, the authorities provide data on BB and estimates of D. This, if the calculated values of $BB^*(t+j)$ and $D^*(t+j)$ are at all reliable, would give the banks collectively some information on how far D and BB correspond to the authorities' plans.

Correspondence between any particular pair of $BB(t+j)$ and $BB^*(t+j)$ is, as we have seen, likely to be poor and no doubt the series would contain a great deal of noise, at least in the early days of the system. Nevertheless, as weeks pass, it should be possible for the banks to form some expectation of whether $BB(T+1)$ would exceed its target and therefore whether it would be wise to hold excess reserves.

At the end of each control period, new data would be issued for $D^*(T+i+1)$ and $BB^*(T+i+1)$. This would involve the revision of $D^*(T+2)$ and $(T+3)$ and the corresponding figures for BB*. The extent of any revisions would, of course reflect both the extent of any error $D(T+1)-D^*(T+1)$ and the speed with which the authorities aim to "correct" errors.[29] We would argue that the error correction process should be gradual in the sense that it should be planned to take place over considerably more than one control period. We would also argue that, at least initially, it should be defined primarily on the basis of discrepancies in growth rates rather than levels.

Our discussion therefore suggests:

(1) control of $£\dot{M}_3$ only up to any error arising from the inadequacy of the currency demand function;

[28] The $BB^*(t+j)$ would, of course, be derived from the $BB^*(T+i)$.

[29] This raises the usual problem of whether "errors" are to be defined in terms of levels $(D-D^*)$ or rates of change $(\dot{D}-\dot{D}^*)$. Since $£\dot{M}_3^*$ is, in practice, defined with a range of permissible errors, there seems much to be said for the second definition though it means accepting "drift."

(2) an error defined over $\dot{D}$ in relation to $\dot{D}^*$;

(3) a relatively slow process of error correction

buttressed by an arrangement designed to encourage banks to maintain $q > \hat{q}$ if it appears that BB will exceed BB*.

This is a fairly unambitious form of "supply side control" in that, while it might ensure a degree of correspondence between $£M_3$ and $£M^*_3$ over (say) calendar quarters or half years which would be "acceptable" from the point of view of its impact on the real economy and consistent with 'medium term' policy, it would not necessarily provide a short-run performance more "acceptable" to financial and City interests. This is unfortunate. But in the present state of our knowledge, it may well be impossible to devise a system of "supply side" control which offers any prospect of achieving more than this without, at the same time, requiring major changes in debt management techniques and in U.K. financial markets which would not necessarily be beneficial in the longer term.[30]

Conclusions

The central proposition of this paper is that the technical problems of implementing a "gradualist monetarist" monetary policy are severe. In short, though, in principle, the nominal money stock is a "controllable" variable, the precision with which it

[30] It seems intuitively likely that the current fuss, in the City and among politicians, over short-term deviations in $£M_3$ from target, would be much reduced by an "acceptable" medium term performance such as the proposed system might provide. If, however, City comment and forecasting effort continues to be devoted to "short-term" discrepancies, the simplest course might be for the authorities to issue *daily* estimates of the growth rate of a very wide range of nominal money stock concepts. These series would, in all probability, contain a very considerable amount of noise and frequently be in contradiction with one another. Moreover, they would often need revision. Thus flooded with manifestly unreliable information, there would be some prospect of the market and financial commentators concentrating their attention on what is, theoretically at least, the relevant concept — namely the trend — which the authorities probably could control quite effectively under the proposed system. It should be noted, however, that the authorities believe that medium term control is effective under the present system. Cf. *Green Paper* para 1.9 where the "medium term" is defined as "a year or more." The out-turn over the last 12 months has, however, thrown considerable doubt on the authorities' contention in this regard.

can be controlled is not as great as has often been assumed particularly over relatively short periods of calendar time. We have also argued that even when short term changes in £M_3 can be engineered by the authorities they may be of little significance in terms of the underlying macro-economic theory from which the monetarist emphasis on £M_3 is derived.

Taking this view, which on some readings of the *Green Paper* seems to be shared by the authorities, we have identified effective monetary control with a set of monetary arrangements which:

(i) make it possible, from monthly data, to identify the "trend" in £M_3 - taken to be an empirical proxy for the theoretically relevant £$\bar{M}$;

(ii) ensure that this "trend" will be an acceptable approximation to £$\bar{M}_3$* over (say) 3 - 4 quarters;

while

(iii) minimising the incentive for financial institutions to undertake induced distortions of £M_3 from the theoretically relevant £$\bar{M}_3$.

On this basis we have discussed the sort of arrangements which might meet the difficulties of satisfying (i) - (iii) in a "supply side" or "base" system. Whether this or some alternative scheme would work better than *either* the existing "discretionary demand" system *or* the authorities' proposed "indicator system" is, however, far from certain. Moreover, even if the best judgement was that it probably would, we have not given any attention to its implications for efficiency or to the relation between the costs involved in introducing it and the value of its longer terms benefits. This renders our discussion incomplete.

The incomplete and rather general nature of the analysis are not, however, of primary importance since our purpose is to illustrate the complexities of monetary control and thus the real, but frequently neglected, difficulties of controlling the chosen monetary aggregate in a way which, in practice, is consistent with the familiar "monetarist" proposition that the nominal money stock is a manageable intermediate target.

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