Monetary Stabilisation and the Stabilisation of Output in Select Industrial Countries*

Introduction

With most industrial countries now opting for monetary targets,[1] a key question is whether this is also likely to stabilise income and output. This paper looks at the recent history of a number of industrial countries and attempts to evaluate whether, if these countries had followed a more stable money supply policy, the growth of nominal income or output would have been stabilised. Two approaches are used in the analysis. A first approach attempts a simple simulation of what the rate of growth of production would have been if monetary growth had been stabilised. These results are then compared with actual outcomes. A second approach starts with the proposition that with monetary growth stabilised income variability would be determined by the variability of velocity. An attempt is then made to remove from the variability of velocity the influence of both monetary instability and any time trend: the residual variability of velocity would then be an approximation to the variability of velocity with monetary growth stabilised. This residual variability of velocity is then compared with the variability of observed nominal income.

I. A First Approach

This section reports on an exercise designed to compare the actual variability of industrial production in the seven major indus-

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* Some of the work in this paper was begun when the author was a Consultant to the Research Department of the International Monetary Fund during 1977. It, however, represents the author's personal view and not that of the International Monetary Fund.

[1] See W. McClam, "Targets and Techniques of Monetary Policy in Western Europe", in this *Review*, March, 1978.

trial countries with the variability of industrial production that would have eventuated if monetary growth had been stabilised.

A first step is to define a more stable (alternative) money supply policy. We chose to define an alternative monetary strategy in two ways. First (Rule 1) we assume that the monetary authorities had implemented a rate of growth of nominal money which was a two-year moving average of the observed rate of growth of nominal money. This enables us to evaluate the effects of simply smoothing out the monetary growth series. Second (Rule 2) we try to approximate Friedman's monetary rule. We now assume that the monetary authorities had implemented a rate of growth of money which reflects the trend in the observed monetary growth series. In other words, monetary growth is the forecast value of a regression of the actual rate of growth of money against time. If the time trend is insignificant then monetary growth would be represented basically by the constant in the equation; in this case the Friedman rule of a constant rate of growth of money would be exactly observed.

A second step in the analysis is to compute a hypothetical rate of growth of production which would have prevailed if each of the monetary rules had held. To determine the impacts on output of variations in the monetary impulse we drew on some econometric work which showed that monetary growth has significant effects on output and that these effects are spread over several quarters. The weights attaching to the monetary impulse in each quarter are derived from the econometric estimation. By applying these weights it is possible to carry out a simulation of a hypothetical rate of growth of production for each monetary rule. (These weights are shown in Table 1).

For the first rule we proceeded as follows: we first calculate a difference between the actual rate of growth of nominal money and the two-year moving average of the observed rate of growth of money. To determine what the rate of growth of production would have been with the two-year moving average we apply the monetary weights to this difference. This yields a series which represents the contribution to the rate of growth of production attributable to the difference between the observed monetary growth and the two-year rule. This influence is then removed from the industrial production series (e.g. in period "t" the adjustment to the rate of growth of production is the weighted sum of the difference between the observed monetary growth and the two-year monetary growth in the quarters over which money influences production).

TABLE 1

WEIGHTS USED IN SIMULATIONS - QUARTERS*

Country		Monetary Weights for Industrial Production			
		t	t-1	t-2	t-3
Canada	M1	.10	.07	.05	.03
	M2	.20	.15	.11	.08
France	M1	.35	.21	.13	.08
	M2	.49	.34	.24	.17
Germany	M1	.39	.22	.12	.07
	M2	.28	.20	.14	.10
Italy	M1	.33	.19	.11	.07
	M2	.67	.33	.17	.08
Japan	M2	.31	.25	.20	.16
United Kingdom	M1	.27	.14	.08	.04
	M2	.20	.12	.08	.05
United States	M1	.68	.40	.24	.14
	M2	.43	.22	.11	.06

* Derived from an estimated equation of the following general form:

$$Yr = \alpha_1 (Mo - P) + \alpha_2 FD + \alpha_3 FI + \alpha_4 COMP + \alpha_5 Yr_{-1}$$

where Yr = Per cent change in industrial production.
Mo = Per cent change in money (narrow or broad).
P = Per cent change in consumer price index.
FD = Per cent change in foreign demand.
FI = A measure of discretionary fiscal policy.
COMP = Per cent change in the country's competitive position.

The equation was estimated for the seven countries. In some cases insignificant variables were dropped. In each case the monetary impulse (represented by the per cent change in real money balances) was significant. The impact coefficient α_1 and the coefficient of the lagged dependent variable α_5 allow us to calculate the weights attaching to the 4 quarters following a monetary change.

For details of the definitions of the variables and the results see V. ARGY, "The Contribution of Monetary and Fiscal Impulses to Economic Activity", *International Monetary Fund*, December, 1977.

The simulations assume that the difference between the actual and the assumed monetary growth under the two rules represents a change in real monetary growth. In other words, it is assumed that the time path of the rate of inflation is largely independent of cyclical changes in monetary growth and determined by the longer-term trends in monetary growth. This is not unrealistic given the longer time lags that apply to the effects of changes in the volume of money on inflation.

The second rule is simulated in the following way. For each country we regress the nominal rate of growth of money against time. The residuals from this equation represent the deviations from the trend rate of growth in the volume of money. These residuals are then appropriately weighted to obtain their contribution to the rate

of growth of production. The contributions are then removed from the observed production series.

A third step is to contrast the variability of the hypothetical industrial production series with the variability of the original series over the same time period. This would provide some indication of the cyclical performance of money. Here we use Hansen's[2] measure of the per cent of the rate of growth of output stabilised over a time period. It is:

$$Yp = 100\left(1 - \frac{s1}{s2}\right)$$

where Yp is the per cent of the fluctuation in output which is stabilised by monetary management, s_1 is the standard deviation of the original production series and s_2 is the standard deviation of the newly generated production series (i.e. the original series stripped of the cyclical influence of the monetary impulse).

If $s_2 > s_1$ this implies that the monetary influence was stabilising (i.e. that the removal of the cyclical monetary influence destabilised production). If, on the other hand, $s_1 > s_2$ the expression is negative implying that the cyclical monetary influence was destabilising.

The results of this exercise are reported in Table 2. Inspection of the table reveals that the results are sensitive to the definition of money as well as to the particular rule tested. Nevertheless, a number of assertions may be made. There is an overwhelming predominance of negative outcomes, implying that had a more stable money supply policy been followed the growth of output would have been more stable. In Canada, Italy, Japan the results are throughout consistent: whatever the definition used or the rule applied there is a significant destabilising effect.[3] In Italy, for example, the destabilising effect is of the order of 10%-20%. In Germany there is a significant difference depending on the definition of money used. The broader definition, which is probably the more appropriate, yields large destabilising results, particularly for Rule 1. In the U.K., too, on the broad definition large destabilising results are obtained, particularly again for Rule 1. For the U.S. there is a marginal stabilising result for Rule 1 on the broad definition but the three other results

[2] B. Hansen, "Fiscal Policy in Seven Countries", *O.E.C.D.*, 1968.

[3] For Japan M2 is clearly the more appropriate concept. See R. Komiya and Y. Suzuki, "Inflation in Japan" in L. Krause and W. Salant (Eds.), *World Wide Inflation*, Brookings Institution, Washington D.C., 1977.

TABLE 2

EFFECTS OF REMOVING CYCLICAL MONETARY INFLUENCES FROM INDUSTRIAL PRODUCTION
(Per cent stabilised)

COUNTRY	MONETARY RULES (QUARTERLY)			
	RULE 1		RULE 2	
	M1	M2	M1	M2
Canada	[60(2)–76(3)] – 5.9	[60(1)–76(4)] – 5.4	[59(2)–76(4)] – 10.1	[59(2)–76(4)] – 5.5
France	[60(2)–76(4)] – 2.5	[62(1)–76(4)] + 4.8	[59(2)–76(4)] + 0.1	[60(4)–76(4)] + 6.5
Germany	[60(2)–76(4)] + 12.1	[60(2)–76(4)] – 20.4	[59(2)–76(4)] + 3.9	[59(2)–76(4)] – 8.6
Italy	[60(1)–76(3)] – 16.7	[60(2)–76(4)] – 19.5	[59(2)–76(4)] – 11.6	[59(3)–76(4)] – 9.9
Japan		[62(1)–76(4)] – 18.0		[60(4)–76(4)] – 5.5
United Kingdom	[60(2)–76(4)] + 13.0	[66(1)–76(2)] – 26.1	[59(2)–76(4)] – 3.0	[65(1)–76(2)] – 8.2
United States	[60(2)–76(4)] – 16.7	[60(2)–76(4)] + 3.5	[59(2)–76(4)] – 13.0	[59(2)–76(4)] – 2.4

are destabilising. France alone has a predominance of positive outcomes implying that cyclical monetary policy may have been marginally stabilising. On balance, therefore, it is difficult to escape the conclusion that in general monetary management has tended to be destabilising[4] vis à vis the growth of output.

It is interesting to see if those countries where money supply policy appears to have been most destabilising, were also those where the variability of monetary growth was also the greatest. Table 3 attempts to throw some light on this. No firm conclusions are possible from these results. The three Anglo-Saxon countries (the U.S., the U.K. and Canada) appear to have had the greatest variability in their monetary growth while monetary growth appears to have been relatively most stable in Japan, Italy and France. Yet it is not true in

TABLE 3

RANKINGS OF MONETARY VARIABILITY AND DESTABILISING MONEY SUPPLY POLICIES

Country	Destabilising Monetary Policies[a]		Coefficient of Variation of Monetary Growth (Rankings)[b]	
	M1	M2	M1	M2
Canada	3	4	2	1
France	4	6	4	5
Germany	6	1	5	3
Italy	2	2	6	4
Japan	—	3	—	6
United Kingdom[c]	4	—	1	—
United States	1	5	3	2

[a] Highest ranked is country exhibiting the most destabilising cyclical monetary policy (derived from Table 2).
[b] Highest ranked is country with the most unstable monetary growth (highest coefficient of variation). Coefficient of variation is the standard deviation divided by the mean.
[c] M2 excluded -period much shorter.

[4] This is consistent with work by Cooper-Fischer who carried out simulations of a monetary rule with the Fed-MIT Penn model for the U.S. They compare the standard deviation of the rate of unemployment and the rate of inflation for a simple rule with the standard deviations which the model produces on the basis of the exogenous variables, including the money supply. The rule outperforms the model's historical predictions. See J. Cooper and S. Fischer. "Simulations of Monetary Rules in the FRB, MIT Penn Model", *Journal of Money, Credit and Banking*, May, 1972.

general that money supply policies tended to be most destabilising in the former group of countries and least destabilising in the latter group.

II. A Second Approach

Consider the following identity:

[1] $$Y = M + V$$

where Y is the per cent change in nominal income, M is the per cent change in the volume of money (narrow or broad) and V is the per cent change in velocity (narrow or broad).

Now it is evident from this identity that if monetary growth were perfectly stabilised the variability of Y would be determined exactly by the variability of V. What we need therefore is some idea of the likely variability of V with monetary growth stabilised. The actual variability of V would be a biased measure of the variability of V with stabilised monetary growth, because some at least of the variability of V is attributable to the variability of monetary growth.[5] For example, one would expect that an acceleration (deceleration) in monetary growth would decrease (increase) the per cent change in velocity. This is so, in part at least because nominal income responds with a lag to variations in the growth in the volume of money. Hence the observed variation in the per cent change in velocity must at the least be purified of the influence coming from variations in monetary growth. Also the per cent change in velocity may exhibit a trend over time; the influence of this trend must also be removed from the observed variability in velocity.

To remove these influences from the variability of velocity the following regression was estimated (with annual data) for each of the countries:

[2] $$V = a_1 + a_2 M + a_3 M_{t-1} + a_4 T$$

where T is time.

[5] W. McClam, *op. cit.*, calculates standard deviations of per cent changes in money and in velocity in several industrial countries. He finds that in most countries the standard deviation of the per cent change in velocity is greater than the standard deviation of monetary growth and concludes that monetary targeting is unlikely to remove the greatest source of income fluctuation. However, this paper argues that since some at least of the variability of velocity can be attributed to monetary variability, this conclusion need not follow.

The standard error of this regression represents the residual standard deviation of V attributable to influences other than monetary changes and time trends. Basically these residual influences take three forms: shifts in the demand for money, cost push influences or autonomous changes in real demand. Each of these can bring about variations in the per cent change in velocity independently of variations in money. Indeed if monetary growth were stabilised these would be the only sources of changes in velocity and hence of nominal income.[6]

Table 4 shows the results of estimating Equation [2] for the countries (including now Australia). These results reveal the following. Nearly all of the equations are satisfactory and conform to theoretical expectations. The first period coefficient of monetary growth is negative and significant in almost every case for narrow and broad money. As expected the coefficient is less than 1, implying that a 10% increase in monetary growth, for example, will result in a less than 10% decrease in the per cent change in velocity. Most results show a coefficient of the order of 0.8-0.9. Also as expected the coefficient of monetary growth lagged one year has a positive sign and is in several cases significant. Most countries have significant positive time trends for narrowly defined velocity.

Table 5 (Columns 1 and 2) shows the standard error of estimate of Equation 2. As suggested this is a rough measure of the standard deviation of the growth of nominal income with monetary growth stabilised.[7] This result can now be compared with the actual standard deviation of nominal income growth, after removing the influence of any time trend (shown in Column 3). Columns 4 and 5 show the results of calculations similar to those in Table 2, to determine the per cent of nominal income stabilised. One should not, of course, expect too much consistency with the results presented in Table 2 given the differences in the basic methodology. Nevertheless

[6] An earlier paper by the author assumed as a first approximation that the variance of velocity change under a simple rule was the same as the observed variance of velocity changes. The paper recognised a bias in the assumption but made no attempt to remove this bias. See V. ARGY, "Rules, Discretion in Monetary Management and Short Term Stability", *Journal of Money, Credit and Banking*, Feb. 1971, Vol. III. No. 1, pp. 102-122.

[7] Of course if monetary growth were stabilised it is possible that the non-money supply disturbances would also be stabilised in which case the measure obtained is biased in an upward direction.

TABLE 4

REGRESSIONS OF PER CENT CHANGES IN VELOCITY AGAINST MONEY GROWTH AND TIME[a,b]
(Annual)

Country	Constant	M_1	M_{1-1}	T	M_2	M_{2-1}	T	R^2	Period
Australia	1.9 (1.3)	−0.9 (−7.1)	+0.17 (1.4)	+0.6 (2.8)				0.81	1961-1977
	−0.4 (−0.4)				−0.8 (−7.1)	+0.3 (2.7)	+0.5 (3.6)	0.77	1961-1976
Canada	2.0 (2.1)	−1.0 (−13.6)	+0.2 (3.4)	+0.4 (6.7)				0.92	1958-1977
	2.9 (2.8)				−0.8 (−5.0)	+0.4 (2.7)	−0.1 (−0.3)	0.77	1959-1976
France	6.1 (3.6)	−0.8 (−6.9)	−0.01 (−0.12)	+0.30 (3.6)				0.82	1958-1977
	3.7 (1.6)				−0.8 (−5.5)	+0.4 (1.7)	+0.4 (3.5)	0.68	1960-1976
Germany	4.1 (1.7)	−1.0 (−5.6)	+0.4 (2.3)	.0 (.0)				0.62	1958-1977
	4.5 (2.3)				−0.6 (−4.1)	−0.02 (−0.15)	+0.1 (0.1)	0.54	1959-1976
Italy	5.1 (1.0)	−0.9 (−3.1)	−0.17 (−0.6)	+0.7 (2.9)				0.40	1958-1976
	−6.2 (−1.7)				−0.04 (−0.13)	−0.02 (−0.4)	0.25 (1.2)	0.0	1959-1976
Japan	12.6 (2.4)				−0.9 (−3.9)	+0.02 (0.45)	+0.1 (0.7)	0.53	1960-1976
United Kingdom	1.3 (0.8)	−0.7 (−4.0)	+0.02 (0.1)	+0.6 (3.1)				0.46	1958-1976
United States	3.4 (3.8)	−0.6 (−2.4)	+0.07 (0.28)	+0.2 (2.0)				0.18	1958-1976
	2.6 (2.4)				−1.0 (−7.3)	+0.25 (1.8)	+0.25 (2.8)	0.76	1959-1976

[a] Equation [2] of text.
[b] t statistic shown below regression coefficients.

TABLE 5

RESIDUAL STANDARD DEVIATION OF PER CENT CHANGE IN VELOCITY

Country	(1) Residual V1[a]	(2) Residual V2[a]	(3) Y[b]	(4) % Stabilised M1 $100\left(1-\frac{(3)}{(1)}\right)$	(5) % Stabilised M2 $100\left(1-\frac{(3)}{(2)}\right)$
Australia	2.1	1.6	2.1	0	−30
Canada	1.6	1.7	2.0	−25	−18
France	1.9	1.8	2.9	−50	−60
Germany	2.3	2.3	2.6	−13	−13
Italy	4.5	3.4	4.2	+ 7	−23
Japan	—	2.8	3.5	—	−25
United Kingdom	3.0	—	2.9	+ 3	—
United States	1.5	1.4	1.6	− 7	−14

[a] Standard error of estimates of equation [2] for V1 and V2.
[b] Standard error of estimate of an equation of per cent change in nominal income against time.

they are in broad agreement (with the exception of France) in suggesting that a more stable monetary growth would have reduced the variability in nominal income.

III. Policy Implications

The conclusion reached that, had a more stable money supply policy been implemented *in the past*, the growth of nominal income would in general have been more stable will not come as a surprise. Indeed a major motivation for switching to monetary targeting was precisely to avoid the swings in monetary supply policy which had been a feature of the past.

It would be wrong, however, to deduce from this that monetary policy ought therefore in principle not to be used for demand management and that a policy of stabilising monetary growth from year to year is necessarily an optimal policy. First, economic theory suggests that stabilising monetary growth is not a first-best policy, except in a world governed by rational expectations.[8] In such a world, if the

[8] See T. SARGANT and N. WALLACE, "Rational Expectations and the Theory of Economic Policy", *Journal of Monetary Economics*, April, 1976.

monetary authorities implement a discretionary monetary policy in accordance with some rule (e.g. gear the rate of growth of money to known policy targets) and this rule became known, so that the rate of growth of money that the monetary authorities will implement is fully anticipated, monetary policy will be ineffective. Then the monetary authorities would do as well, if not actually better (since there will be less uncertainty) by following a Friedmanite monetary rule (i.e. allow the money supply to grow at a fixed rate). In these same conditions only *unanticipated* monetary growth will have real effects. The monetary authorities would be able to pursue a successful discretionary policy only if they should have superior information, not accessible to the general public.

However, the assumptions underlying a world of rational expectations are highly restrictive and unrealistic. Expectations must be rationally based (i.e. on the best information available on the structure of the economy) and there must be no institutional constraints (e.g. lags, wage determination procedures that gear wages to *past* changes in prices, labour contracts etc.) placed on the implementation of these expectations. There is indeed now a major counter attack on the theory of rational expectations.[9] The case for stabilising monetary growth is therefore not an *economic* one but rather a political one based on the judgement that politicians cannot be counted on to implement a successful demand management policy.[10]

Second, money supply policy was unsuccessful in stabilising income in large part because it tended to focus on *other* targets of policy (e.g. interest rates, inflation and the balance of payments).[11] In a world where monetary management is largely directed at targets other than income stabilisation it is not of course surprising that

[9] See E. PHELPS and J. TAYLOR, "Stabilising Powers of Monetary Policy under Rational Expectations", *Journal of Political Economy*, February, 1977; B. MCCALLUM, "Price Level Slickness and the Feasibility of Monetary Stabilisation Policy with Rational Expectations", *Journal of Political Economy*, February, 1977; F. MODIGLIANI, "The Monetarist Controversy, or Should we Forsake Stabilisation Policies", *American Economic Review*, March, 1977; R. GORDON, "Recent Developments in the Theory of Inflation and Unemployment", *Journal of Monetary Economics*, 2nd Quarter, 1976.

[10] J. COOPER and S. FISCHER, *op. cit* find that there is a discretionary Monetary Policy that will outperform a simple monetary rule.

[11] Needless to say, in the fixed rate world that prevailed for most of the period there were occasions notably in the years 1971-72 when the monetary authorities effectively lost control over the money supply in several industrial countries in the face of large capital inflows.

money supply policy performs poorly vis à vis income stabilisation. Fiscal policy was probably more oriented to stabilising income than monetary policy so a more relevant question may be to ask whether fiscal policy was any more successful in stabilising output. Work by the author[12] suggests that fiscal policy may well have been stabilising. Using a measure of discretionary fiscal policy and annual data the author found that in six of the seven countries fiscal policy was significantly stabilising[13] while in the single case where it was destabilising (Japan) the destabilising effect was negligible. But these results must be treated with considerable caution given the very serious problems associated with the construction of measures of discretionary fiscal policy. Moreover they do not entirely agree with Hansen's findings for an earlier period.[14] Five of our countries: France, Germany, Italy, the U.K. and the U.S. were included in Hansen's study. Hansen found large destabilising effects for France, Italy and the U.K. and large stabilising effects for Germany and the U.S.

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[12] See V. ARGY, *op. cit.*

[13] The period covered was 1960-61 to 1975-76 except for the U.K. where the period was shorter (1964-75).

[14] B. HANSEN *op. cit.*, p. 69. The years covered were 1955-58 to 1965.