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The Appreciation of Sterling - Causes, Effects, Policies

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January, 1981

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by Jürg Niehans

Introduction

The subject of this study is the recent appreciation of sterling. Its outlines are given in fig. 0.1. Since autumn 1976 the dollar price of the pound increased by about 50 per cent, since spring 1979 it increased by almost 20 per cent. The trade-weighted effective exchange rate, while rising only about 10 per cent from autumn 1976 to spring 1979, appreciated by more than 20 per cent since February 1979. However, to the extent exchange rates just reflect international differences in inflation rates, their fluctuations present no particular problems beyond those of inflation itself. The real problems begin with the deviations of exchange rates from purchasing-power parity, that is, with the fluctuations in real exchange rates. From the autumn of 1976 to the middle of 1980 the real rate of sterling in terms of the currencies of its principal trading partners increased by almost 50 per cent. This involved a shift in competitiveness of a size for which it is difficult to find precedents (though Japan comes close). This shift is the specific subject of this study. The latter is divided into three parts dealing, respectively, with the causes, the effects and the policy implications of sterling appreciation.

The report takes the view that the appreciation of sterling is mainly a problem of, and for, monetary policy. Monetary policy is an art. This art is based on principles reflecting the accumulated scientific research and historical experience of centuries.

[1]This study is sponsored by the Center for Policy Studies. I wish to thank Dr E Cottrell and Robert Miller for help in providing the statistical sources without which the study could not have been written.

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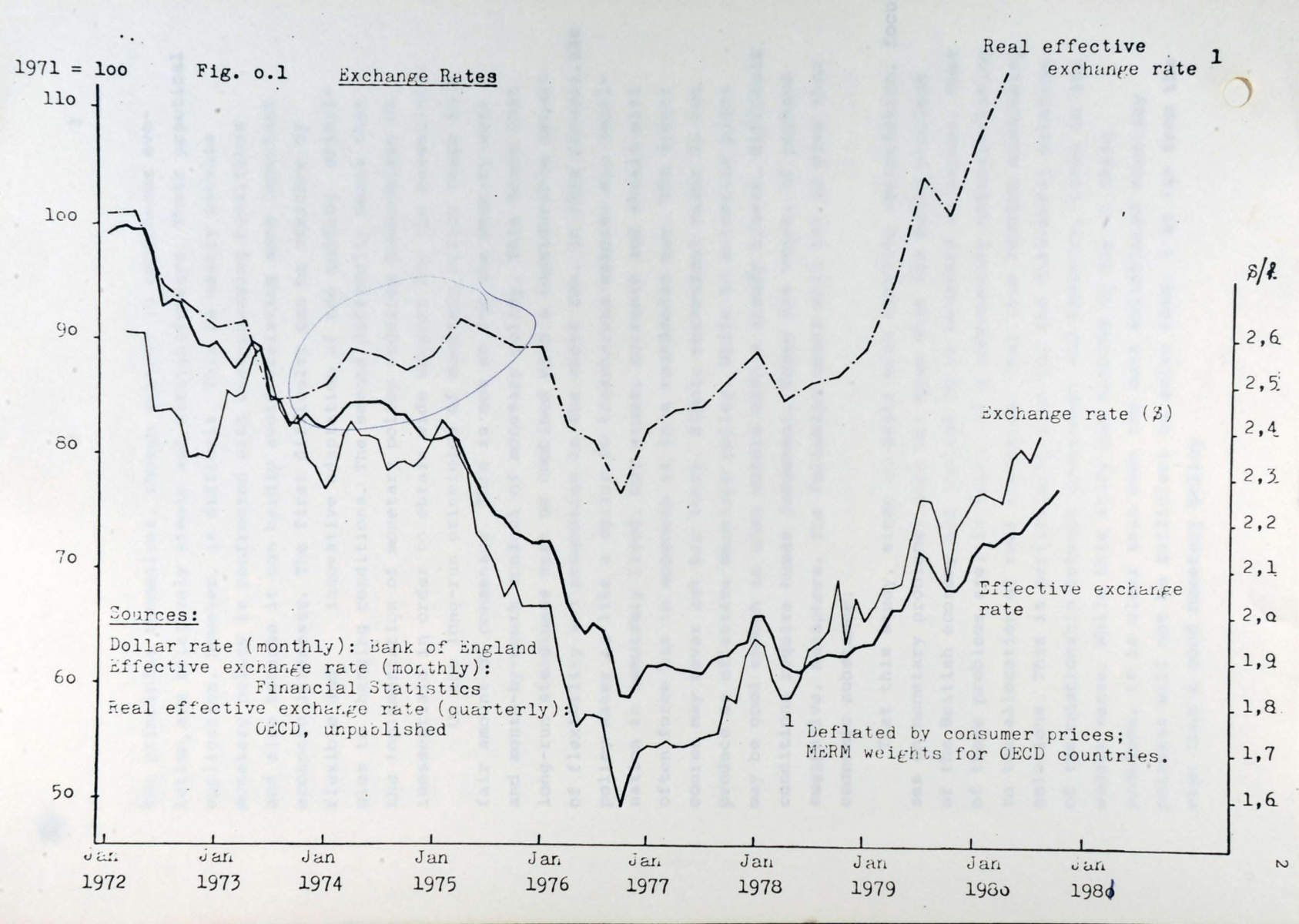

1971 = 100
Fig. o.1 Exchange Rates
Real effective exchange rate 1
Exchange rate ($)
Effective exchange rate
$/£
110
100
90
80
70
60
50
2,6
2,5
2,4
2,3
2,2
2,1
2,0
1,9
1,8
1,7
1,6
Jan 1972
Jan 1973
Jan 1974
Jan 1975
Jan 1976
Jan 1977
Jan 1978
Jan 1979
Jan 1980
Jan 1981
Sources:
Dollar rate (monthly): Bank of England
Effective exchange rate (monthly): Financial Statistics
Real effective exchange rate (quarterly): OECD, unpublished
1 Deflated by consumer prices; MERM weights for OECD countries.

The principles themselves, though subject to continuous evolution, are relatively simple and straightforward. Their practical application, however, is difficult. This is mainly because monetary policy is confronted with ever-changing conditions and also because it can hardly avoid violating some important economic interests. The first difficulty can be overcome by flexible and innovative adaptation of the guiding principles to changing conditions. The second difficulty means that the implementation of monetary policy requires compromises on inessentials in order to obtain wide support for the essentials.

On the long-run principles of monetary policy there is a fair amount of consensus. This is not so for the week-by-week and month-by-month conduct of monetary policy. This means that long-run steadiness must be combined with a considerable amount of flexibility and pragmatism in the short run. In this respect, the policy maker is like a sailor in treacherous waters: His destination is immutably fixed, but winds, currents and shoals will often force him to approach it in a roundabout way. The direct course may never get him there. Simple mechanical rules do not produce an effective monetary policy. While an automatic pilot may be good enough in open waters with a steady breeze, difficult conditions require human judgement. These are vague, if perhaps suggestive, metaphors. The following pages will try to give them economic substance.

That this study, since it deals with sterling appreciation, focuses on monetary problems, does not mean that the basic problems of the British economy are implied to be monetary in nature. Most of these problems are, in fact, of a nonmonetary nature, relating to the allocation of real resources. They thus require nonmonetry solutions. This is particularly true for the structural problems of the relationship between government and industry, taken in its widest sense. While this study has nothing to say on these problems, it is clear that even the most enlightened monetary policies will not be sufficient to solve them. I am far from the view that a good monetary policy

cures all economic ills. However, if an economy is made to suffer the consequences of mistaken monetary policies, the solution of the "real" problems becomes all the more difficult and perhaps impossible. In this sense, a sensible monetary policy, while far from sufficient, is necessary for the solution of the "real" problems. Monetary policy also has the virtue that it can be decisively improved within a rather brief period, long before much progress can be expected in the structural field. It is fortunate that excessive sterling appreciation can be corrected by improvements in monetary policies quite independently of the problems of resource allocation. Those who refuse to make use of this opportunity, insisting on a simultaneous solution of associated "real" problems, run the danger of never accomplishing anything.

One would normally want such a study to be based on, say, two years of careful work covering the many-sided theoretical, historical, empirical and institutional aspects of the problem. The time alloted for the present paper was five weeks. As a consequence, it will certainly suffer from many shortcomings. Judged by the standards of scholarly research it will appear as an unfinished piece. However, monetary policy can rarely wait for the results of scholarly research. In the unending chain of unique events we call human history, every year, every quarter poses new problems requiring innovative decisions. Such decisions, like those on a battlefield, have to be made before all the relevant intelligence is in, sometimes on extremely incomplete information. To this decision-making process the present study tries to make a modest contribution.

Part I: The Causes of Sterling Appreciation

1. North Sea Oil as a Cause of Sterling Appreciation

Before the advent of North Sea oil, the United Kingdom imported all of its oil. During the last few years, it became largely self-sufficient overall. This shift in real resources has often been held responsible for the recent appreciation of sterling.[1] The appreciation of sterling since 1976 indeed coincided with the rapid expansion of oil output and the even more rapid increase in the value of oil and gas (see table 1.1.). There is the question, however, to what extent North Sea oil is really the cause of sterling appreciation and to what extent the two developments were associated by coincidence. This question requires some theoretical considerations. I see tree main channels through which North Sea oil might have influenced exchange rates.

(1) Balance-of-Trade Effects of North Sea Oil

A first argument is based on a flow approach to exchange rate determination. According to this approach, an exchange rate must be such that in the balance of payment the receipts match the payments. North Sea oil would produce an incipient excess of receipts over payments. In order to eliminate it, the exchange rate has to appreciate, making imports cheaper relative to exports and/or raising home-goods prices relative to traded-goods prices.

[1] For a recent example see David T. King, What Should be Done About the Overvalued Pound, The Banker, Dec. 1980.

TABLE 1.1

Production of North Sea Oil

	1975	1976	1977	1978	1979	(1980[1])
Output, Oil (mill. to)	1	12	38	54	78	(82)
Output, Gas (Mill. toe)	31	34	36	34	32	(32)
Value of output, oil (£ Mill.)	48	641	2258	2819	5297	(8972)
" oil an gas[2] (£ Mill.)	1282	2447	4365	4630	7622	(12537)

1) NI ESR estimates

2) Gas valued at oil price on assumption it replaces oil imports

Source: National Institute Economic Review, The Medium Term Prospects and Problems, p. 16.

This is illustrated in fig. 1.1. Before the advent of North Sea oil, the sterling exchange market was represented by point 1. Self-sufficiency in oil then eliminated a large item on the payment side. At the old exchange rate there would thus have been a large balance-of-payments surplus. Under floating rates this is eliminated by an appreciation of the sterling rate, here expressed in dollars, combined with a contraction of both receipts and payments. The appreciation of sterling would thus be accompanied by a contraction of exports, while non-oil imports would rise, though not by the full amount of the former oil imports. This argument can be further developed by deriving the curves for sterling receipts and payments from the underlying demand and supply curves for foreign and domestic goods. In this way, the appreciation of sterling due to North Sea oil can be traced back to the price elasticities of the demand and supply for domestic and foreign goods.[1] According to the well-known Bickerdike/Robinson/Metzler condition, the deterioration in the trade balance, expressed as a percentage of total imports (or exports), resulting from an exchange appreciation by 1 per cent is

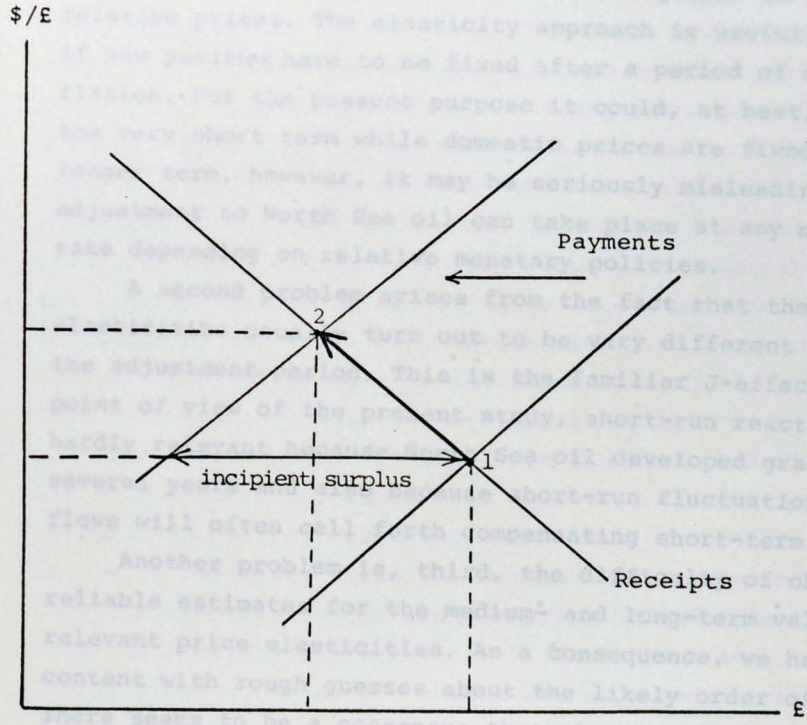
$$\kappa = \frac{(1 + \varepsilon_x)\eta_x}{\varepsilon_x - \eta_x} - \frac{(1 + \eta_m)\varepsilon_m}{\eta_m - \varepsilon_m}$$

where

ε_x = price elasticity of foreign demand for UK exports,
ε_m = price elasticity of UK demand for imports,
η_x = price elasticity of UK supply of exports,
η_m = price elasticity of foreign supply of UK imports.

[1] By this method, P.J.Forsyth and J.A. Kay (The Economic Implications of North Sea Oil Revenues, Fiscal Studies, vol. 1, no. 3, July 1980, p. 1 - 28) concluded that 22 per cent was a realistic assessment of the order of magnitude of the "oil premium" on sterling. In the light of the following considerations this estimate seems far too high.

Fig. 1.1 Demand and Supply of Sterling



In 1976, just before oil production began to be substantial, oil imports accounted for about 15 per cent of total imports (or exports). The percentage change in the exchange rate required to close this gap could thus be calculated as $de/e = (0.15)/k$.

The application of this approach to policy questions is subject to a number of well-known difficulties. First, the nominal exchange rates that appear in the elasticity approach provide an adjustment to monetary disturbances while North Sea oil, being a shift in real resources, requires an adjustment in relative prices. The elasticity approach is useful, in particular, if new parities have to be fixed after a period of domestic inflation. For the present purpose it could, at best, serve for the very short term while domestic prices are fixed. Over a longer term, however, it may be seriously misleading. In principle, adjustment to North Sea oil can take place at any nominal exchange rate depending on relative monetary policies.

A second problem arises from the fact that the various price elasticities usually turn out to be very different depending on the adjustment period. This is the familiar J-effect. From the point of view of the present study, short-run reactions are hardly relevant because North Sea oil developed gradually over several years and also because short-run fluctuations in trade flows will often call forth compensating short-term capital flows.

Another problem is, third, the difficulty of obtaining reliable estimates for the medium- and long-term values of the relevant price elasticities. As a consequence, we have to be content with rough guesses about the likely order of magnitudes. There seems to be a consensus that the sum of the two (absolute) demand elasticities is well above unity and probably more than 2. Suppose the sum is 2. With infinite supply elasticities, an appreciation of sterling by 15 per cent would be required to close a 15- per cent trade gap. If the sum of the demand elasticities, again with perfectly elastic supply, were 2.5, a 10-per cent appreciation would be enough; with demand elasticities summing to 3.5, the required appreciation would decline to 6 per cent.

Supply elasticities are not infinite, of course. Their influence, while somewhat complicated, is not very strong, however. Suppose the demand elasticities were $\varepsilon_x = -1.5$ and $\varepsilon_m = -0.5$. A lowering of supply elasticites from infinity to 2 would then raise the required exchange appreciation only from 15 per cent to 17 per cent. For completely inelastic supplies, the required exchange appreciation would again be 15 per cent, independently of demand elasticities.

Alternatively, it could be assumed that the UK economy faces given world market prices for both exports and imports. In this case, the required appreciation depends on the sum of the (absolute) price elasticites of the British demand for imports and the British export supply. If this sum is as low as 1.5, the required appreciation is 10 per cent; if the sum is as high as 3.0, an appreciation by 5 per cent would be enough. A mechanical application of the elasticity approach thus gives the impression that the required change in the exchange is of the same order of magnitude as the trade gap, though with a wide range of uncertainty.[1] However, the following considerations lead to the conclusion that this estimate is still too high, possibly by a wide margin.

The fourth problem arises from the fact that North Sea oil not only reduced the demand for imports, but also brought an increase in natural resources and wealth for the British economy. This will certainly raise the demand for imports and exportables, thus contributing to the trade adjustment and reducing the required sterling appreciation. In fact, in a small open economy facing given world market prices the adjustment takes

[1] Empirical estimates of the exchange-rate elasticities of UK exports and imports are given in section 6. They add to 1.23. If the product of the two supply elasticities equals the product of the two demand elasticities this can be shown to be also an estimate of k. In this special case, the estimates of section 6 would imply that a 15-per cent change in the trade balance requires a 12-per cent appreciation. If the product of the supply elasticities is lower than the product of the demand elasticities the required appreciation is less than 12 per cent; in the opposite case it is higher. However, even if both supply elasticities are twice as high as the (absolute) demand elasticities, the required appreciation would still be less than 17 per cent.

place without any shift in the terms of trade. Suppose the United Kingdom produces two goods, namely fossil fuel, F, and a composite commodity, Y. Its production possibilities before the oil discovery might be as indicated by P_1 in fig. 1.2 (a). The shape of this curve is meant to express the fact that England has virtually no oil deposits. At the given world market prices, expressed by the slope of the price line B_1, the structure of the economy would be represented by point Q_1 while consumption would be at C_1. The difference between Q_1 and C_1 indicates that the United Kingdom imports fossil fuels and exports other goods. The development of North Sea oil would be reflected in a rightward shift in the production possibilities to, say, P_2. In a small open economy, world market prices and thus the terms of trade will not change appreciably. Nevertheless production will move from Q_1 to Q_2, while the increase in welfare permits an expansion of consumption from C_1 to C_2. As the graph is drawn, England would still import oil, though much less than before. At the same time, some factors would be shifted from non-oil production to the oil industry. This illustrates the fact that the reallocation of resources resulting from North Sea oil can take place without a lasting change in the terms of trade.

By historical coincidence, the development of North Sea oil was accompanied by another rapid rise in world market prices. As a consequence, the price line not only shifted outwards from B_1, but also became steeper. This is illustrated by B_3 in fig. 1.2 (b). The terms of trade thus move in favor of oil and against other goods. Oil consumption declines, the production of other goods declines even more, and in the graph the United Kingdom becomes self-sufficient. It nevertheless remains true that the advent of North Sea oil, taken in itself, does not require a shift in the terms of trade compared to what they would have been in its absence.

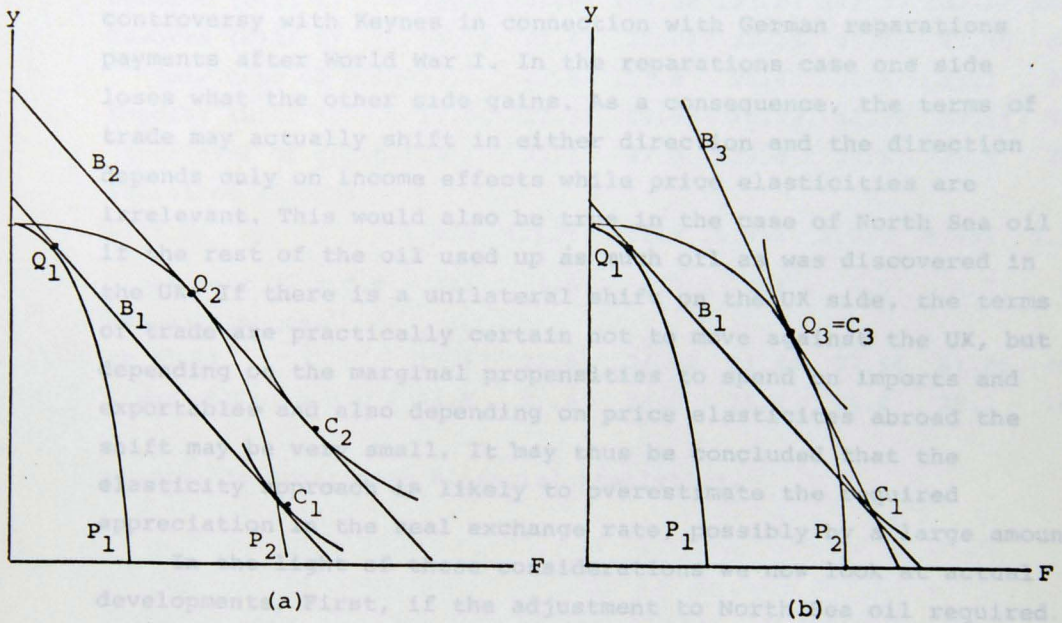


Fig. 1.2 Increase in Oil Resources

In general, of course, the terms of trade will not be fixed by world markets. The advent of North Sea oil will then move the terms of trade in favor of the United Kingdom. However, it still remains true that the increase in UK wealth will make this shift smaller than it would otherwise have been. The crucial role of income effects was pointed out by Ohlin in the famous transfer controversy with Keynes in connection with German reparations payments after World War I. In the reparations case one side loses what the other side gains. As a consequence, the terms of trade may actually shift in either direction and the direction depends only on income effects while price elasticities are irrelevant. This would also be true in the case of North Sea oil if the rest of the oil used up as much oil as was discovered in the UK. If there is a unilateral shift on the UK side, the terms of trade are practically certain not to move against the UK, but depending on the marginal propensities to spend on imports and exportables and also depending on price elasticites abroad the shift may be very small. It may thus be concluded that the elasticity approach is likely to overestimate the required appreciation in the real exchange rate, possibly by a large amount.

In the light of these considerations we now look at actual developments. First, if the adjustment to North Sea oil required a substantial appreciation of sterling in real terms, we would expect to see a decline in the value of oil imports and a substantial decline in non-oil exports.

This is not what the statistics show (see table 1.2). In fact, the value of oil imports, after a massive increase in 1974, continued at its high level, though it declined relative to gross domestic product. The "second oil shock" just about made up by higher prices what was saved in quantity terms. No downward adjustment in exports was needed on this account. As a matter of fact, exports expanded in money terms and roughly maintained their share of gross national product since 1974. The same is true for non-oil imports.

TABLE 1.2

Imports and Exports

	1973	1974	1975	1976	1977	1978	1979
Gross Domestic Product (Bill £)	72.81	82.65	104.38	123.81	142.37	163.07	188.18
Exports (Bill £)	17.12	22.97	27.01	35.19	43.31	47.40	54.30
(per cent of g.d.p)	23.5	27.8	25.9	28.4	30.4	29.1	28.9
Imports (Bill £)	19.01	27.37	28.99	36.89	42.59	45.54	54.34
(per cent of g.d.p.)	26.1	33.1	27.8	29.8	29.9	27.9	28.9
Petroleum Imports (Bill £)	1.678	4.537	4.167	5.486	5.030	4.454	5.136
(per cent of g.d.p.)	2.3	5.5	4.0	4.4	3.5	2.7	2.7
Non-oil Imports (Bill £)	17.33	22.83	24.82	31.40	37.56	41.08	49.20
(per cent of g.d.p.)	23.8	27.6	23.8	25.4	26.4	25.2	26.1

Source: International Financial Statistics.

Second, if the appreciation of sterling is mainly due to Noth Sea oil, we would also expect an expansion of the domestic demand for English goods while export markets are depressed. In fact, the reverse was closer to the truth, export demand holding up rather well while domestic demand slackened. While manufacturing production, except for a brief spurt in the spring of 1979, remained on a plateau from autumn 1976 to autumn 1979 and declined thereafter, the volume of manufacturing exports, except for a dip in early 1979 because of Iran, showed a rising trend until early 1980 and its recent decline was less than that in manufacturing production (see table 1.3). While the trade deficit was unusually small in the second half of 1977 and in 1978, when oil production was just beginning to be substantial, in 1979 it reverted to the order of magnitude it used to have before the advent of North Sea oil. If it should again turn out to be small in 1980, the most likely explanation would not be North Sea oil but the domestic recession.

Third, if the appreciation of sterling was due to North Sea oil it would probably have been accompanied by rather favorable economic conditions, though there might have been some adjustment problems in export and import-competing industires. In reality, this was a period of serious recession.

Finally, if North Sea oil was really the main cause of sterling appreciation, one would expect to find a marked depreciation of sterling during the oil shock of 1974. In fact, there was hardly any depreciation at that time, the effective exchange rate declining only about 5 per cent from July 1973 to April 1975 while the real effective rate actually appreciated.

TABLE 1.3

Production and Exports of Manufacturers

Index of Industrial Production: Manufacturing (1975 = 100, quarterly, seasonally adjusted)

	I	II	III	IV
1975	103.8	99.2	98.2	98.8
1976	99.1	101.7	101.8	103.2
1977	103.9	102.4	103.2	102.0
1978	102.3	104.2	104.8	103.0
1979	102.5	107.1	103.1	104.0
1980	100.7	96.5	92.4	

Export volume: Manufactures (1975=100, quarterly, seasonally adjusted)

	I	II	III	IV
1975	102	99	98	102
1976	106	109	107	111
1977	114	118	123	117
1978	119	119	121	122
1979	104	126	122	125
1980	125	120	119	

Source: Economic Trends, Monthly Digest of Statistics

Of course, these observations do not provide a strict proof of anything. They make it hard to believe, however, that the balance-of-trade effects of North Sea oil result in a lasting appreciation of sterling in real terms of major proportions. During the transitional period, before domestic prices had time to adjust, the oil-related shifts in the balance of trade may indeed produce some temporary appreciation in the exchange rate. However, to the extent this is so, the appreciation is of doubtful desirability since it may induce painful disturbances in output and employment which are not required from a long-term point of view. In addition, it is unlikely that the balance of trade was anything like the dominant factor behind the recent appreciation of sterling even from a short-run point of view.

(2) Capital Flows Induced by North Sea Oil

The preceding discussion concentrated on trade flows. It has been argued that North Sea oil is affecting the exchange rate also by attracting an inflow of capital. There is considerable confusion in economics about international capital movements. Basically, these are not a financial phenomenon. Purely financial transactions in the foreign asset market, no matter how large, cannot move a single pound worth of capital across national borders. Genuine capital flows are defined as an excess of domestic investment in real capital goods over domestic wealth accumulation. The question is how North Sea oil has affected this difference and how such a difference, if it occurs, may have affected the exchange rate.

Oil fields with the accompanying infra- and superstructure may indeed have opened up attractive investment opportunities. The economic theorist would say that the curve of the marginal product of capital moved upward. One might be tempted to seek confirmation of such a shift in a rise in domestic interest rates relative to foreign interest rates. This is likely to be futile. Rates of return for similar assets, expressed in the same currency, are promptly equalized internationally by arbitrage. This takes place almost overnight and in any case long before the capital flows have run their course. Arbitrage does not require capital movements. The relevant indicator should rather be sought in a rise in the values of existing capital goods above the cost of newly-constructed capital goods (that is, a rise in Tobin's q). It is quite possible that a margin of this sort appeared in the oil industry. If it did, the consequent increase in interest rates (both at home and abroad, in principle) would tend to "crowd out" some other investment which would have been profitable in its absence. The "profit squeeze" in British industry may thus, in part, be the darker side of an oil investment boom. In the present context, the important point is that such an improvement in investment opportunities, taken in isolation, would tend to produce a capital inflow.

On the other hand, the advent of North Sea oil also amounts to an increase in domestic wealth. This, taken in isolation, would tend to stimulate the UK demand for foreign assets and thus to produce a capital outflow.[1] The net effect of North Sea oil on capital flows is obtained by comparing the capital inflow resulting from improved investment opportunities with the capital outflow resulting from increased wealth. In general, it may go in either direction. We thus have to conclude that North Sea oil, if exchange rates were held constant, may induce either a capital inflow or a capital outflow.[2]

This is not all. Even if North Sea oil were certain to produce a capital inflow, the effect on the exchange rate would still be unclear. First, we again have to distinguish between nominal and real exchange rates. To begin with nominal rates, there is no reason why foreign purchases of, say, British oil stocks or foreign direct investments in North Sea oil, even if they continue for a long time, should necessarily result in a higher dollar price of sterling. Capital flows, like trade flows, are a real phenomenon, controlled by relative prices and yields. Exchange rates, on the other hand, are primarily a monetary phenomenon, at least in the long run. There is no clear-cut effect of capital flows on exchange rates, and even large international capital movements can often be effected without an appreciable fluctuation in exchange rates.

For real exchange rates the question is more complicated. It is tempting to argue that a capital inflow requires a real appreciation of the exchange rate to create the

[1] In the discussion of North Sea oil it has often been argued that foreign assets should be accumulated to counterbalance the eventual depletion of oil.

[2] It should be clear that this discussion relates to the transition phase before interest payment on foreign assets begin to dominate the picture.

corresponding import surplus. Again, however, the transfer argument is relevant: It is not clear a priori in what direction the terms of trade have to move in order to accommodate the additional capital flow. While it is conceivable that oil-connected capital imports have contributed to the real appreciation of sterling, the reverse is hardly less likely and in any case the effect will probably be small. Even if there were only one homogeneous commodity in the world, excluding any possibility for changes in the terms of trade, capital imports would be automatically accompanied by the required import surplus.

In summary, since both the effect of North Sea oil on capital flows and the effect of the latter on the real exchange rate are of uncertain sign and probably small, capital inflows induced by North Sea oil cannot be regarded as a major cause for sterling appreciation. This conclusion is consistent with empirical observations. In the case of the UK, there has been an continuous outflow of direct investment (see Table 1.4), which from 1977 to 1979 increased from year to year. There was typically an inflow of portfolio investment, but it was smaller in 1979 than in 1977 and there was even an exceptional outflow in 1978. Other long-term capital shows a large swing from a moderate inflow to a large outflow during the same period. While such figures are no evidence that capital outflows have helped to keep sterling down, they offer certainly no prima facie evidence that a surge of capital inflows has helped to push sterling up.

TABLE 1.4

International Capital Movements

(Mill. US $)

	1973	1974	1975	1976	1977	1978	1979
Direct Investment	-2168	-1689	-1262	-2506	-942	-2194	-3084
Portfolio Investment, nie	1968	3685	769	3378	3013	-2105	1456
Other long-term Capital, nie	-522	-463	-713	-2740	1421	-1760	-7062
	-722	1533	-1206	-1868	3492	-6059	-8690
Other short-term capital, nie	740	-1107	2738	-1571	3540	-2411	7021
	18	426	1532	-3439	7032	-8470	-1669

Source: International Financial Statistics.

(3) Monetary Effects of North Sea Oil.

The preceding sections considered the possible effect of North Sea oil through the flows of international trade and international capital movements. North Sea oil might have affected the sterling rate in other ways, namely through the stock demand for different currencies. There are, in particular, two types of such stock effects.

The first of these is an income effect. At an unchanged employment of resources, North Sea oil raises the real income in the United Kingdom economy. At unchanged prices, therefore, the demand for money is likely to rise, though not necessarily in the same proportion. If the supply of central bank money (the "cash base") is not adjusted upward, the UK currency will become scarce relatively to other currencies; British interest rates will rise. This will, in turn, exert deflationary pressure on the UK economy. At first, output and employment contract. This contraction will then produce a downward pressure on price and wage increases. After a period of recession, prices and wages will be significantly lower than they would have been in the absence of North Sea oil while employment is back to normal. While the cash base, by assumption, is unaffected in nominal terms, it is now higher in real terms. The real cash balances which the central bank refused to supply were supplied by deflation (or rather, by retarded inflation). In this way, North Sea oil may conceivably produce the equivalent of monetary contraction. I believe this is a channel through which North Sea oil may indeed have influenced the sterling rate, but purely monetary factors, which had nothing to do with oil, were probably much more important.

The other stock argument has to do with expected exchange rates. According to the popular argument, North Sea oil, by creating a trade surplus and/or capital inflows, would push sterling rates up. It would thereby provide an insurance against future depreciation and perhaps even create the expectation of a further appreciation. Combined with sterling convertibility, North Sea oil, so the argument runs, would thus induce asset holders to shift part of their portfolios, particularly oil money, from other currencies into sterling.

There were speculations that sterling might even become one of the main reserve currencies again.

The consequences of such a shift are basically the same as those of an increase in real income. To the extent the stock demand for sterling balances actually increases, refusal of the central bank to supply the additional balances would immediately raise the sterling rate. This would be followed by deflationary pressure on the UK economy. This pressure would only come to an end when prices and wages have declined to such an extent that the increased demand for real sterling balances is satisfied.

This argument, too, cannot be dismissed out of hand. Two points should, however, be noted. First, the argument is clearly based on the assumption that investors are convinced by the flow-oriented explanations of exchange rate fluctuations popular in the financial press.[1] While this is certainly conceivable, security and foreign exchange markets, by and large, seem to suggest that the influence of the financial press is, on average, not that strong while the judgement of investors is, on average, somewhat better. As a consequence I am not inclined to give this argument much weight.

Second, the above argument is again, in principle, monetary in character. In particular, if the central bank simply provided the additional sterling balances both the initial sterling appreciation and the subsequent deflationary pressure could be avoided. While monetarists - rightly or wrongly - tend to believe that the demand for money is rather stable, it was always part of monetarist doctrine that shifts in the demand for money, if they can be clearly identified, should be accommodated by the central bank (This is, after all, the reason why Friedman advocated a constant expansion rate for M_1 and not for the monetary base).

[1] David T. King (op. cit.) explicitly assumes that speculators take into account only short-run flow effects of North Sea oil, neglecting the inevitable future depreciation of sterling.

The conclusions from this section can be summarized as follows. From its low point in the fourth quarter of 1976 the real effective sterling rate appreciated by more than one half. During the last 2 years alone it appreciated by about one third. In the fall of 1980 it was about 15 per cent higher than it had ever been since 1970. In the light of the preceding considerations it seems unlikely that a major part of this appreciation was caused by a lasting shift in real factors. Such shifts tend to be much smaller per year, even in the presence of someting like North Sea oil. The latter may nevertheless have contributed to the appreciation of sterling. However, if it did, this was not so much because of the structural changes in the balance of trade or in capital flows, but rather because, through the increase in real resources and through portfolio shifts in favor of sterling, it contributed to the relative scarcity of money at the full-employment level of output. To the extent North Sea oil was a factor, it was for the most part a monetary factor. Like other monetary factors, its effect were, in principle, temporary and correctible by monetary means.

2. Monetary Policy as a Cause of Sterling Appreciation

In the public discussion, the appreciation of sterling has usually been attributed to North Sea oil. There is, however, another explanation, namely monetary policy. The two explanations may partially overlap inasmuch as North Sea oil, as pointed out in the preceding section, may itself have acted as a monetary factor. In addition, there is the possibility that monetary policy, quite independently of oil, may have contributed to the appreciation of sterling. This study takes the view that it was indeed the primary cause of sterling appreciation. The present section will try to identify the underlying shifts in monetary policy. The following section about the "overshooting" of exchange rates will explain how such shifts can produce seemingly excessive fluctuations in exchange rates.

(1) Interest Rates

During the period in question, the main instrument of monetary policy was the discount rate. It will be argued in part III that this is not a good choice. Interest rates are also deficient, in general, as descriptive indicators of the "thrust" of monetary policy. However, under the given circumstances the minimum lending rate (MLR) may fairly be taken as an indicator of what policy makers intended to do. From March 1978 to November 1978 the MLR was raised continuously from 6½ per cent to 12½ per cent(see table 2.1). After staying at or near this level until May 1979 (with a brief peak of 14 per cent in February) it was further raised in two steps to 17 per cent. In the light of these observations, 1978 and 1979 must be regarded as a period of intended monetary restraint.

It would be interesting to know whether the increase in nominal MLR was associated with an increase in real MLR or whether it merely reflected progressive inflation . In the absence of reliable measurements of expected inflation, real interest rates can be roughly calculated by subtracting from nominal rates the concurrent increase in consumer prices.

Table 2.1

Minimum Lending Rate

Nominal Rate (end of month)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1976	10.00	9.50	9.00	10.50	11.50	11.50	11.50	11.50	13.00	15.00	14.75	14.25
1977	12.25	12.00	9.50	8.25	8.00	8.00	7.50	7.00	6.00	5.00	7.00	7.00
1978	6.50	6.50	6.50	7.50	9.00	10.00	10.00	10.00	10.00	10.00	12.50	12.50
1979	12.50	14.00	13.00	12.00	12.00	14.00	14.00	14.00	14.00	14.00	17.00	17.00
1980	17.00	17.00	17.00	17.00	17.00	17.00	16.00	16.00	16.00			

Source: International Financial Statistics

Real Rate

(nominal rate minus monthly change in consumer prices at annual rate)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1976	-0,92	5.18	-12.72	-4.38	2.02	-0,02	-0.86	0.22	-8.24	0.12	-0.01	-14.79
1977	0.85	-0.24	-21.22	-3.51	-4.60	0.92	-2.22	-0.92	-0.96	4.88	1.84	- 0.68
1978	-1.18	0.62	-9.46	0.06	2.40	1.00	0.16	3.52	4.36	1.24	5.30	- 0.10
1979	1.58	5.48	-6.20	1.44	-7.56	-44.32	3.44	0.68	2.24	4.40	8.84	-11.20
1980	-0.76	0.80	-24.64	4.64	5.96	7.28	10.40	7.60				

Unfortunately, it is not clear how the latter should be measured. Annual rates can be calculated by comparing prices for the same month in successive years. For the present purpose annual rates of this sort are not satisfactory, however, because they depend as much from what happened a year ago as from what happened in a given month. This problem can be avoided by using price increases from month to month, annualized by multiplication by 12. In this case there will, of course, be seemingly erratic jumps in inflation rates. Nevertheless the timing of changes in inflation rates can probably be judged more accurately in this way. The real interest rates given in the lower part of table 2.1 were calculated in this way. From January 1976 to March 1978 these real rates were negative 2/3 of the time. From April 1978 to August 1980 they were positive about 3/4 of the time. Since July 1979 there were only 3 negative values, and from April to August 1980 the real rates stayed roughly between 5 and 10 per cent. For a five-month period, these are high rates indeed. While far from accurate, these real interest rates thus confirm that the last two years were a period of progressive monetary restraint.

(2) Money Supply

While the MLR was used as the main policy instrument, monetary targets during this period were expressed in terms of sterling M_3 (on the concept of £ M_3 see section 7). This raises the question to what extent the intended restraint was actually reflected in £M_3. Fig. 2.1 indicates that £M_3 did not show any clear sign of monetary restriction. There was perhaps a hint of some flattening-out early in 1980, but this was rapidly followed by another burst of expansion. From May 1974 to May 1979 the average monthly increase in £ M_3, calculated by regressing £M_3 on time, was 324 Mill. For the period from May 1979 to Oct. 1980 the corresponding increase was £ 691 Mill. (see table 2.2). This development was widely taken as a sign that there was no actual monetary restraint or, at the most, a very mild one[1]. I believe this conclusion is not warranted. As will be explained in section 7, £M_3 is likely to be a misleading indicator of monetary policy, often showing an expansion when policy is restrictive and vice versa. The main reason is that this aggregate includes interest-bearing short-term assets that are used as substitutes for cash balances, thus increasing as the supply of cash balances is tightened.

A more reliable picture of the actual monetary policy can be obtained by looking at the money supply M_1 (see fig. 2.1). This aggregate shows a hint of restriction starting in early 1978 and marked restriction beginning in the early summer of 1979. Table 2.2. indicates that the average monthly increases from May 1979 to October 1980 was only £ 85 Mill., compared to 243 Mill. from May 1974 to May 1979. If after May 1979 the supply of M_1 had continued the monthly expansion it had shown during the preceding five years, by October 1980 it would have been about 10 per cent higher than it actually was.

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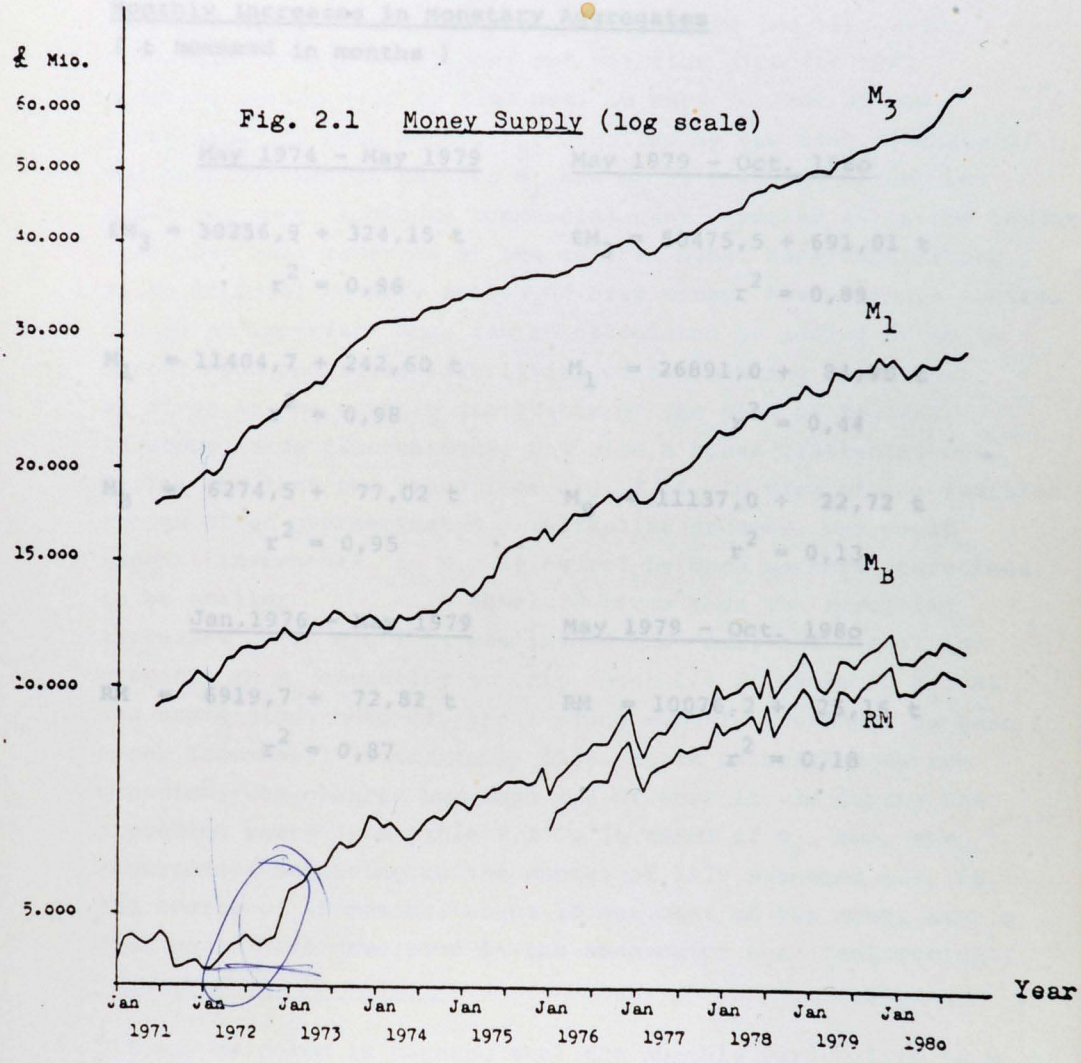
[1] This is, for example, the view expressed in King's above-mentioned article.

Fig. 2.1 Money Supply (log scale)



Source: Bank of England

Table 2.2

Monthly Increases in Monetary Aggregates

(t measured in months)

May 1974 - May 1979	May 1979 - Oct. 1980
$£M_3 = 30256,9 + 324,15\ t$	$£M_3 = 50475,5 + 691,01\ t$
$r^2 = 0,96$	$r^2 = 0,89$
$M_1 = 11404,7 + 242,60\ t$	$M_1 = 26891,0 + 84,90\ t$
$r^2 = 0,98$	$r^2 = 0,44$
$M_B = 6274,5 + 77,02\ t$	$M_B = 11137,0 + 22,72\ t$
$r^2 = 0,95$	$r^2 = 0,13$

Jan.1976 - May 1979	May 1979 - Oct. 1980
$RM = 6919,7 + 72,82\ t$	$RM = 10076,2 + 25,16\ t$
$r^2 = 0,87$	$r^2 = 0,18$

This figure can be taken as a rough estimate of the amount of cash balances that was "squeezed out" of the monetary system since the early summer of 1979 (it is a low estimate since the average monthly increase was calculated in sterling amounts and not in terms of percentages).

The money supply M_1, since it includes deposits with commercial banks, still does not describe directly what monetary policy did. To find out, we have to look at the "cash base" or base money, M_B, supplied by the Bank of England. The main difference between M_1 and M_B is that the former, besides currency, includes commercial bank deposits while the latter includes bank reserves at the central bank. Remarkably, there is no official monthly series of base money. A substitute series, though an imperfect one, can be calculated by adding notes in circulation and total liabilities of the banking department as given in the monthly statements of the Bank of England. It shows large fluctuations, but also a clear flattening-out, during the last two years (see fig. 2.1). In view of the familiar - though often overestimated - multiplier process, one would expect increments in M_B, if caused by open markets operations, to be smaller in absolute terms than the resulting increases in M_1. This was indeed the case, the annual increments in M_B amounting to only about 1/4 of those in M_1. At the samte time, however, the average monthly increment in base money from May 1979 to October 1980, again calculated by regression, was clearly less than 1/3 of what it was during the preceding years (see table 2.2). In terms of M_B, too, the restriction beginning in the summer of 1979 squeezed out, in the course of 15 months, about 10 per cent of the money supply that would have developed in the absence of such restriction[1].

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[1] It may be noted in passing that the monthly variability in M_B as calculated from the regression was much higher since May 1979 than it was before.

This is consistent with the fact that the main policy variable was the discount rate to which M_B adjusted passively. The variability of M_B was also higher than the variability of M_1, which was in turn much higher than the variability of $£M_3$. This agrees well with the fact that M_1 and to an even higher extent $£M_3$, being endogenous variables, were dampened by the inertia of the economic system.

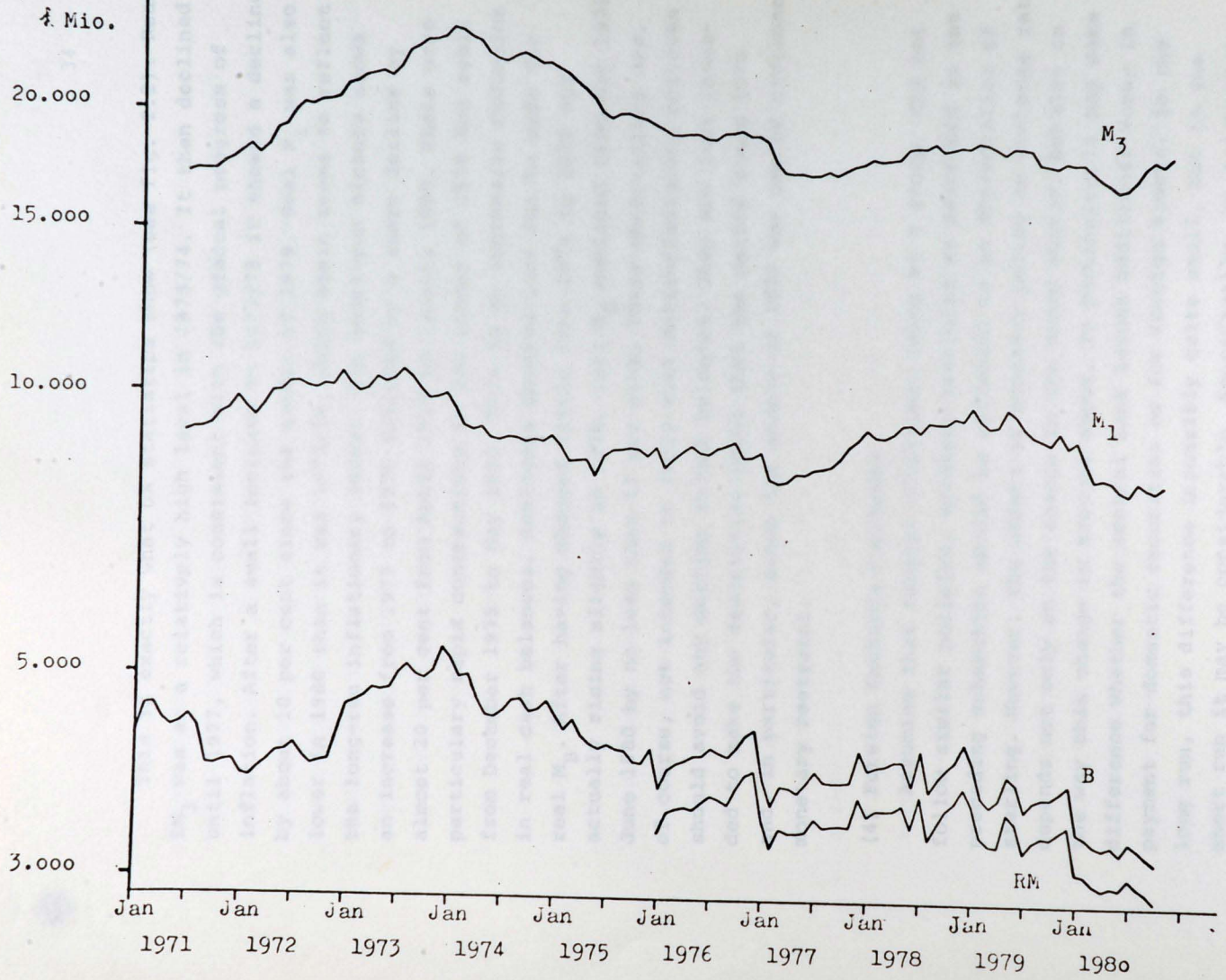
Alternatively, the monetary base can be measured by the monthly series for reserve money, RM, corresponding to the quarterly data given in International Financial Statistics. This series, while not published, was kindly made available for the purpose of this study (see fig. 2.1). While the differences to the preceding series for M_B are minor, reserve money shows an even more abrupt restraint in the summer of 1979. In fact, it shows no increase at all from September 1979 to October 1980 and hardly any since May 1979. In the autumn of 1979 the growth of the base money supply was brought to a full stop. In the light of these observations, UK monetary policy not only seems to have rejected any concession to "gradualism", but also refused to make allowance for real growth. It thus appears to have been more abrupt than even the most ardent monetarists ever advocated. This was a policy shift with few historical precedents.

To what extent this abrupt restraint was intended is not clear. The fact that monetary discussions in the UK do not normally pay much attention to the monetary base gives the impression that it may have been at least partially unintentional. In fact, few observers seem to be aware of it even now.

(3) Real Money Supply

While the monetary aggregates show an abrupt stop in monetary expansion, there is no actual contraction. However, what matters for the short-run real effects of monetary policy is not so much the nominal money supply as the real money supply. It is obtained by deflating the nominal series by the consumer price index. The long-run trend of the real money supply is determined by the demand of the private sector for real balances. It is not directly controlled by monetary policy, but monetary policy has an indirect effect inasmuch as inflation affects the real yield on, and thus the demand for, real cash balances. In the short run, however, monetary policy has a marked effect on the real money supply. Since prices tend to react to monetary policy with a lag of many months and perhaps a few years, a reduction in the rate of monetary expansion after a long period of inflation is likely to produce a marked decline in real cash balances.

Fig. 2.2 Real Money Supply (log scale)



This is exactly what UK statistics show (see fig. 2.2). Real £M_3 was at a relatively high level in 1973/74. It then declined until 1977, which is consistent with the gradual progress of inflation. After a small increase in 1977/78 it showed a decline by about 10 per cent since the summer of 1979. Real M_1 was also lower in 1980 than it was 1973/74, which again seems to reflect the long-run inflationary forces. The short-run picture shows an increase from 1977 to 1979 followed by a sharp decline by almost 20 per cent from April 1979 to January 1980. There were particulary rapid contractions in the summer of 1979 and again from December 1979 to May 1980. This is an impressive reduction in real cash balances. Analogous observations can be made for real M_B. After having changed little from 1976 to 1978 and actually rising slightly in 1978, real M_B declined from May 1979 to June 1980 by no less than 17 per cent. These observations are, of course, not intended to imply that antiinflationary policies should avoid any decline in real balances. They are just intended to make the descriptive point that the period since 1978 and, in particular, since the summer of 1979 was one of pronounced monetary restraint.

(4) Foreign Exchange Purchases

Assuming that foreign countries, taken as a group, did not follow similar policies, monetary restraint as described in the preceding subsection should be reflected in an appreciation of sterling. However, the effect of monetary policy on exchange rates depends not only on the change in the money supply, but also on the way this change is brought about. In particular, it may make a difference whether the central bank issues additional money in payment for domestic securities or for foreign assets. In the long run, this difference is possibly quite small, but in the short run it may be considerable. Specifically, by accompanying its restrictive monetary policy by foreign exchange purchases, the Bank of England, acting as the agent for the Exchange

Equalization Account, could have dampend the short-run effect on the sterling rate. This is not what it actually did (see table 2.3). There were indeed large increases in foreign exchange reserves during 1977, which helped to dampen the appreciation of sterling at that time. Since then, however, there were considerable net sales of foreign exchange, and by early 1979 the central bank seems to have withdrawn from the foreign exchange market for all pratical purposes. Monetary restraint could thus affect sterling exchange rates with its full force.

Monetary policy was so far described just by statistical series. However, its effect on exchange rates (as on other economic variables) depends also on the expectations of the market about the future course of monetary policy. It is clearly impossible to quantify these expectations, if only because they are typically different for different individuals. It is fairly evident, however, that the wide publicity given to the intended shift in monetary policy in the summer of 1979 created the widespread expectation that there would be a resolute monetary contraction. Once again, expectations turned out to be fairly correct, even though the official target variable $£M_3$ gave consistently misleading signals.

The general conclusion from this section seems clear: The last two years, and particularly the last 18 months, were a period of abrupt and pronounced monetary restraint. The question remains how such restraint becomes translated into a seemingly excessive appreciation of the currency of the sort the British economy is suffering from at the present time. This question will be taken up in the following section.

Table 2.3

Convertible Currencies in Official Reserves

(quarterly, in £ Mill.)

	I	II	III	IV
1973				2033
1974				2053
1975				1648
1976	2185	2036	2105	1476
1977	4670	5831	8965	9911
1978	10103	8066	7529	6972
1979	8171	7787	8316	8105
1980	8468	8273		

Source: Bank of England

3. The Overshooting of Exchange Rates as a Cause of Sterling Appreciation.

(1) The General Meaning of Overshooting

If prices and wages could adjust instantaneously to changes in monetary policy, then exchange rates, too, would simply reflect the course of monetary policy. Purchasing-power parity would assert itself not only over the years, but even from month to month. If at a given moment, say in the summer of 1979, British monetary policy became less inflationary relative to other currencies, then sterling, without showing any violent fluctuations, would simply begin to depreciate at a slower pace and perhaps even to appreciate. This is not the world we live in. The real economy is characterized by a considerable inertia of prices and wages. As a consequence, prices react to unexpected changes in monetary policy with a lag of many months and perhaps several years; the quantity theory of money asserts itself but slowly. In the meantime, money has powerful real effects on interest rates, ouput and employment.

One of the typical features of such an adjustment period is the apparent "overshooting" of exchange rates. It was already observed and described by Gustav Cassel about 60 years ago, but his insight was forgotten to be rediscovered around 1974[1]. Overshooting means that exchange rates first react to a retardation of monetary expansion with a virtually instantaneous and seemingly excessive appreciation followed by a gradual normalization towards their long-run path.

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[1] The phenomenon is briefly described in Jürg Niehans, Some Doubts about the Efficacy of Monetary Policy under Flexible Exchange Rates, J. of Internat. Econ., vol. 5, no. 3, Aug. 1975. A full analysis is given by Rudiger Dornbusch, Expectations and Exchange Rate Dynamics, J. of Pol. Econ., vol. 84, no.6, Dec. 1976

This overshooting is not peculiar to exchange markets. It is actually a general characteristic of asset markets, occuring wherever the return on an asset is expected to change. Suppose the shares of company A were so far expected to have a constant yield of 7 per cent. Suppose further there is now a piece of good news to the effect that, in addition, this company will earn a windfall of 5 per cent in each on the next 4 years. This information will be immediately capitalized by the market, resulting in an instantaneous appreciation of the stock This will be followed by a gradual downward adjustment over the next four years. As a matter of fact, the immediate price rise is necessary to create the impression that the stock is now "overvalued" and thus likely to decline in the future. If the future consequences of the unexpected news are correctly foreseen, the immediate appreciation will be such that an annual price decline by 5 per cent would bring the stock to its former price within 4 years. It would thus amount to about 22 per cent. Those lucky enough to hold the stock when the news arrived would, of course, make a capital gain. For the subsequent owners the additional dividends would just be matched by the annual capital loss.

(2) Overshooting of Exchange Rates

Foreign exchange rates behave just about like the prices of other assets. An unexpected shift in UK monetary policy to a less inflationary course will normally be followed by a period of relatively high interest rates. However, arbitrage in the foreign exchange market sees to it that all currencies carry the same yield. Sterling will thus appreciate to the point where it appears to be overvalued. The holders of sterling would then expect to lose from future depreciation what they hope to gain from the favorable interest margin. Sterling will have to appreciate in order to create the expectation of a future depreciation. Even a mere reduction in monetary expansion without an actual contraction of the money supply would thus produce an instantaneous jump in the sterling rate.

It should be noted that fluctuations of this sort do not result from "irrational speculation", but from the sober calculations of perfectly rational traders. While speculative waves may certainly occur, they are not of the essence. It should also be noted that the understanding of this mechanism does not open the way to speculative profits because, once the news is in, expected changes in spot rates are constantly matched by interest differentials. There are no unexploited profit opportunities.[1]

This mechanism is illustrated in fig. 3.1. This relates to the simple, though somewhat unrealistic, case where sterling has so far been on an inflationary trend while the rest of the world maintains stable prices. At t* British monetary policy shifts unexpectedly to a non-inflationary course. The assumed path of the nominal money supply is pictured by M; it should be noted that there is no actual contraction at any moment. Suppose that the implications of this shift, once it has occured, are clearly understood by the market. Expected long-run inflation thus goes immediately to zero. The equilibrium price level actually shifts down as expressed by the curve of expected prices, $\bar{p}$. The downward shift is due to the fact that, with lower inflation, the cost of holding money is reduced and people thus wish to hold higher real cash balances. This is equivalent to a deflationary pressure on the economy. Actual prices, represented by p, are inert. Their rate of increase will thus decline only gradually. Sooner or later, however, there will be a phase of declining prices.

During the initial phase, real cash balances will be much tighter than the nominal money supply figures seem to indicate. During this period, interest rates, graphed in the lower part of fig. 3.1, will be high. Gradually, however, they will decline to a lower, non-inflationary level. If domestic and foreign assets are perfect substitutes, domestic interest rates will eventually approach the level of foreign interest rates, i_F.

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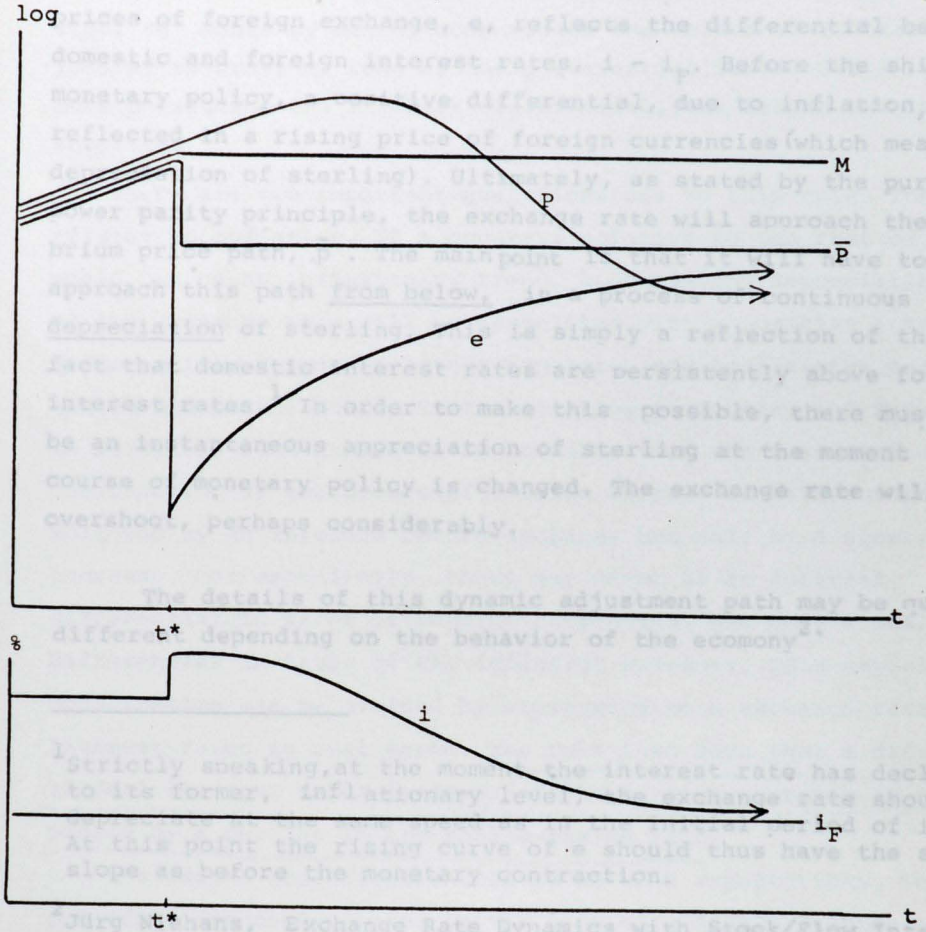
[1] For an interpretation of overshooting that is essentially based on erroneous speculation see King, op. cit.

Fig. 3.1 Overshooting of the Exchange Rate



The path of exchange rates, represented by the sterling prices of foreign exchange, e, reflects the differential between domestic and foreign interest rates, $i - i_F$. Before the shift in monetary policy, a positive differential, due to inflation, was reflected in a rising price of foreign currencies (which means, a depreciation of sterling). Ultimately, as stated by the purchasing-power parity principle, the exchange rate will approach the aquilibrium price path, $\bar{p}$. The main point is that it will have to approach this path from below, in a process of continuous depreciation of sterling. This is simply a reflection of the fact that domestic interest rates are persistently above foreign interest rates.[1] In order to make this possible, there must be an instantaneous appreciation of sterling at the moment the course of monetary policy is changed. The exchange rate will overshoot, perhaps considerably.

The details of this dynamic adjustment path may be quite different depending on the behavior of the ecomony[2].

---

[1] Strictly speaking, at the moment the interest rate has declined to its former, inflationary level, the exchange rate should depreciate at the same speed as in the initial period of inflation. At this point the rising curve of e should thus have the same slope as before the monetary contraction.

[2] Jürg Niehans, Exchange Rate Dynamics with Stock/Flow Interaction, J. of Pol. Econ., Vol. 85, no. 6, Dec. 1977.

The basic rule, however, is relatively simple. It says that an interest differential in favor of the United Kingdom relative to, say, the United States must be associated with an overshooting of sterling to such an extent that the subsequent decline in sterling, month by month, compensates the holder of dollars for the loss of interest as long as the differential lasts. The larger and the more persistent the interest differential, the larger the overshooting.

There are two important qualifications to this rule. The first relates to inflation. If a country, relative to the rest of the world, is on an inflationary trend, a continuing depreciation of the exchange rate will be associated with a positive interest differential. Suppose monetary expansion now accelerates further (as it did in the United States relative to Germany and Switzerland in 1977). In such a case it is possible that the instantaneous overshooting of the prices of foreign currencies will not be followed by an absolute future decline, but only by a slower increase. Correspondingly, there may never be an interest differential in favor of foreign currencies, but only a smaller differential in favor of the inflating currency. This expository complication can be avoided by expressing both exchange rates and interest rates in real terms. The rule then says that a differential in real interest rates in favor of the foreign currency is accompanied by a decline in its real exchange rate.

The second qualification has to do with expectations. The preceding argument related to the case of a single unexpected shift in monetary policy where all subsequent developments are perfectly foreseen. As a matter of fact, reality tends to present us with pieces of new information almost every day. Each of these pieces produces its own little overshooting wave. What we observe in the daily quotations of exchange rates is the combined result of all these little waves. This implies that the actual path of exchange rates may continuously deviate from the expected path, creating speculative profits and losses. Further speculative profits and losses may arise from the fact that traders do not possess a perfect

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understanding of the adjustment following a shift in monetary policy. Nevertheless, the overshooting model, while abstract, draws attention to an important aspect of reality. In certain periods, this aspect actually seems to dominate just about everything else. For the United Kingdom, the last two years seem to have been such a period.

(3) Empirical Studies of Overshooting

The empirical evidence on overshooting, while still scanty, seems to indicate that its size may be large. In an econometric study, Robert Driskill found that from 1973 to 1979 the Swiss franc rate of the dollar tended to overshoot by a factor of about 2.3 in the first quarter after a monetary change[1]. Over time, the exchange rate and relative prices behaved as if they reacted to each shift in relative money supplies according to the time profiles given in fig. 3.2. A recent simulation study by Paul McNelis for the United States relative to the rest of the world, though based on a very different approach, produced a very similar time profile with an overshooting of the same order of magnitude[2]. The econometric estimates of Bernholz and Kugler for the dollar rates of the Swiss franc, while very different from Driskill's (and implausible) for later periods, also imply similar initial overshooting.[3]

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1 Robert Driskill, Exchange-Rate Dynamics: An Empirical Investigation J. of Pol. Econ. Forthcoming).

2 Paul McNelis, A Simulation Analysis of Exchange Rate Dynamics with Stock/Flow Interaction, Sept. 1980. (unpublished).

3 Peter Bernholz and Peter Kugler, Flexible Wechselkurse, Kaufkraftparität, Ueber- und Unterbewertung (unpublished).

Of course, overshooting may be quite different for different countries and also for different episodes in the same country. Research in this area is only in its beginning and the early results must be regarded as highly tentative. They receive support, however, from recent experience. In the United States, the first half of the Carter administration was a period of diminishing confidence in U.S. monetary policy. This was accompanied by a rapid depreciation of the dollar. By the end of 1977 the dollar was widely regarded as undervalued. The depreciation continued, however, for another 9 months. By then, in the course of about 15 months, the real exchange rate of the dollar relative to the pound and the mark had declined by about one eighth. Relative to the Swiss franc it had declined by about one third. Exchange rates thus deviated massively from purchasing-power parities. Overall, at the present state of theoretical and empirical research and in the light of recent historical experience, a marked overshooting of exchange rates in response to changes in monetary policy must be regarded as normal.

It was shown in section 2 that there was indeed a marked and largely unexpected change in UK monetary policy in the middle of 1979. It possibly coincided with some monetary factors arising from North Sea oil, though these are much less clearly identified. Until the autumn of 1978, the development of the real exchange rate was not much different in the UK from what it was, say, in Germany or Switzerland. However, while Germany and Switzerland then checked the appreciation of their exchange rates by a massive, though temporary, relaxation of their monetary policy, the United Kingdom actually tightened its monetary policy progressively. In the light of foreign exchange theory and historical experience, one would expect a massive appreciation of the real exchange rate under these circumstances. It is difficult to escape the conclusion that the actual appreciation of sterling since the summer of 1979 was largely due to monetary restraint.

Summary of Part I

The conclusions of part I about the causes of sterling appreciation can be briefly summarized as follows:

(1) North Sea oil was probably not a major factor. To the extent it contributed to the appreciated of sterling, this was not so much through its effect on trade and capital flows than through its effect on the demand for money.

(2) The principal cause of recent sterling appreciation was the abrupt halt in monetary expansion in the spring of 1979.

(3) The effect of monetary contraction on the sterling rate was magnified by exchange-rate overshooting, which must be regarded as a normal concomitant of shifts in monetary policy.

Part II: Effects of Sterling Appreciation

During the last two years, the British economy, particularly its manufacturing sector, had to adjust to at least three major changes, namely (1) the so-called"second oil shock", (2) the development of North Sea oil, and (3) monetary restraint. The present recession must, in the main, be regarded as the combined result of all three factors. Among these factors, monetary restraint was probably the most powerful. The transition from inflation to non-inflationary growth is inevitably accompanied by at least a temporary slow-down in the growth of output . "Stagflation", far from being a "puzzle" or "paradox", is a normal text-book phase of desinflation. Once an economy is adjusted to an annual expansion of the money supply by more than 10 per cent, a sudden stop of monetary expansion will produce severe recession. With the present degree of rigidity of wages and prices, this recession may well be intolerable. In an open economy with large international commodity and capital flows, the recession will be further aggravated by the overshooting of the exchange rate. This particular aspect is the subject of the second part of this study. It should be kept in mind that the appreciation of sterling is only one of the various aspects of monetary restraint. Even if it were absent, abrupt monetary restraint would still produce recession.

4. Price Effects of Overshooting

(1) Price Effects in General

Overshooting of the exchange rate has its most immediate effect on the relative domestic prices of goods bought or sold in international markets. In particular, the domestic prices of imports bought at given world market prices decline relative to domestic goods. The same is true, though to a lesser extent, for imports whose foreign prices are more or less sensitive to our import demand. Inasmuch as import prices, either directly or through the competitive pressure on home goods, are a major determinant of the overall price index, this has a deflationary effect on the general price level.

The same is true for exports sold in international markets. The prices received by manufacturers in domestic currency decline and so do their profit margins. Inasmuch as this increases the competitive pressure in home markets, this, too, has a deflationary effect on the general price level. Inflation seems to abate rapidly. To the extent wages depend on the development of consumer prices, the pressure for wage increases declines. This is particularly true if wages are linked to the consumer price index by an automatic formula.

This price effect has often been welcomed as a major blessing of overshooting. It is questionable whether this is justified. Overshooting can clearly not be permanent. The deflationary effect lasts only as long as the exchange rate deviates progressively more from its equilibrium level. Once the overshooting has reached its peak, the effect comes to an end. Beyond this point, while the overshooting gradually recedes, there will inevitably be an inflationary effect. Once the real exchange rate is back at its original level, consumer prices will be at roughly the same level they would have had in the absence of overshooting. In effect, far from contributing to the long-run reduction of inflation, overshooting just imposes a temporary disturbance on the underlying trend of prices.

It has sometimes been argued that the deflationary effect in the early phases has an important "psychological"effect by helping to break inflationary expectations. Antiinflationary policies seem to do surprisingly well, after all. While this may well be so, this effect has a counterpart in the opposite effect in later stages. "Inflationary psychology" is then seen to reappear and financial writers will profess to be "disillusioned" about the effectiveness of antiinflationary policies. Overall it must be doubted whether short-lived illusions based on misunderstandings can really be expected to help monetary policy.

(2) An Illustration from Swiss Statistics.

The argument of the preceding subsection can be illustrated by price developments in Switzerland (see table 4.1). Attention will be focused on the last three years, but similar observations can be made in earlier periods. 1977 and 1978 were years of rapid appreciation of the Swiss franc. Import prices moved from an increase of 6 per cent to a decline of lo per cent (col. 6). At the same time, export prices moved from a 2 - per cent increase to a 4 - per cent decline (col. 4). In consumer prices, this was reflected in the virtual disappearance of inflation (col. 2). During 1978 consumer prices actually started to fall. In the autumn of 1978, the Swiss National bank put an end to overshooting, initiating a short period of depreciation of the franc, followed by relative exchange stability. Both import and export prices immediately reverted to inflation rates they had not reached for four or five years. Consumer prices in 1979 recorded the highest inflation rate since 1975. The point is that this had little to do with the money supply or the quantity theory of money. It was just the inevitable reaction to the end of overshooting.

Table 4.1: Annual Rates of Price Increases (in per cent)

(1) Year	(2) Private Consumption	(3) Domestic Product	(4) Exports	(5) Domestic Expenditure	(6) Imports	(7) "Home Product"
1970	4.0	4.7	4.4	5.6	2.2	4.84
1971	6.9	9.2	3.9	8.2	1.4	11.72
1972	7.6	9.8	4.9	8.7	2.0	12.24
1973	9.0	8.1	4.3	8.7	6.3	10.33
1974	10.0	6.9	13.0	8.7	17.9	4.21
1975	6.6	7.1	2.7	5.6	-2.8	9.36
1976	2.3	2.7	-1.0	1.3	-4.7	6.03
1977	1.2	0.3	2.1	1.3	5.7	0.04
1978	0.5	3.5	-4.0	0.7	-10.1	8.68
1979	3.7	2.2	2.5	3.5	7.6	2.41

Source: National Accounts

In view of these considerations it might seem desirable to have an index of domestic or nontraded goods prices. This could then be used to gauge the underlying course of "real" domestic inflation. An ideal series of this sort is not available and may be impossible to construct. As a first approximation one could perhaps use the deflator for gross domestic product (col.3). Because it excludes the volatile imports, its fluctuations have been clearly less pronounced than those of consumer prices. Characteristically, it had its low point already in 1977, at the end of the preceding recession , long before the central bank began to intervene, and it actually declined in 1979. Domestic product, however, includes exports which, though less volatile than imports, still reflect exchange fluctuations. In a second approximation one might thus deduct the statistical contribution of export prices. The resulting series, labeled "home product", relates to domestic output sold in the domestic market (col.7). It shows a pronounced peak in 1978, probably reflecting the fact that only a fraction of import price reductions was actually passed on to consumers in the same year, the remainder increasing the implied compensation to domestic factors.

Of course, such statistical comparisons give, at best, a rough and tentative picture. It should also be noted that the underlying statistics cannot be regarded as satisfactory. They suffice, however, to illustrate the general point made above, namely that the price effects of overshooting are rather an undesirable disturbance than a valuable contribution to antiinflationary policies.

5. Trade and Output Effects of Overshooting

(1) Imported Overshooting

In order to get a clear picture of trade and output effects of overshooting, it is convenient to begin with the case of "imported overshooting" caused by foreign monetary policy. In the United Kingdom, recent overshooting of the exchange rate is largely a by-product of domestic monetary restraint; it is home-made. Its effects on trade and output are thus inseparably intertwined with those of monetary restraint itself. In the case of imported overshooting, the effects of overshooting can be observed in an almost pure form. The qualifier "almost" takes account of the fact that foreign monetary policy would have some effect on the domestic economy even in the absence of overshooting; flexible exchange rates provide no complete insulation against foreign business fluctuations. For the policy purpose at hand, however, the effects of foreign monetary policy give a sufficiently accurate picture of overshooting, taken by itself.

A good historical illustration of imported overshooting is provided by the effects of U.S. monetary policy on other economies in 1977/78. Actions and pronouncements created the expectation that policy makers would revert to a more inflationary course, an expectation that turned out to be correct. At that time, German and Swiss monetary policy, after a serious recession, was on a reasonably steady course, gradually leading back to non-inflationary growth. In this environment, the shift in U.S. policy produced a marked overshooting of the mark and the Swiss franc, which must be regarded as largely imported. In Switzerland this was particularly pronounced. The Swiss case can thus be taken as a paradigm of imported overshooting.

The most immediate effect of the exchange-rate appreciation may be a surplus in the trade balance. Suppose export contracts are written in terms of domestic currency while imports are paid in terms of foreign currency. Suppose further that the quantities of exports and imports, partly because contracts have been made in the past, show little immediate reaction. In this case, the domestic-currency proceeds from exports will remain largely unchanged while the domestic -currency payments for imports will decline. Such a "perverse" effect on the trade balance is certainly not inevitable, but it is clearly possible. In practice, its repercussions on domestic output and employment are probably small.

The first significant effects on the domestic economy are likely to be initiated by a decline in orders from abroad in the export industries, which tend to be highly sensitive to exchange-rate fluctuations[1]. In the tourist trade, the corresponding effect wil be observed as a rapid decline in bookings from abroad[2]. These effects begin to be noticed within weeks after an appreciation and assume their full force within a few months.

This is accompanied by an increasing pressure on the domestic-currency prices of exports. Export firms will try to maintain their output by price concessions, both at home and abroad. There will alsc be difficulties with requests of foreign customers for the renegotiation of old contracts. Profit margins become compressed. In the short run it will even pay to produce at a loss. Similar pressure will appear in domestic industries exposed to foreign competition. Their orders will decline, too, an so will their prices and profit margins. A spirit of gloom will descend on large parts of the business communitiy.

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[1] Christoph Zenger found that in Switzerland from 1973 to 1978 a real appreciation of the franc by 10 per cent used to be associated with a decline in foreign orders by 7.4 per cent in the same quarter. (Volkswirtschaftliche Wirkungen realer Kursänderungen des Schweizerfrankens, Mitteilungsblatt für Konjunkturfragen, vol. 36, no. 4, Bern 1980.)

[2] From 1973 to the middle of 1979, a real appreciation of the Swiss franc by 10 per cent was, with a lag of 6 months, associated with a decline of foreign tourist-nights in Swiss hotels by about 6% (Zenger

Sheltered industries and service trades, on the other hand, will not have much to complain yet, and the same will be true for the construction industry. The import trade will actually flourish, of course, and its profit margins will expand. During the initial period, before domestic output and income have been much affected, some sectors may well feel that they have never had it so good.

It should be noted that this downturn in business conditions is not necessarily associated with a decline in the quantity of exports, though such a decline is certainly possible. Exports as recorded in foreign trade statistics will still be determined largely by past contracts. The downturn may also be hard to detect, at first, in statistics of output and employment, as many firms have a considerable inventory of unfilled orders.

Over a few months, however, the overshooting of exchange rates will indeed affect output and employment and thus domestic demand. Mundell pointed out long ago that under floating exchange rates the international transmission of monetary impulses is likely to be inverse, an expansion abroad producing a recession at home. With overshooting exchange rates, this effect is magnified. In a sense, the overshooting of floating exchange rates is similar to the stabilization of a currency at too high a parity unter the gold standard. Both exert deflationary pressure on the domestic economy which, with the given inertia of prices and wages, produces a temporary, but possibly serious, recession.

The development of exports is the combined result of the changes in relative prices and in domestic demand. The decline in competitiveness, taken in itself, tends to reduce the quantity of exports. On the other hand, the decline in domestic output, taken in itself, would tend to stimulate exports; domestic recession will have its normal effect of increasing export supply. As a result, the actual decline in exports will be smaller than the mere price elasticities would indicate. As a matter of fact, exports may even increase; there may be talk of an "export miracle". The latter, if it occurs, is probably

not of a lasting nature, though. To the extent it is achieved at the expense of price concessions and disappearing profit margins, marginal firms will be forced to withdraw from export markets, perhaps shifting their operations to foreign subsidiaries.

Analogous observations can be made on the import side. The decline in import prices, taken in itself, would, of course, stimulate imports. At the same time, the domestic recession, taken in itself, would reduce the demand for imported raw materials and consumer goods. The net increase in imports will thus be smaller than the price elasticities would indicate, and there might actually be a net decline in imports[1].

In the light of these considerations, the overall result of overshooting on the trade balance is uncertain. From this point of view, too, the trade balance is a virtually worthless indicator.

These effects are not permanent, to be sure. Even if the distortion of real exchange rates somehow persisted, full employment would eventually be restored, though with a different structure of the economy. What is more relevant, the disturbance in real exchange rates itself is inherently temporary. In the case of a unique change in foreign monetary policy, it is likely to reach its peak, as described in section 3, within a few months. If the shift in monetary policy is distributed over a longer period, overshooting may persist accordingly, but it will pass within a few months once the monetary shift has come to an end. During the normalization phase, there may even be a period of undervaluation, giving the domestic economy a competitive advantage.

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[1] Holding domestic income constant, Zenger found an increase in Swiss imports by about 13 per cent for a 10 - per cent appreciation of the Swiss franc. Without holding income constant, the increase in imports was no more than 1 per cent, giving the impression that exchange rates have no influence on imports.

The temporary nature of overshooting effects is not a valid reason to neglect them, however. All real effects of monetary policy are, in principle, temporary and yet they produce the most serious disturbances in output and employment. There is also no reason to expect that developments of this sort are anticipated to such an extent that their real effects become harmless. Surely, if the underlying shift in foreign monetary policy had been generally and correctly anticipated, it would have no real effect on the economy. An unanticipated shift in foreign monetary policy, however, will inevitably have real effects of the sort described even if the overshooting mechanism is correctly understood by everybody.

During periods of overshooting there is usually considerable talk about the economy becoming more "healthy" by the weeding out of inefficient firms. As Keynes has said in a similar case, this is like arguing that influenza is good for public health because those with heart ailments will succumb first. That the marginal firms will disappear first is true by definition. The point is that in the absence of overshooting these firms, though not among the most efficient, might have been perfectly viable. Some firms are always ma ginal, and if they are progressively forced out, not much will be lef In addition, perfectly healthy and efficient firms may also suffer just because they are particularly exposed to exchange fluctuations.

(2) Home-made Overshooting

At least since 1979, the appreciation of sterling was not due to foreign monetary policy, but largely the home-made consequence of British monetary restraint. Its effects were thus superimposed on those monetary restraint would have even had in the absence of overshootin The latter can be approximately determined by considering a closed economy.

For a closed economy, the sequence of events is now fairly well understood[1]. Immediately after monetary restraint, unexpectedly, set in, real interest rates are high. The basic reason is the slow adjustment of current output prices. As a consequence, real cash balances decline, even if there is no actual contraction in the money supply. Alternatively, this could be explained by saying that the monetary restraint is achieved by financing a higher proportion of public debt by sales of bonds to the nonbank sector instead of by new money, which raises interest rates. After a while, under the pressure of tight money, output begins to decline below its normal level while prices still continue, more or less,along their previous path. This is the "stagflation" phase. It is one of the most fundamental facts about macroeconomics that it is virtually impossible to achieve a change in the course of prices without a temporary change in output and employment. In due course, however, nominal interest rates will begin to decline again, adjusting to the lower rate of expected inflation. Output will start to climb back to normal while inflation rates now begin to fall noticeably. This is quite an agreeable state for the economy to be in, a recovery in output now being associated with receding inflation. In the end, the only effect of monetary restraint will be a lasting reduction in inflation.

The question is how this sequence of events is modified by the overshooting of exchange rates. In the present state of research and experience, this question can only be answered in a tentative way. By and large it seems that overshooting tends to accentuate, rather than to dampen, the fluctuations in output during the adjustment to monetary restraint. The chain of events is conveniently divided into three phases.

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1 The following discussion is adapted, though with some significant modifications, from Jürg Niehans, Purchasing-Power Parity under Flexible Rates, in:Peter Oppenheimer (ed.), Issues in International Economics, Stocksfield (Oriel) 1980.

In the first phase, dominated by the familiar J-effect, the quantities of internationally-traded goods seem to be impervious to the appreciation of the currency. The trade balance in value terms may easily improve. As a consequence, the overshooting of the exchange rate will have to be strong enough to produce, despite the high real interest rates, a net capital outflow. The counterpart of this outflow will be a decline in domestic investment. During this first phase, the recessionary effect from monetary restraint will not be pronounced, monetary policy taking several months to affect output and employment. It will tend to be further weakened by the improvement in the trade balance, if any.

During the second phase, the appreciation of the real exchange rate will deepen the recession in output and employment caused by monetary restraint. At constant output, overshooting would now produce a trade deficit, pulling resources from the traded-goods sector into the home-goods sector. Since output is declining, this does not necessarily materialize, but nevertheless the decline in output is made more severe. This phase will probably last several quarters.

The third phase is characterized by the gradual disappearance of overshooting, probably followed by a period of a rather under-valued currency. It is now the return of output towards its normal level that receives an additional impulse from the exchange-rate mechanism.

It is difficult to estimate the additional impulse arising from real exchange rates during these phases. It seems reasonable to assume that they are of the same order of magnitude as the effects of imported overshooting. A plausible guess is that they amount to a major part, but probably less than one third, of the depressive effect recently observed in the British ecomony, the remainder being accounted for by the second oil price shock, possibly by the re-allocation of resources due to North Sea oil and, above all, by the temporary depressive effects abrupt monetary restraint would have even in a closed economy.

6. Estimates of Trade and Output Effects for the United Kingdom

The preceding section gave a general description of trade and output effects of overshooting. This section presents econometric estimates for the effects of sterling appreciation on the British economy. Strictly speaking it is not correct, of course, to speak of the effects of sterling appreciation on exports, imports, output etc., because the fluctuations in these endogenous variables are the joint effect of the underlying changes in exogenous variables like the foreign and domestic money supplies, oil discoveries, oil prices and the like. The association between the real exchange rate and, say, exports will, in principle, be different depending on the combination of the exogenous variables that caused their fluctuations. A really satisfactory analysis of sterling appreciation would thus require a complete macroeconomic model. It was obviously impossible to construct such a model for the present study. The following estimates are based on a much simpler approach using single-equation techniques to "explain" foreign orders, exports, imports, tourist demand and output each in terms of a few explanatory variables including the real exchange rate. While the basic limitations of this approach are recognized, the results seem to be so clear-cut that it is hard to believe they would not leave their imprint on a more complex model. The econometric research for this section and much of the writing is due to Christoph Zenger of the University of Bern.

Except for tourism, all estimates are derived from the same type of equation by the Cochrane-Orcutt method. The variables are expressed in natural logarithms, the coefficients thus representing elasticities. The data are quarterly from the first quarter 1973 to the second quarter 1980. The bracketed figures are t-statistics. One or two asterisks denote significance at, respectively, the 5 or 1 per cent level. The correlation coefficient (adjusted for degrees of freedom), the Durbin-Watson statistic and the estimated first-order coefficient of autocorrelation are indicated underneath each equation. The statistical sources are given in the appendix.

(1) Orders from Abroad

Even if supply conditions were invariant, recorded exports would not be a satisfactory indicator of fluctuations in export demand because their lag structure gets blurred by all sorts of delivery lags. One can hope to obtain a clearer picture by concentrating on incoming orders from abroad. For the United Kingdom, statistical series on foreign orders are available for the engineering industry only. Since this is an important sector of manufacturing, they nevertheless promise to give interesting insights into the behavior of the reaction of export demand to exchange-rate fluctuations.

In the following regression equation, foreign orders (f_t) are the dependent variable while the real effective exchange rate for sterling (e^*_t) and industrial production in OECD-countries (y^*_t) appear as independent variables[1]. For the activity variable, both the concurrent value and a one-quarter lag are used. The results are

$$(1)\quad f_t = \underset{}{2.210} \underset{(1.43)}{-0.843e^*_t} \underset{(3.06)^{**}}{+ 0.642y^*_t} \underset{(2.08)^{*}}{+ 0.692y^*_{t-1}} \underset{(2.05)}{}$$

$$\bar{R}^2 = 0.536$$

$$DW = 1.8$$

$$\rho = 0.32$$

Equation (1) shows a highly significant influence of the real exchange rate on the seasonally adjusted volume of foreign orders (net of cancellations) in the engineering industry. A sterling appreciation by 10 per cent results, on average, in a loss of foreign orders of about 8 per cent. This influence appears in the same quarter, without a lag. It is true that the separate introduction of lagged exchange rates reveals negative coefficients up to the third quarter.

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[1] While e, appearing in section 3, is the sterling price of foreign currency, e^* is the foreign-currency price of sterling.

However, the Almon technique produces at best a distribution of the unlagged effect over the lagged values. This is a characteristic feature of the method in the absence of genuine lags. That there are, in fact, no lags is confirmed by the so-called sequential t-test procedure. Starting with an unconstrained estimation with a maximum lag of three quarters, the last coefficient turns out to be not significant. The procedure is thus repeated with the number of lags reduced by one. Again the last coefficient turns out to be insignificant and the corresponding lag is thus dropped. The end result was equation (1), pointing to a relatively fast adjustment of foreign demand to exchange-rate fluctuations.

There is also a reasonably high elasticity of foreign orders with respect to economic activity in OECD countries. Again the significant influence is felt in the same quarter, but there is some evidence of a lagged effect. Since this (like the following equations) is not meant to be a total explanation of the dependent variable, the moderate size of the correlation coefficient does not have to bother us; the partial influence of the exchange rate stands out clearly enough.

(2) Exports

While the behavior of engineering orders from abroad implies a fast adjustment of demand to exchange rates, statistically recorded exports, in view of delivery lags, may still show a lagged response. As the following regression equation shows, manufacturing exports (x) indeed adjust to changes in the real exchange rate (e^*) with pronounced lags:[1]

$$(2)\quad x_t = \underset{}{4.302} + \underset{(3.822)^{**}}{0.831}\, y^*_t - \underset{(6.134)^{**}}{0.427}\, e^*_{t-4} - \underset{(1.899)}{0.372}\, e^*_{t-5} + \underset{(1.712)}{s}$$

$$\bar{R}^2 = 0.841$$

$$DW = 2.09$$

$$\rho = 0.28$$

---

[1] s represents a set of seasonal dummies.

The sequential t-test was started with lags of up to two years[1]. By gradual elimination it led to equation (2). The result means that exchange rates tend to influence exports with a lag of roughly one year. While the separate coefficients for lags of four and five quarters have, in view of the existing multicollinearity, reasonably high t-values, they are not significant at the 5-per cent level. This indicates that the distribution of the lag between 4 and 5 quarters is not very reliable. The sum of the two coefficients is -0.799. It is indeed significant at the 1-per cent level and its t-value is high. This sum, therefore, seems to deserve some confidence[2].

This leads to the conclusion that an appreciation of sterling, with a lag of 4 - 5 quarters, results in a contraction of exports by about 8 per cent. It is interesting to note that this reaction is of the same order of magnitude as in the case of engineering orders from abroad, but follows the latter with a lag of about a year. On the basis of these lagged effects, one would expect that the strong appreciation of sterling during 1979 and 1980 would leave its imprint on exports throughout 1981.

To the extent exchange rate fluctuations are caused by monetary policy, these estimates are likely to underestimate the separate effect of exchange-rate fluctuations on exports. Suppose sterling appreciation is due to monetary contraction. In this case, the domestic recession resulting from monetary contraction will tend to stimulate exports, thus weakening the negative effect of the exchange-rate appreciation. (No IP)

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1 Longer lags were discarded because they produced a marked negative correlation of the exchange rate with foreign economic activity which must be regarded as coincidental and thus spurious.

2 These coefficients would provide estimates of the price elasticity of the UK export supply in the limiting case in which the foreign demand for UK exports is infinitely elastic. With finite demand elasticities, the price elasticity is higher, and possibly much higher, than the exchange-rate coefficients in equation (2). The reason is that in this case the price change is smaller than the exchange-rate change.

Since in equation (2) this influence is attributed to the exchange rate, the effect of the latter appears as weaker than it actually is. In an experiment in which just the exchange rate is varied, the elasticity of exports with respect to the exchange rate might thus be considerably higher than it appears from equation (2)

It should also be noted that a significant part of the exchange-rate effects seems to appear after more than 5 quarters. In fact, a regression including lags up to 15 quarters produced exchange-rate coefficients with a sum of about -1.3. However, in view of the correlation of lagged exchange rates and foreign output mentioned in footnote 1, these coefficients were not reliable. While equation (2) does not have this problem, it must be regarded as short-run.

Foreign economic activity ($\hat{y}^*$) has the expected positive effect on British exports; the respective elasticity of about 0.83 looks plausible. It is somewaht higher than the corresponding elasticity of foreign orders in equation (1), but the order of magnitude is not much different.

(3) Imports

If a real appreciation of sterling were imposed on the British economy from the outside, as an exogenous change, it would affect imports in (at least) two ways. At an unchanged level of domestic activitiy there would be a substitution effect in favor of imported goods at the expense of domestic goods. At the same time, the appreciation of sterling would have a depressing effect on domestic activity which, in turn, would tend to reduce imports. The total effect of the exchange rate on imports will thus be smaller than the partial substitution effect and it might conceivably be even negative.

The following regression represents the volume of imports (m_t) as a function of the real sterling rate (e^*_t), domestic industrial production (y_t) and a set of seasonal dummy variables (s):

$$(3)\quad m_t = -1.376 + 0.431\, e^*_{t-1} + 0.882\, y_t + s$$
$$\qquad\qquad (1.018)\quad (2.969)^{**}\quad (3.886)$$

$$\bar{R}^2 = 0.888$$

$$DW = 1.731$$

$$\rho = 0.751$$

The main result is that a real appreciation of sterling has a highly significant effect on imports, the latter rising by about 4 per cent for every lo-per cent change in the exchange rate[1]. The sequential t-test procedure started with a maximum lag of 12 quarters, but all lags exceeding one quarter successively dropped out. On the other hand, the unlagged value of the exchange rate was not significant either. This led finally to equation (3). This choice was confirmed by running the equation alternatively with the unlagged and the lagged exchange rate, only the coefficient of the lagged variable being significant. This leads to the conclusion that the exchange rate affects imports essentially with a lag of one quarter. It should be noted that this result was not dominated by oil, since an almost identical regression equation was obtained for imports excluding oil.

In addition, there is a prompt reaction of imports to domestic activity with a plausible elasticity of about 0.9. It will be shown in equation (5) that domestic activity, in turn, is negatively influenced by the exchange rate with an elasticity of -0.252 and a lag of about three quarters. In addition to the positive direct effect of the exchange rate on imports as represented in equation (3) there is thus a slow-working indirect effect, working through domestic activity, with a negative sign and an elasticity of (0.882) (-0.252) = (-0.222). This would indicate that the total effect of the exchange rate on imports, after the ouput adjustment is completed, is only about half the direct effect.

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[1] This would provide an estimate of the price elasticity of the UK demand for imports in the limiting case in which the foreign supply of imports is infinitely elastic. With finite elasticites of foreign supply, the price elasticity of import demand is higher, possibly by large margin, than the exchange-rate coefficient in equation

(4) Incoming Tourism

The preceding subsections concentrated on commodity trade. The same forces operate, in principle, on the invisibles. As an illustrative example of the latter we select incoming tourism. Since there are no satisfactory data for real expenditures of foreign tourists or for the number of tourist-nights spent by foreigners in British hotels, the number of arrivals of overseas visitors in the United Kingdom (v_t) is taken as a proxy. The variables in this subsection are expressed as the percentage change in a given quarter over the same quarter of the preceding year, thus providing a rough seasonal adjustment. Estimation was by ordinary least squares and the period was from the first quarter 1975 to the second quarter 1980.

The estimating equation is as follows:

$$(4) \quad \hat{v}_t = 14.723 - 0.826\ \hat{e}^*_t$$
$$(8.135)^{**} \quad (4.766)^{**}$$

$$\bar{R}^2 = 0.523$$

$$DW = 1.924$$

$\hat{}$: percentage change over same quarter a year ago.

The equation indicates that an appreciation of sterling by 10 per cent, other things equal, results in a decline in foreign visitors by about 8 per cent. This is a remarkably strong effect[1].

Starting with a maximum lag of one year, the sequential t-test procedure did not show any significant influence of lagged exchange rates. It was also impossible to detect an impact of foreign economic activitiy, either in a lagged or in an unlagged form. The latter result was also found in the Swiss case. It suggests that short run variations in industrial production do not have a significant influence on the demand for vacations.

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[1] In the case of Switzerland, the elasticity of the number of nights spent by foreign visitors in Swiss hotels with respect to the real exchange rate of the Swiss franc was estimated to range between -0.6 and -0.7.

(5) Industrial Production

The empirical analysis of foreign orders, exports and tourism suggests that a real appreciation of sterling should lead to a contraction of domestic production. The empirical investigation of imports, indicating substitution away from domestic goods, reinforces this suggestion. To test the output effect of the exchange rate directly, industrial production was regressed on the real effective exchange rate, OECD production and a set of seasonal dummy variables[1]. This resulted in the following equation

$$(5)\quad y_t = \underset{(4.786)^{**}}{3.080} \; \underset{(2.586)^{*}}{-0.252\, e^{*}_{t-3}} + \underset{(5.474)^{**}}{0.572\, y^{*}_{t}} + s$$

$$\bar{R}^2 = 0.902$$

$$DW = 1.905$$

$$\rho = 0.513$$

The coefficient of the exchange rate in this equation reflects not only the direct substitution effects, but also the multiplier effect through domestic demand. It indicates that an appreciation of sterling by 10 per cent tends to result in a decline in industrial production by about 2.5 per cent[2].

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[1] OEDC production includes UK production, but since the weight is only 5.5 per cent the resulting biases cannot be serious.

[2] This is slightly smaller, but of the same order of magnitude as in the Swiss case.

Starting with a maximum lag of 12 quarters, lags exceeding 3 quarters were successively dropped on the basis of the sequential t-test. Lags of less than 3 quarters could also be dropped because they had no significant influence. This left a significant lag of 3 quarters. If the equation is run alternatively with an exchange rate lag of different length, the coefficient turns out to be significant only for 3 quarters, confirming the above result.

The effect of foreign activitiy on British industrial production is of a plausible order of magnitude and highly significant; it appears within the same quarter. It sould be noted that the positive coefficient of foreign activity in equation (5) is perfectly compatible with the proposition that monetary policy, under floating rates, tends to produce an inverse transmission of business fluctuations. In the first place, not all business fluctuations are due to monetary policy. What is more important, the coefficient in (5) is partial in the sense that it excludes the effect of exchange rate fluctuations. It is precisely the latter which account for the inverse transmission of monetary impulses.

Equation (5) permits the conjecture that the appreciation of sterling since the summer of 1979 was a major contributing cause of recent declines in output. The continuation of sterling appreciation during 1980 would lead to a tentative prediction that his recession will last well into 1981.

As a final remark it should be noted that the empirical estimates in this section did not include monetary policy variables among the determinants of trade and output. To the extent that domestic monetary policy has a prompt and marked effect on real exchange rates, its effects are thus attributed to the latter. As a consequence, the results of this section probably overestimate the effects of imported overshooting or the differential effects of overshooting compared to the effects of monetary policy in a closed economy.

Summary of Part II

Overall, part II led to the following conclusions about the effects of sterling appreciation:

(1) The price effects of overshooting, being only temporary, are rather an undesirable disturbance than a valuable contribution to long-run antiinflationary policy.

(2) Overshooting, taken by itself, may have a serious, though temporary, effect on output and employment while its effects on trade are generally less clear. If overshooting is the concomitant of domestic monetary restraint, it may be conjectured that it magnifies the real effects of monetary policy.

(3) To the extent this is possible in a simple single-equation approach, empirical estimates for the United Kingdom tend to confirm a considerable influence of real exchange rates on output and also on trade.

Appendix to section 6.

Symbols and Statistical Sources

f : Volume of net new export orders, engineering, seasonally adjusted, 1975 = 100.
Source: OECD, Historical Statistics 1960-79; Main Economic Indicators.

e* : Real (effective) exchange rate, deflated by relative consumer prices, 1970 = 100. Country coverage: 13 OECD countries.
Source: OECD (unpublished).

y : United Kingdom industrial production, not seasonally adjusted, 1975 = 100.
Source: OECD, Historical Statistics 1960-79; Main Economic Indicators.

y* : OECD industrial production, not seasonally adjusted, 1970 = 100.
Source: OECD, Historical Statistics 1960-75, suppl. no 1; Indicators of Industrial Activity.

x : Volume of manufacturing exports, not seasonally adjusted, 1975 = 100.
Source: CSO, Monthly Digest of Statistics.

m : Volume of imports, not seasonally adjusted, 1975 = 100.
Source: CSO, Monthly Digest of Statistics.

v : Number of overseas visitors to the United Kingdom, not seasonally adjusted.
Source: British Business.

Part III: Policy Implications of Sterling Appreciation

7. Techniques of Monetary Control

The main subject of this study is the exchange rate. However, the exchange rate depends largely, though not exclusively, on monetary policy. In particular, an ineffective system of monetary control could make it virtually impossible to develop a good foreign exchange strategy. It is necessary, therefore, to precede the sections on foreign exchange policy by a discussion of monetary control. Disregarding details, this will be limited to a few fundamental problems.

(1) Objectives of Monetary Policy[1].

Montetary policy may be said to have three distinct objectives:

- Its long-term trend should be such that prices remain roughly stable. This objective relates to price movements from, say, one half-decade to the next. If these could be held within 10 per cent most observers would probably feel that the long-run objective has been met.
- Over the medium term, monetary policy should help to avoid andreduce fluctuations in output and employment.
- In the short run, from week to week, monetary policy should be designed to prevent and counteract critical fluctuations in bank liquidity.

These objectives are, for practical purposes, largely independent of each other. The long-run trend of monetary policy indeed determines the long-run course of inflation or deflation, but it seems to have no major influence on real output and employment and certainly none on bank liquidity. Over intermediate

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[1] The "tree-frequency approach" to monetary policy outlined in this subsection is more fully described, though only for a closed economy, in Jürg Niehans, The Theory of Money, Baltimore (Johns Hopkins U.P.) 1978, chap. 12.

periods of several quarters, variations in monetary policy, to the extent they are unexpected, have indeed a marked, if complicated, effect on output and employment. However, if they take place around an unchanged trend, the inertia of prices and wages prevents them from having a significant effect on the long-run course of inflatio On the other hand, they will leave ample time to neutralize undesirable effects on bank liquidity. Day-to-day "lending of last resort finally, if it is each time promptly liquidated, will have no significant effect on output and employment and certainly none on the long-run course of inflation. As a consequence, there is no inherent conflict between the three objectives.

The rules by which monetary policy should be guided to attain these objectives depend on the time horizon. In determining the long-run trend, monetary policy can take the past trend of prices as its guide. If, over the last few years, this trend has been rising, monetary policy should, without abrupt changes, gradually become more restrictive and vice versa. In judging the path of prices, one should mainly look at the prices of domestic inflation. From this long-run point of view, deviations of monetary policy fro one year to the next are not necessarily a cause for alarm; what matters is the trend of monetary policy over a number of years.

For medium-term deviations from the long-run trend, the course of prices offers no guidance. In view of the importance of the exchange rate for fluctuations in output and employment, mone tary policy in an open economy will rather have to look to the course of real exchange rates. Over the long term, this requires no particular attention because it is determined by real factors; monetary policy has no power over it[1]. (No IP)

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[1] For a qualification to this statement, unimportant in the present context, see Jürg Niehans, Static Deviations from Purchasing-Power Parity, J. of Monetary Economics, vol. 7, no.1, Jan. 1981.

Purchasing-power parity rules the field (This does not mean, of course, that real exchange rates remain constant; it means that they cannot be influenced by monetary policy). From month to month, however, monetary policy has a strong, and often decisive, influence on real exchange rates and thus on the competitiveness of the economy. It should thus be conducted in such a way that serious disturbances caused by past mistakes or by foreign monetary policy are reduced and no disturbances are newly created.

In the short run, finally, neither fluctuations in prices nor in exchange rates require particular attention. The markets for goods and foreign exchange seem perfectly able to cope with them. What now becomes important is the state of the short-term money market as reflected in credit conditions and interest rates. In particular, it may be a reason for action if certain banks, in view of market imperfections, are unable to borrow the needed amounts at the going market rate. At the same time, the interbank money market can take occasional per-annum rates in the range of 50 to 100 per cent in its stride, provided these rates clear the market and last only for a few days. The prevention of liquidity crises does not require day-to-day stabilization of interest rates.

For an open economy one thus obtains, in summary, the following concept for monetary policy:

- Set the long-run trend of monetary policy to prevent secular inflation or deflation.
- If necessary, deviate from this trend to dampen excessive fluctuations in real exchange rates from quarter to quarter.
- Be ready to prevent critical short-run disturbances in credit market conditions.

The following subsection will outline how this general strategy can be implemented under present conditions in the United Kingdom.

(2) Intermediate Targets for Monetary Policy

It is normally quite difficult to determine how the day-to-day operations of monetary policy must be conducted in order to reach the ultimate objectives described in the preceding subsection. It has often been suggested that this task could be facilitated by using an itermediate target.Under such a two-stage approach, the policy strategist first determines the value of the intermediate target variable in view of the ultimate objectives. In the second stage, the tactician then determines the day-to-day operations required to reach the intermediate target.

In recent years, British monetary policy used sterling M_3 as the intermediate target. $£M_3$ is essentially the total amount of short-term liabilites of the consolidated banking sector, including the central bank, vis-à-vis the nonbank sector. It consists of currency, sight deposits, time deposits and government deposits. Its counterpart on the asset side of the balance sheet is bank leading to the public sector, to nonbanks and to overseas borrowers.

For certain purposes, $£M_3$ may be a useful summary measure of net liquidity of the nonbank sector. Both experience and analysis suggest, though, that it is not suitable as an intermediate target. There are two principal reasons for this. First, there is no reliable relationship between $£M_3$ and the future course of prices, output or the exchange rate. For example, an expansion of $£M_3$, depending on how it is brought about, may foreshadow either inflationary or deflationary pressure on the economy. During a contraction, in particular, $£M_3$ may well expand, because the public and the private nonbank sectors borrow more while the private nonbank sector, in view of low investment and consumption demand, increases its liquid assets. It is likely that this is a least part of what happend in 1980[1].

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1 One aspect of this is "round tripping", whereby firms use overdraft facilities to add to their liquid assets. It should be noted that the same aggregate result may appear even in the absence of round tripping by individual firms, borrowing and lending being done by different firms.

Second, £M_3 is almost impossible to control by monetary policy. For example, restrictive open market operations by the central bank, even though they might be quite effective in reducing inflation, may well result, as a byproduct, in an expansion of £M_3. The reason is that the increase in money-market yields may induce the nonbank sector to go into debt in order to increase its holdings of interest-bearing deposits by even more than the demand for currency is reduced (if it is reduced at all). 1980 offers again a telling illustation. In view of these shortcomings, £M_3 should be discarded as an intermeditate target. A policy maker using £M_3 may easily get into the situation of the man who, though freezing to death, kept turning down the heat because he had the thermometer upside down.

If, for some reason, an intermediate target must be used, some suitable measure of the money suppply M_1 would be superior to £M_3. It is one of the fundamental principles of monetary policy that variations in the quantity of the means of payment have, pound for pound, a stronger influence on prices and output than variations in the supply of nonmonetary assets, even quite liquid ones. To avoid inflation and fluctuations in output, monetary policy should therefore use an intermediate target that reflects the quantity of the means of payment as distinct from nonmonetary assets. In particular, the target variable should clearly reflect substitutions between means of payment and other liquid assets. At times, the distinction between the two may be blurred. This was the case in the United States, for example, when interest-bearing time deposits and money-market fund shares subject to check where included in M_3, but not in M_1. Such ambiguities can usually be eliminated by suitable redefinition of the monetary series. In recent years, the British series of M_1 shows a pattern very different from £M_3 and much more in line with other indicators of liquidity.

A more basic question is whether an intermediate target should be used at all. The answers to this question differ even among confirmed monetarists. In the United States, an intermediate-target approach is strongly suggested by the two-stage character of the decision-making process, the strategic decisions being made at the periodic meetings of the Federal Open Market Committee in Washington while the tactical operations are carried out by the Manager of the System Open Market Account in New York. For other central banks with different procedures this institutional consideration is, of course, not relevant. The main economic virtue of the intermediate-target approach lies in the automatic neutralization of critical shifts in the banks' demand for cental bank deposits If banks suddenly desire to be more liquid, the central bank will automatically provide the additional funds, thus avoiding an abrupt contraction in bank lending. The reverse happens in the case of a sudden decline in desired bank liquidity. The intermediate-target approach is thus designed to reconcile a flexible reaction to short-run disturbances within the banking sector with a steady course, based on fixed expansion rates, vis-à-vis the nonbank sector of the economy.

However, it is questionable whether any monetary variable can be found for wich fixed expansion rates are really appropriate from the point of view of the medium-term and long-term objectives of monetary policy. Whatever target is used, a noninflationary long-run trend of prices, in view of structural changes in the financial sector, will usually require compensating adjustments in the long-run trend of the money supply. What is more important, overshooting of the exchange rate due to monetary disturbances abroad will often require medium-term deviations from fixed expansion rates even in the absence of home-made disturbances.

It is also questionable whether a two-stage intermediate-target approach permits policy makers to use information efficiently.[1]

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[1] This has been investigated, by, among others, Benjamin Friedman (Targets, Instruments and Indicators of Monetary Policy, J.of Monetary Economics, Vol. 1, no. 4. Oct. 1975.)

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Of course, recent data on monetary aggregates like £M_3, M_1 or currency circulation may be very useful in determining the day-to-day course of monetary policy. There seems to be no general reason, however, why other pieces of information on, say, prices, output, interest rates or exchange rates should not be similarly taken into account. To decide on actual operations in the light of all available information can hardly be worse than to concentrate just on some intermediate target and often it will be better.

(3) Instruments of Monetary Policy

According to present procedures the minimum lending rate and the public sector borrowing requirement, defined as public borrowing from both banks and nonbanks, are used as the main instruments of monetary control. With a given PSBR, the MLR should be set at the level which causes the nonbank and the overseas sectors to borrow from banks (or to sell government bonds to banks) in just the amount of the target value of £M_3. At a higher MLR,but an unchanged PSBR, firms and households would presumably wish to borrow less (and to hold more government securities), thus reducing £M_3. With a higher PSBR, but an unchanged MLR, since firms and households would have no reason to shift their portfolios, more bank lending to the government would be necessary, thus raising £M_3. In theory, it should thus be possible to control £M_3 through the MLR and PSBR[1].

In practice, however, this seems to be very difficult, if not impossible. There are several reasons for this. The first has to do with the relationship between the Treasury and the Bank of England. Under present procedures, open market operations of the Bank see to it that supply and demand for funds match in the neighborhood of the minimum lending rate. This means,in effect, that the Bank is ready to supply an unlimited amount of money at the MLR; its supply curve for money (or its demand curve for money-market instruments) is horizontal.

[1] It should be noted, however, that one should not expect a close relationship between £M_3 and the PSBR alone, because interest rates are another potent determinant. It is not surprising, therefore, that economic tests of this relationship were inconclusive (see K. Cuthbertson, S.G.B. Henry, D.G. Mayes and D. Savage, Money and the PSBR, National Institue Economic Review.)

The Treasury is thus able to "monetize" any amount of debt at the going rate; the Bank is powerless. If it feels the resulting money supply is excessive, it can only implore the treasury to reduce the PSBR or else raise the MLR. Similar considerations apply to private borrowing. If firms and households wish to add to their cash balances by borrowing from banks (or by selling government securities to banks), the additional cash is automatically provided by the Bank of England. Any errors in forecasting the demand for bank loans by the non-bank sector (including the government) or, equivalently, any error in forecasting the demand for money by firms and households is thus immediately translated into an unintended variation in the money supply. This is vividly illustrated by the large and seemingly erratic fluctuations in the monetary aggregates during the last two years.

While this problem would, mutatis mutandis, arise with any monetary aggregate, another difficulty is specific to £M_3. As a matter of fact, an increase in the MLR, presumably meant to be restrictive, may conceivably result in an expansion of £M_3, while a contraction of £M_3 may require a lowering of the discount rate. The apparent paradox arises because roughly half of £M_3 consists of interest-bearing time deposits. With rising yields on short-term assets, the demand for these expands, possibly by more than the demand for currency and checking deposits contracts.

The most fundamental flaw of interest control relates to stability. With much simplification, it can be described by the statement that interest rates adjust to the money supply, but the money supply does not adjust to interest rates. If the central bank shifts to a lower rate of monetary expansion, interest rates, probably after an initial rise, will automatically decline in step. On the other hand, if the central bank gradually lowers the interest rate, the money supply, far from shifiting automatically to a lower rate of expansion, will actually become more inflationary. In pure logic, the same effect as through a gradual reduction in the money supply could be achieved by an appropriate control of interest rates, but these would have to be guided along a highly complicated trajectory, first rising and the gradually declining. In practice, it is virtually impossible to determin

this trajectory. Overall, efforts to control the money supply through interest rates have consistently been unsuccessful. Monetary theory shows, furthermore, that this is not an historical accident but the result of inherent deficiencies of this approach.

In the light of both experience and analysis it seems much more promising to use the quantity of base money (or the "cash base"), consisting of currency and central bank deposits, as the main instrument of monetary control. This was clearly recognized in the recent statement of the Chancellor of the Exchequer regarding a gradual evolution towards a monetary base system. This evolution should be strongly encouraged. Statistical data on base money can be compiled, at least approximately, from Bank of England statements. Quarterly data on "reserve money" are published by the IMF in International Financial Statistics. A modest, but easy and indispensable step in the evolution toward base control would be the regular monthly publication of statistical series of base money.

Under flexible exchange rates, the base money supply can be completely controlled by the central bank by buying or selling nonmonetary assets against payment in currency or central bank deposits. Whenever it is not so controlled, this is because of the central bank's own rules and procedures. Such control essentially means that the central bank maintains a vertical supply curve for base money. Interest rates, on the other hand, are then determined by the demand for base money by firms, households and banks. As a consequence, interest rates will usually fluctuate more than if they are used as a control instrument.

Under such a control procedure, treasury operations have no direct influence on the supply of base money. There is no automatic monetization of goverment debt. However, public borrowing influences the interest rate at which banks and nonbanks are willing to hold the given amount of base money. More generally, the fiscal operations of the government determine the total supply of liquid assets to the private sector of the economy. The central bank then determines which part of this total supply consists of money. Since prices, output, exchange rates and the like depend, in principle, on the supply of both monetary

and nonmonetary assets, they are jointly influenced by both the treasury and the central bank, no matter what control procedures are used. However, both historical experience and economic analysis suggest strongly that, pound for pound, and increase in government debt, though having a strong effect on interest rates, has only a fraction of the effect of an increase in money on prices, employment and exchange rates[1]. With base money as the main policy instrument, the principal responsability for monetary policy clearly rests with the central bank.

Using the monetary base as the main instrument of monetary policy does not necessarily mean that base targets should be announced several quarters or even a year ahead. Particularly during periods of transition from one control procedure to another it may be preferable not to commit the central bank to such targets. On the other hand it may be argued that the discontinuation of targets may give the impression of a major shift in monetary strategy where, in fact, there is only a shift in operating procedures. Overall I am inclined to believe that under present circumstances the latter argument should prevail. An important qualification to this view will, however, be added in the following section.

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[1] On this point see Jürg Niehans, The Theory of Money, Baltimore (Johns Hopkins U.P.) 1978, chap. 10 and 11.

8. Guidelines for Monetary Policy

The preceding section dealt with the techniques of monetary control. The present section takes up the question of the quantitative guidelines for monetary policy in a world of overshooting exchange rates. It will be assumed that the monetary base, as suggested in the preceding section, is indeed used as the main policy instrument.

At the present time, the most urgent problem for monetary policy is how to guide the economy out of the shock of abrupt restraint on to a sustainable path of gradual disinflation. Just to revert to an inflationary course would lead to disaster; the hard-earned rewards for the hardships of the last two years would be thrown away. The economy would be back on square one. What is necessary is a coherent strategy that permits the economy to resume its growth while still moving closer to a noninflationary long-run path. This section tries to outline such a strategy. Commentators will call this strategy risky and it certainly requires a certain boldness. However, all of its elements have been successfully tried before and I believe it has a fair chance of obtaining broad support.

(1) Medium-Term Money-Supply Targets

The long-run trend of base money mainly determines the long-run trend of prices and hardly anything else. If, in the long run, (1) the income velocity of money were about constant, (2) the base multiplier were approximately constant (3) the treasury expanded government debt roughly in step with economic growth, and (4) there were no inflation at the present time, then price stability would require an expansion of base money roughly corresponding to real growth. In reality, some or all of these conditions will usually not be satisfied. In this case, the long-run price objective requires a rate of monetary expansion different from economic growth.

This is particularly true in the presence of serious inflation. From a practical point of view, the case for "gradualism" is overwhelming. Monetary expansion at a rate of, say, 12 per cent should not be unexpectedly reduced to zero overnight. A feasible strategy might consist in reducing the expansion rate of base money by, say, 4 per cent in the first year, 3 per cent in the second year, and so on. At the present time, after a period of abrupt restraint, the objective should be to bring the economy back to such a path of sustainable disinflation. From this point of view, a plausible range for a base target, measured in terms of reserve money, might be £ 11000 - 11200 by June 1981. This corresponds to an annual increase of 5 - 6 per cent since June 1979, but since there was virtually no expansion over much of this period, there would be room for some relaxation in the coming 6 month. I believe such a short-term target should be announced immediately; every week of delay would make things more difficult. After June 1981 the annual increase in the monetary base might at first be continued in a range of 5 - 6 per cent. This would still leave an inflation rate of several per cent, to be sure, but the United Kingdom would have joined the ranks of the low-inflation countries. Inflation would have ceased being a major social problem. Further reductions in monetary growth could then be made gradually over the following 2 - 3 years. These numbers are suggested without any claim to precision; they are not based on detailed quantitative studies. The main point is that the medium-term money-supply targets should be consistent with a gradual, but persistent approach to long-run price stability that can be maintained over several years.

While the target range takes account of the long-run price objective, the medium-term and short-term objectives may require temporary deviations from these targets, possibly of considerable magnitude. Long-run steadiness of monetary policy will have to be combined with short-run flexibility. It will usually not be possible to anticipate the need for such flexibility at the time the annual targets are announced, nor will it usually be possible to quantify the required deviations in advance. The announcement of a target range would thus have to be accompanied by a "flexibility clause" to the effect that the central bank would feel free to move outside the target range if conditions require it. The overshooting of exchange rates would be of particular relevance in this context.

These deviations from the medium-term target will be the subject of the following subsections. If the underlying overshooting diagnosis was correct, it should in each case be possible to return to the long-term path before domestic prices and wages have been significantly affected[1].

(2) Temporary Exchange Rate Targets

The normalization of business conditions requires a reduction of exchange-rate overshooting[2]. A medium-term money supply policy as proposed in the preceding subsection will automatically contribute to this reduction. If overshooting was mainly produced by severe monetary restraint, a relaxation of this restraint will help to dampen it. It is well possible that no further measures are required. It is conceivable, however, that serious overshooting will still persist. In this case, additional measures will have to be taken. They are the subject of this subsection.

It should be clearly understood that these measures go beyond the normal routines of monetary policy. They will also be controversial and require a certain boldness. To use a military metaphor, they are like the reserves an army commander puts in at the critical point of a battle. Of course, it is better to win the battle without using the imperial guards, but to have lost the battle without having used the reserves is usually regarded as a serious criticism of leadership. It should also be pointed out that the measures proposed here have been successfully used in Germany and on an even larger scale in Switzerland during the last few years. In the light of recent experience, there are probably few central banks that to-day would tolerate overshooting on the British scale without using measures of this sort.

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[1] It should be noted that such a base policy can be implemented without minimum reserve requirements except for protection purposes. Even if commercial banks are free to hold whatever reserves they wish, purchases and sales of assets by the central bank still have their effect on prices and output and effects may still be reasonably predictable. A base money approach is thus compatible with a policy of gradual generalization and relaxation of reserve requirements.

[2] On this central point the present study agrees with King's conclusions (op. cit.).

The Swiss case is particularly instructive. In 1977 Switzerland just emerged from a deep recession. Before the recovery was completed, the economy was hit by the progressive overshooting of the exchange rate caused mainly by the increasingly inflationary policy of the United States. For more than a year, the Swiss National Bank responded with sporadic dollar purchases and assorted restrictions against foreign holdings of Swiss francs. These measures turned out to be ineffective. A spirit of helplessness and gloom descended over the Swiss economy. The central bank seemed to have shot its guns without effect. In fact, it had hardly started to use them. In the autumn of 1978 the Swiss National Bank finally announced a temporary suspension of its money supply targets combined with an aggressive exchange rate policy. Within about a month the crisis was over, the bold decision of the central bank initiating two years of steady growth with low inflation rates.

The case of sterling overshooting differs from the mark and the Swiss franc inasmuch as it is home-made rather than imported. However, once it has assumed serious proportions, it can be corrected by essentially the same measures. The center-piece of these measures are foreign-exchange purchases. Under British institutional arrangements, these require close cooperation between the Treasury and the Bank of England, the former controlling foreign exchange purchases by the Exchange Equalization Account while the latter controls the supply of base money through purchases of domestic securities. More about this cooperation will be said in section 9. For the present purposes it will be assumed that there is no sterilization, purchases of foreign exchange by the Exchange Equalization Account being reflected, pound for pound, by the creation of additional base money. This can be achieved by the Bank of England buying the securities issued by the Treasury to finance its foreign exchange purchases. It will be argued below that this is not necessarily the optimal procedure, but for the purposes of the present section this does not matter much.

Intervention into the foreign-exchange market should not take the form of haphazard and erratic purchases. Faced with recalicitrant overshooting of the exchange rate, the Bank of England should rather make use of the flexibility clause in its monetary targets to announce a short-term exchange-rate target. Such an announcement might say that the Bank will not tolerate a sterling rate "much above", say $ 2.15 in the "foreseeable future". The Bank might also announce a similar ceiling for, say, the mark if this seems warranted by the importance of the European market. The central bank would not sharply define what "foreseeable future" and "much above" are supposed to mean. Through the Exchange Equalization Account it would buy any dollars (and possibly marks) offered at or near the announced rate. In the short run, the money-supply target would thus be superseded by a foreign-exchange target.

The exact value of such targets is probably not of primary importance. A rate of $ 2.15 would reduce the real effective exchange rate by about 10 per cent. This would still leave it at a historically high level. Most of the increase since 1976 would remain. Such a rate would thus minimize the risk undervaluation of sterling. At the same time it would probably permit a normalization of business conditions. Clearly, the precise choice of the ceiling rate would need further study.

The temporary expansion of the money supply would result in a decline in short-term interest rates[1]. The imposition of an exchange-rate ceiling would also result, of course, in an immediate increase in import prices. Inevitably, statistical inflation rates would rise again. However, this apparent recurrence of inflation will have to be seen in its proper perspective. As was pointed out in section 4, what really matters from a long-run point of view is the trend of domestic prices. The temporary deviations from this trend due to fluctuations in exchange rates mostly just cloud the picture.

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[1] It may be desirable, however, to leave the MLR at its old level, at least initially, in order to restore the penalty character of the discount rate.

If real exchange rates appreciate, they convey the misleading impression of abating domestic inflation. If they decline, they create the equally misleading picture of accelerating domestic inflation. There is just no way of preserving the deflationary contribution of real appreciation except by letting exchange rates deviate progressively more from their equilibrium level, which is clearly impossible. Fortunately, the underlying trend of domestic inflation tends to be so inert that it will hardly be affected by a temporary deviation from medium-term targets.

On the other hand, if the analysis in part II was correct, the dampening of overshooting will lead to a rapid normalization of business conditions. In Switzerland, normalization took in most sectors less than a month. In the United Kingdom, since the effects of overshooting have been much more serious, it may take longer, but the first favorable effects on business attitudes would probably be felt within weeks.

It is clear that there would also be an expansion of the monetary base beyond the target range. It is impossible to estimate in advance how large this deviation might be. If the market is rapidly convinced of the central bank's firm resolve and/or if the overshooting has already passed its peak anyhow, it may be moderate. Otherwise it may be large. The required intervention may be particularly large in the early phases, as traders still speculate on an early reaffirmation of the money-supply targets and doubt the central bank's perseverance. As the central bank gradually regains its dominance over the foreign exchange market it will be able to achieve its aims with relatively small purchases. In Switzerland where the exchange-rate correction was of the same order of magnitude, the monetary base increased by about 1/5 in four months. In any case, since there is no limits to the possible foreign exchange purchases, the central bank has the power to impose its exchange target on the market.

Fortunately the expansion of foreign exchange reserves and of the domestic money supply promises to be largely self-liquidating. Without a chance for appreciation and with lower interest rates, the attractivity of sterling will soon decline. Other currencies like the dollar, now without risk of depreciation and with relatively higher interest rates, may become almost irresistible to the investor. Dollars will thus begin to flow out of the Exchange Equalization Account and sterling will flow back into the Bank of England. This is what happend, mutatis mutandis, in Switzerland in 1979. Within a year after the initial expansion, both the additional dollars and the additional base money had virtually disappeared. The money supply was back on its target trajectory (see fig. 8.1). At first it had been expected that this liquidation phase would be economically painful. It turned out to be completely painless, requiring no restictive policies at all. The additional money disappeared, as if by magic, under the influence of the same forces, now working in reverse, that had produced the overshooting.

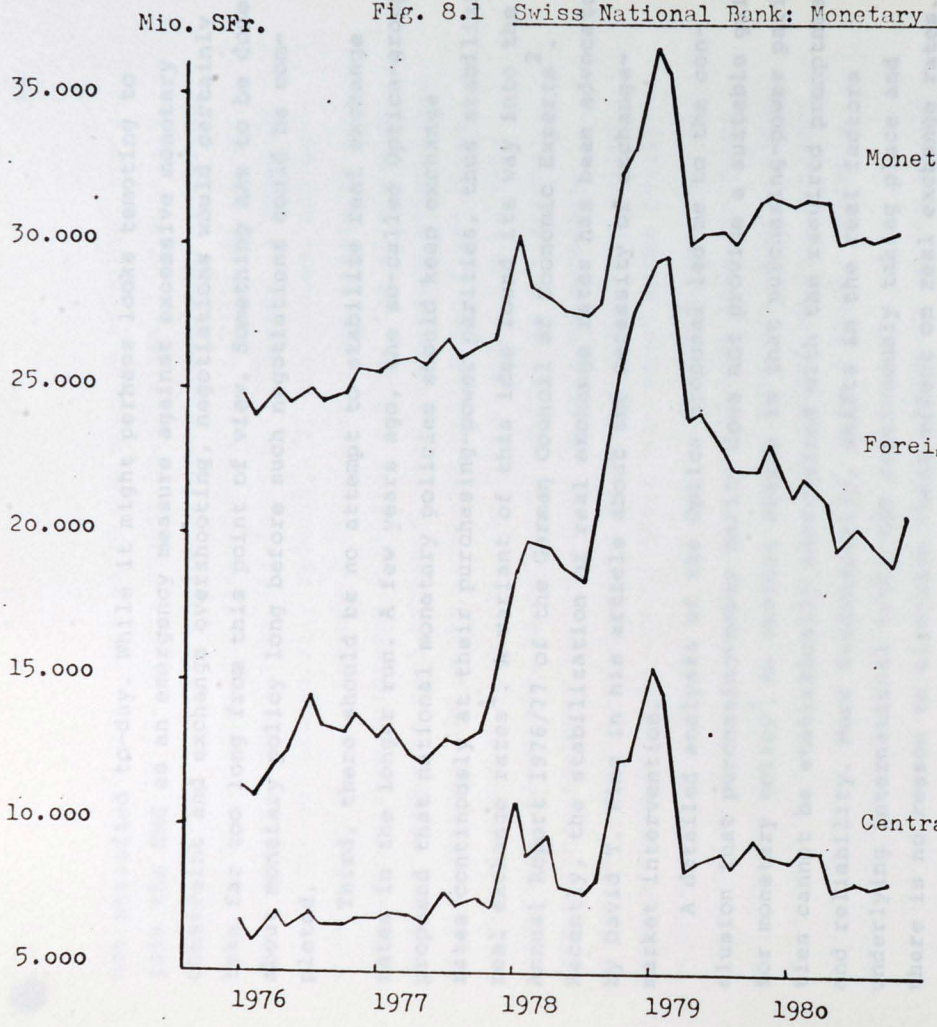
(3) Continued Floating of Exchange Rates

Temporary exchange-rate ceilings as proposed in the preceding section should be regarded as an aspect of managed floating. They are not to be interpreted as a return to fixed exchange rates. At the present time there is no serious alternative to floating rates for the pound. This is particularly relevant in three respects.

First, there should be no efforts to eliminate day-to-day and week-to-week fluctuations in exchange rates. Fluctuations by, say, $\pm$ 5 per cent, while perhaps not perfectly harmless, can usually be absorbed without undue strain.

Second, an effort to return to a fixed-rate system by joining the European Monetary System would appear at least premature. Such an effort might conceivably be in order if the countries of the EMS, by following enlightened monetary policies, have shown themselves able to maintain a non-inflationary course with satisfactory employment for some time. It also requires that the United Kingdom is already close to such a course and that the sterling rate fluctuates around a sustainable level. These conditions are clearly

Fig. 8.1 Swiss National Bank: Monetary Aggregates



Source: Monthly Reports, SNB.
(Last month of each quarter omitted because of distortion from bank window dressing)

not satisfied to-day. While it might perhaps looks tempting to join the EMS as an emergency measure against excessive monetary constraint and exchange overshooting, negotiations would certainly take far too long from this point of view. Something has to be done about monetary policy long before such negotiations could be completed.

Third, there should be no attempt to stabilize real exchange rates in the longer run. A few years ago, the so-called Optica-group proposed that national monetary policies should keep exchange rates continously at their purchasing-power parities, thus stabilizing real exchange rates[1]. A variant of this idea found its way into the Annual Report 1976/77 of the German Council of Economic Experts[2]. Recently, the stabilization of real exchange rates has been advocated by David T. King in his article about the necessity of exchange-market intervention.

A detailed analysis of the Optica proposal led me to the conclusion that purchasing-power parity does not provide a suitable guide for monetary policy[3]. An obvious reason is that purchasing-power parities cannot be statistically ascertained with the required promptness and reliability. More fundamentally, shifts in the real factors underlying international trade are continuously taking place and there is no reason to eliminate their effect on real exchange rates.

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1 Commission of the European Communities, Inflation and Exchange Rates: Evidence and Policy Guidelines for the European Community (Optica Report 1976), Brussels 1977.

2 Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, Zeit zum Investieren Jahresgutachten 1976/77, Stuttgart und Mainz 1976, p. 181. According to this variant, the change in the exchange rate between two currencies should be made to correspond to the difference between the expansion rates of the respective money supplies.

3 Jürg Niehans, Dynamic Purchasing Power as a Monetary Rule, in: J.S. Chipman and C.P. Kindleberger (eds.), Flexible Exchange Rates and the Balance of Payments, Amsterdam (North Holland) 1980, chap. 11.

As a matter of fact, this would not even be possible, since changes in relative prices cannot be eliminated by monetary means. In addition, the optica rule could not even be relied upon to reduce short-run disturbances. In particular, a dynamic analysis shows that (1) foreign influences on domestic output are not necessarily reduced, (2) the economy may become unstable, (3) temporary disturbances are likely to be transformed into permanent inflation and (4) the elimination of fluctuations in real exchange rates may produce other types of disturbances. While the reasoning behind the first three points is somewhat technical, the fourth point can be made intuitively plausible. An effort to neutralize deviations from purchasing-power parity caused by foreign monetary policy may require major shifts in domestic monetary policy. These produce disturbances of their own, which might easily be more serious - though in the opposite direction - than the overshooting of the exchange rates would have been. In general, the Optica rule would make present monetary policy, since it is used to neutralize overshooting caused by past monetary policy, a slave of past mistakes. This is a fairly reliable method to destabilize the economy.

This leads to the conclusion that monetary policy should indeed try to dampen excessive deviations of exchange rates from purchasing-power parity, but it should not have the ambition to eliminate such deviations. As a consequence, it does not matter very much how real exchange rates are measured. Unless the disturbances are large by any and every reasonable standard, monetary policy should not begin to do anything about them. There is no point in trying to "fine-tune" exchange rates.

9. The Coordination of Monetary Policy and Foreign Exchange Policy

It was observed in the preceding section that the dampening of exchange-rate overshooting requires cooperation between the Exchange Equalization Account and the Bank of England. This cooperation will now be discussed in more detail.[1]

(1) Foreign Exchange Purchases by the Exchange Equalization Account.

In pure logic, it would be possible for the Exchange Equalization Account to enforce an exchange-rate ceiling without additional money creation by the central bank. In this case, the foreign asset purchases would be "sterilized" by an increase in public sector borrowing from the private sector[2]. As a consequence, the increase in the price of foreign currencies would be accompanied by an increase in domestic interest rates.

The relationship between the exchange rate effect and the interest rate effect of a given amount of such foreign exchange purchases depends primarily on the demand for sterling balances. If this demand is quite sensitive to interest rates but rather insensitive to exchange rates, then the interest effect of foreign exchange purchases will be weak while the exchange rate effect is strong. If the demand for sterling balances is quite sensitive to the exchange rate but rather insensitive to interest rates, then the exchange rate effect is weak while the interest effect is strong. In particular, if the demand for sterling balances is extremely sensitive with respect to exchange rate fluctuations, as could happen with highly stable expectations, very large foreign

[1] This discussion is based on Jürg Niehans, Volkswirtschaftliche Wirkungen alternativer geldpolitischer Instrumente in einer kleinen offenen Volkswirtschaft, to be published in Schriften des Vereins für Socialpolitik. This paper is an abbreviated version of a report originally written for the Swiss National Bank.

[2] It has sometimes been argued that such a policy would amount to an export of capital by the government, supplementing private capital movements (see, for example King op.cit.) This reflects a frequent confusion about capital flows. In fact, transactions of this sort just reshuffle assets between owners, leaving net international indebtedness unchanged.

exchange purchases could be needed to have the desired effect on the exchange rate.

Another inportant consideration has to do with the degree of substitutability between sterling assets and foreign assets. If this substitutability is high, a small interest differential is enough, at given exchange rates, to produce large shifts in portfolios. In this case, both the interest effect and the exchange rate effect of foreign exchange purchases, whatever their relationship may be, will be absolutely small. In the limiting case in which the foreign assets bought by the Exchange Equalization Account and the domestic assets sold to the nonbank sector are perfect substitutes, both effects would vanish.

The preceding discussion related to the immediate asset effects of foreign exchange purchases. Over several months, the latter would also effect the flows of trade, output and employment. Unless foreign and domestic assets are perfect substitutes, it is virtually certain that output would rise, despite the higher domestic interest rates. The details of these medium-term reactions are rather complex, but it still remains true that a highly sensitive reaction of the demand for sterling balances to exchange rate fluctuations would rob foreign exchange purchases of their effect. With the high degree of substitutability that seems to characterize actual exchange markets, mere foreign asset purchases by the Exchange Equalization Account with complete sterilization, and thus without any change in the money supply, do not seem to be an effective policy.[1]

(2) Open Market Purchases by the Bank of England

On the other hand, the lowering of sterling exchange rates does not necessarily require foreign exchange purchases. It could also be achieved, in principle, by open market purchases

[1] King (op.cit.) believes that an exchange of domestic assets for foreign assets by the government would be enough. However, if the problem were really an excess demand for sterling bonds relative to foreign bonds it would express itself in relatively low interest rates on sterling bonds. In fact the latter are relatively high. This suggests that the problem is rather the tight supply of sterling currency relative to sterling bonds, that is, monetary restraint.

of the Bank of England without any cooperation from the Exchange Equalization Account. This is because an increase in the money supply by purchases of domestic assets not only lowers domestic interest rates, but also lets foreign currencies appreciate relative to sterling. This illustrates the fact that there is nothing like a "free floating" of exchange rates. Whatever monetary policy does automatically influences the exchange rate, even though there might be no direct intervention in the foreign exchange market. It will generally be true, however, that the exchange-rate effect of open-market purchases is relatively weak while the interest effect is relatively strong. Again, a large volume of purchases would probably be needed to achieve a given exchange rate target. The expansion in the money supply would be correspondingly large.

Over the medium term, where output and trade begin to matter, it is still true that open-market purchases result in a depreciation of the domestic currency and a decline in interest rates. Remarkably enough, it is hard to prove that they necessarily stimulate output. This is one of those cases where interest rates are not a reliable indicator of future output effects. Two specific reasons contribute to this seeming paradox. On one hand, the decline in interest rates stimulates investment abroad which, taken in itself, is associated with a decline in domestic expenditure. On the other hand, the depreciation of the domestic currency, by creating an expectation of future appreciation, stimulates the demand for domestic cash balances, again with a negative effect on expenditure. It is plausible to assume the stimulating effect familiar from the closed economy will normally dominate even in an open economy, but it seems this cannot be strictly proved.

While exchange rates could, in principle, be controlled by open-market operations, in practice this would be very difficult. In the foreign exchange market, a given exchange rate can be enforced by simply announcing that, disregarding margins, any desired quantities will be bought or sold at this rate. To

achieve the same result through a third market, namely the market for domestic securities, would evidently require almost super-human skill.

This leads to the conclusion that mere open-market operations are not a promising technique to influence the exchange rate because (1) large purchases with a correspondingly strong decline in interest rates would probably be necessary, (2) the medium-term effects on output may be disappointing, and (3) practical implementation of this policy would be difficult.

(3) Cooperation of the Exchange Equalization Account and the Bank of England.

In most countries, foreign exchange reserves are directly held, bought and sold by the central bank. Under these conditions the third method of intervening in the foreign exchange market is the most straightforward: The central bank simply buys foreign assets against payment in domestic currency. Under the institutional arrangements in the United Kingdom, such a policy requires joint action of the Exchange Equalization Account and the Bank of England, the former, in effect, buying foreign assets with new money borrowed from the latter.

Qualitatively, such a policy has the same short-run effects as open-market operations: The exchange rates of foreign currencies rise and domestic interest rates decline. Quantitatively, however, there is an important difference inasmuch as the depreciation of sterling is now stronger, while the decline of interest rates is weaker, than for open-market operations. In the short-run, the creation of money by foreign exchange purchases thus has a comparative advantage in influencing the exchange rate while open-market operations have a comparative advantage in influencing interest rates. A given effect on exchange rates can be achieved through foreign exchange purchases with a smaller increase in the money supply and a smaller decline in interest rates.

These conclusions remain essentially valid over the medium term, when output and trade effects begin to matter. In addition, it is quite likely - though not certain - that foreign exchange

purchases have a stronger medium-term effect on domestic output and employment, but a weaker effect on exchange rates, than open-market operations. Again it would be illegitimate to use interest rates as an indicator of medium-term output effects.

The influence of foreign exchange purchases on exchange rates is highly dependent on the sensitivity of the demand for sterling balances to exchange rates. If the demand for sterling is very sensitive to exchange rate fluctuations, large foreign exchange purchases are needed to achieve a given exchange rate effect. In the limiting case of an infinitely elastic sterling demand with respect to exchange rates, monetary policy would lose all of its power over the exchange rate. It should be noted that the problem in this case is not due to destabilizing speculation. On the contrary, it is due to the highly stable behaviour of speculation. Such undesirable stability may occur if monetary policy has so far followed fixed and well-known money supply targets. Any deviation from such targets then creates the expectation of a prompt correction. With a more flexible interpretation of monetary targets this problem is likely to become less important.

Cooperation between the Exchange Equalization Account and the Bank of England does not imply, of course, that both must intervene in exactly the same amounts. It could well be, for example, that only part of the foreign assets bought by the Exchange Equalization Account is "monetized" by the Bank of England, the remainder being financed by public borrowing. In this case, a given effect on the exchange rate would require a somewhat larger amount of intervention, but a smaller increase in the money supply. It would also be accompanied by a smaller decline in domestic interest rates. It is difficult to formulate firm rules for the appropriate combination of policies. As a first step it might be advisable to use foreign exchange purchases by the Exchange Equalization Account to enforce the temporary exchange rate target and to use open-market purchases by the Bank of England to prevent interest rates from rising

and even to produce some decline. There is no reason, however, why more money should be created than is necessary to finance foreign exchange purchases. The details of the adjustment process would have to be worked out in the light of accumulating experience.

Whatever these details may be, a variable monetary policy requires that domestic-security operations and foreign-exchange operations are controlled by an integrated decision-making procedure. They cannot be kept in separate compartments, the open-market had not knowing day by day what the foreign-exchange hand is doing. In the light of recent experience, the notion of "freely floating"exchange rate, to be treated by policy-makers with benign neglect", appears as obsolete, one of the fallacies of the 1960s. To-day, domestic-securitiy operations and open-market operations appear as two closely related instruments of the same monetary policy.

Summary of Part III

The appreciation of sterling during the last two years is largely a monetary phenomenon. While monetary aspects of North Sea oil may have contributed, its main cause was progressive monetary restraint, culminating in a complete stop in the growth of the base money supply in the late summer of 1979. A pronounced overvaluation of the currency is a normal concomitant of such a policy.

Monetary restraint is absolutely necessary for the elimination of inflation. Some temporary recession in output and employment is the unavoidable price that has to be paid. However, if the restraint is applied abruptly and the rigidity of wages and prices is high, the recession may be intolerably severe. It is further aggravated by the overshooting of exchange rates. The empirical evidence suggests that this additional effect can be very strong.

In the present situation of the UK economy, monetary policy faces the task of effecting a transition from abrupt restraint to a sustainable path of gradual disinflation combined with a resumption of growth. The strategy proposed in this study can be briefly summarized in the following points:

(1) Money supply targets should be expressed in terms of the monetary base instead of £M_3; as the main policy instrument, the minimum lending rate should be replaced by the supply of base money.

(2) During the first half of 1981, the monetary base should be raised to the level it would have had if it had been permitted to grow at an annual rate of 5 - 6 per cent since the middle of 1979; from then on, the target range should be slowly lowered to a non-inflationary trend.

(3) If the normalization of the base money supply is not enough to restore competitiveness, the overshooting of the sterling rate should be reduced to tolerable proportions (though not necessarily eliminated) by a temporary exchange-rate target

to be implemented by foreign-exchange purchases, even at the cost of temporary deviations of the monetary base from its target.

The principles of British monetary policy during the last two years were sound. The resolution with which they were applied is admirable. The people understand that the price of noninflationary growth is a temporary recession and they are willing to pay the price. The early decline in inflation has justified and even exceeded their expectation.

The implementation of those principles, however,is in urgent need of improvement. If the present rigidity of monetary policy is maintained, there is a serious danger that the principles themselves may be irreparably compromised. The consequence would be a tragic relapse into inflation. The sacrifices would have been in vain.

Such improvements are proposed in this study. They grew out of the experience of central bankers and the progress of economics during a period of rapid evolution in the field of monetary policy. The proposed measures do not guarantee success; decision-making is inherently risky and there will be doubts, warnings and controversies. I believe, however, that in the present situation the risk of doing nothing would be much greater. Im an also confident that the proposed measures could put the British economy on a sustainable path of declining domestic inflation and expanding output within three month. Im am convinced finally that these measures, if properly explained, will command wide support.