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OFFICIAL INTERVENTION IN THE EXCHANGE MARKETS: STABILISING OR DESTABILISING?

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OFFICIAL INTERVENTION IN THE EXCHANGE MARKETS: STABILISING OR DESTABILISING?[1]

Introduction

Disappointment with exchange rate behaviour has resulted, even under the floating rate system, in continuing, and in some cases heavy, intervention by the national authorities in the exchange markets. It is the aim of this study to throw some light on whether this official exchange-market involvement has tended to exert a stabilising influence, or whether it was itself a factor in the large and erratic exchange rate fluctuations which have been an outstanding feature of the international monetary scene over the past ten years.

In order to arrive at an overall judgement of the official rôle in the exchange markets it is necessary to adopt a formal criterion with the help of which the stabilising or destabilising nature of intervention operations can be evaluated. One such yardstick, which in the past has commanded fairly broad support in academic, official and private thinking on the subject, is the profit criterion. The classic formulation of this criterion can be found in Milton Friedman's well-known essay on floating exchange rates:

"In any event, it would do little harm for a government agency to speculate in the exchange market provided it held to the objective of smoothing out temporary fluctuations and not interfering with fundamental adjustments. And there should be a simple criterion of success – whether the agency makes or loses money."[2]

[1] The authors are indebted to Mr. P.D. Saville from the Bank of England and Dr. A. Akhtar from the Federal Reserve Bank of New York for their constructive criticisms and many helpful suggestions.

[2] Milton Friedman, "The Case for Flexible Exchange Rates", *Essays in Positive Economics*, Chicago, 1953.

In a more recent study,* the profit criterion is applied empirically in order to gauge the impact that official intervention may have exerted in the 1970s in the case of a number of currencies. The results of this study are not very complimentary to the official rôle in the exchange market and seem to suggest that intervention was primarily of a destabilising nature.

In Section II of the present paper it is, however, argued that, except under very special circumstances, the profitability criterion cannot be employed in any meaningful sense as an indicator of the stabilising effect of official intervention. Instead, a number of alternative criteria are suggested which circumvent some of the basic difficulties inherent in the profit criterion. Although these alternative criteria, too, suffer from certain conceptual and practical weaknesses, they nevertheless, particularly if used in combination with each other, convey a more realistic impression of the type of influence exerted by official intervention than the naive profit criterion.

Subsequently, in Section III, these alternative criteria are used to evaluate the influence exerted by official intervention in the period from 1974 to mid-1982 on the dollar exchange rate of three key floating currencies, namely, the Deutsche Mark, the Japanese yen and the pound sterling. Unlike the findings made using the profit criterion, the results of this analysis strongly indicate that official intervention in the case of these three currencies was predominantly of the stabilising kind. The paper does not claim that these results are wholly conclusive or that this kind of standardised analysis can act as a full substitute for an in-depth appraisal of each individual intervention episode. Nevertheless, these findings would appear to put the burden of proof on those who argue that the official rôle in the exchange markets has been primarily unhelpful and will continue to be so in the future.

Both the profit criterion and the criteria adopted in this essay inevitably suffer from one basic shortcoming: they can at best tell

* Dean Taylor, "Official Intervention in the Foreign Exchange Market, or Bet against the Central Bank", *Journal of Political Economy*, Vol. 90, No. 2, April 1982.

whether official intervention was in the right direction, but they can provide no information on the extent to which intervention was successful in actually influencing exchange rate movements. On the contrary, to the extent that intervention was fully successful in ironing out unwanted exchange rate movements, neither the profit criterion nor the criteria used here would be generally applicable. Conversely, if intervention was ineffective, and failed to exert a significant influence on exchange rate movements, both the profit criterion (under the specialised conditions where it is applicable) and the criteria used here would perform best, *but* would be irrelevant, since in that case official intervention would be meaningless from a macro-economic point of view.

The use of these criteria is therefore based on the implicit assumption that official intervention has had an impact on exchange rate movements, but only a limited one. The limited nature of this impact appears to be emphatically confirmed by the circumstance that exchange rate fluctuations have remained very large despite official intervention; unfortunately, this same circumstance might seem to suggest that official intervention, insofar as it was in the right direction, was largely ineffective. In order to refute this suggestion, Section I of this study sets out why the authors believe that in the present world of pronounced uncertainties well-timed official intervention can be influential and has an important rôle to play. Because of space limitations, the argument in this first section is presented in a highly condensed and somewhat dogmatic form.* Nevertheless, it stresses the fluid and psychic nature of the exchange markets – each situation is in a way unique – with the intention also of cautioning the reader about regarding the formalised approach adopted in the main body of the study as being of unqualified validity.

* For a more detailed discussion of this point, see Helmut Mayer, "The Theory and Practice of Floating Exchange Rates and the Rôle of Official Exchange-Market Intervention", *BIS Economic Papers*, No. 5, February 1982.

I
The rôle of official intervention in a world of pronounced uncertainties

The case for official intervention springs largely from uncertainty. In an ideal world of near certainty and near-perfect foresight, the best policy in most situations would be to leave the exchange market to itself. In such a world, market participants would hold firm and realistic views about the (real) longer-term equilibrium level of the exchange rate, with the spot rate and the intermediate forward rates being linked to this longer-term equilibrium level through international interest rate differentials. Any official efforts to push exchange rates away from this pattern would be largely futile, since this would offer speculators a sure chance of profits and official intervention would thus be smoothly neutralised by offsetting flows of private funds.

Unfortunately, the present world is quite different from the idyllic scenario implicitly assumed by such a model of near-perfect market foresight. In our imperfect world, the economic performance of a country and its exchange rate will be governed not only by fully rational economic optimising behaviour, but also by the cumulative interaction of a complex set of economic, social and political forces, the concrete outcome of which, in terms of purely economic analysis, will be unpredictable. Moreover, exchange rate movements in such an environment may not only passively reflect underlying developments, but may acquire a life of their own. This will be the case where the national authorities are not in full control of inflation and hence there is a considerable amount of interaction between exchange rate movements and domestic price and economic growth performance. In such an environment, exchange rate movements will tend to some extent to be self-justifying and the future equilibrium level of the exchange rate will be indeterminate, insofar as it depends on the magnitude and sign of the intervening exchange rate movements.

The danger of excessive exchange rate movements and cumulative interaction with domestic economic performance will be particularly large when the current account is slow to respond to exchange rate changes, and especially when there are J-curve effects. Under such conditions, and in the absence of official intervention, satisfactory exchange rate performance would depend on an active rôle by private speculation based on firm and realistic views about the country's longer-term equilibrium exchange rate level. Unfortunately, the scenario depicted in the preceding paragraph, which seems to be quite descriptive of the present world economic environment, makes it rather unlikely that private market participants would be able to hold such firm views about the longer-term equilibrium level of the exchange rate. And even if they knew, in the light of current conditions, what this equilibrium level should be, it would still be extremely uncertain whether at a given point of time in the future the then prevailing rate would actually coincide with it in view of the large degree of indeterminateness of exchange-market behaviour, not to mention the various kinds of unforeseeable economic or political events that might occur in the meantime to alter the equilibrium level itself.

In such an environment, instead of aiming at the extremely elusive longer-term equilibrium level of the exchange rate, market participants will tend to find it much safer to speculate on the very short-term exchange rate movements, basing their views on current exchange rate trends, on what other market participants seem to think and on a few basic influences such as interest rate differentials and current-account balances, as appropriate. Moreover, this reluctance to engage in longer-term speculation may be supported by official regulations, such as limits imposed on banks' open positions, or by accounting rules requiring frequent disclosure of unrealised exchange losses. Thus, in view of the pronounced short-run volatility of exchange rates, speculators could face the danger of having to report losses, even if the longer-run assessment on which their position-taking was based was perfectly sound and might ultimately have proved to be correct.

Unfortunately, position-taking based on very short-term views about current market trends, although it may make a lot of sense from a micro-economic point of view, is not what is needed for the satisfactory functioning of a floating rate system. Without the anchor of a firmly conceived longer-term equilibrium level, there is a serious danger that exchange rates, once they really start to move, may have to go to quite extreme levels before, on the basis of some very loosely conceived purchasing-power equality constraints or lagged current-account reactions, a broad enough group of market participants finds it safe enough to bet on a reversal of the trend. In the meantime, however, this excessive movement may have placed undesirable constraints on domestic economic policy, destabilised national economic performance, provided wrong signals for resource allocation, encouraged protectionist measures and, as a result, affected in numerous ways the longer-term equilibrium level of the exchange rate itself. Moreover, by increasing uncertainty, medium-term exchange rate volatility will tend to have a discouraging impact generally on investment activity and international trade.

Intuitively, it would seem clear that in such a world of self-propelling exchange rate movements official intervention will have a much more important rôle to play than in the highly stylised model of a floating rate system under conditions of near-perfect market foresight. Firstly, there are unnecessary (from the point of view of longer-term exchange-market equilibrium) and destabilising and costly (as regards their economic effects) exchange rate fluctuations which could be usefully mitigated. And, secondly, because of the prevailing uncertainties, the supply of offsetting speculative funds will be much less elastic, which means that official intervention will tend to be more effective in influencing exchange rate behaviour than in a world of near-perfect market foresight.

Of course, even so, the effectiveness of intervention will differ from situation to situation and will depend in large measure on its timing and scale, on the general economic policy background, on the credibility of the authorities and on the exchange rate level at which the intervention occurs. For example, official intervention will tend to

be most effective when it takes place at a time when the exchange rate is already quite out of line with a vaguely conceived longer-term equilibrium level and when it fits in with the government's general line of economic policy. Conversely, if intervention seeks to defend an exchange rate level which in the light of the government's policy stance is considered to be untenable by the market, the concomitant drawing-down of reserves or increases in external indebtedness may, through their negative impact on confidence, more than offset the supportive effect of the intervention.

It is often claimed that official intervention amounts to substituting the authorities' views for those of the market. This, however, is not quite the right way to look at it. For one thing, the government's economic policy performance itself will be one of the most important influences affecting exchange rate behaviour. Hence, for the authorities, the equilibrium level of exchange rates is not an exogenous parameter, but in large measure endogenous to their own policies. Secondly, the problem in the present world of pronounced uncertainties is that, without some kind of official guidance, market participants may not be able to take a longer-range view of the equilibrium level of the exchange rate and act accordingly. The prime purpose of official intervention in such an environment, therefore, should be not to "outguess the market", but, in conjunction with other policy actions, to create a more stable and predictable environment in which private views and position-taking will again play the stabilising rôle ascribed to them by the textbooks.

II
Criteria for evaluating the stabilising or destabilising impact of official intervention

Accepting that official intervention may have a significant impact on exchange rate behaviour, how can one establish whether this influence has been used in the past in a stabilising rather than in a destabilising way? This question is of more than just theoretical

interest, since it has some implications for what might be expected of official intervention in the future. One simple yardstick to evaluate the rôle of official intervention, which at first sight appears to be quite attractive also on intuitive grounds, would seem to be the profitability criterion: if official intervention yields a profit it will reduce unnecessary exchange rate fluctuations, if it entails losses it will be an additional source of exchange rate instability.

Friedman's essay, to which we referred at the beginning of this paper, stimulated a number of academics to carry out studies in this field. Their main interest was to examine the possibility of profitable but destabilising speculation. Their conclusion – as far as issues related to the subject of this paper are concerned – was as follows: if a speculator is defined properly,[1] and the excess-demand curve of non-speculators is linear and has a negative slope, profitable speculation is bound to be stabilising in the sense that it will reduce the variance of the exchange rate movement (see, for example, Telser[2], Kemp[3] and Farrel[4]).

It should be noted, however, that these studies did not preclude the possibility of unprofitable speculation being stabilising. One obvious, but somewhat extreme, example is the case of excessive intervention in the right direction (Diagram 1). The dotted line shows the exchange rate without intervention and the solid line the actual exchange rate. It is obvious (a) that all sales are made at a lower rate than purchases, and (b) that intervention succeeds in reducing the fluctuation of the exchange rate.

More generally, it can be said that, to the extent that intervention does have an impact on exchange rates, the profit criterion, being based on ex post exchange rates and not the rates which would have prevailed without official intervention, will inevitably give more

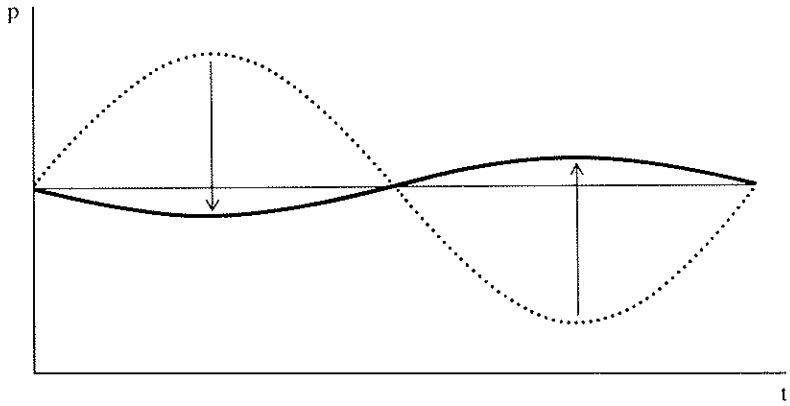
[1] A non-speculator is an economic agent who makes his decision independently of any rate other than the present one; all other agents should be regarded as speculators.

[2] Lester G. Telser, "A Theory of Speculation Relating Profitability and Stability", *Review of Economics and Statistics*, Vol. 41, 1959.

[3] Murray C. Kemp, "Speculation, Profitability and Price Stability", *Review of Economics and Statistics*, Vol. 45, 1963.

[4] M.J. Farrel, "Profitable Speculation", *Economica*, Vol. 33, 1966.

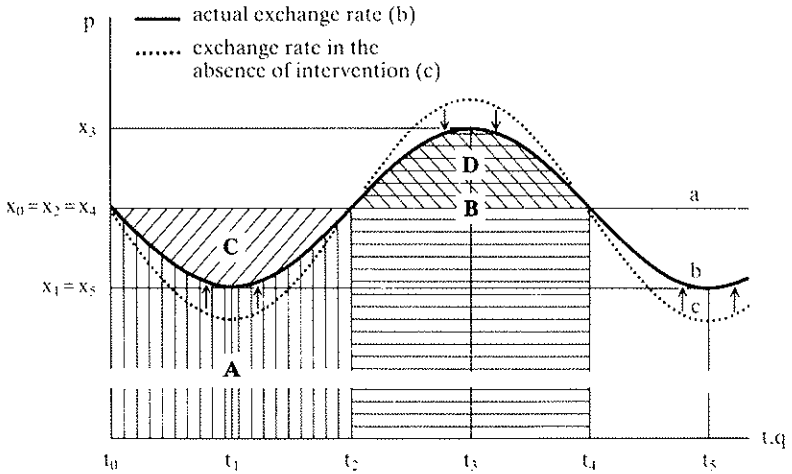
Diagram 1



weight to destabilising than to stabilising interventions. As a result of this negative bias, net exchange rate losses do not necessarily imply that official intervention has been on balance destabilising. For the academics in the 1960s, however, this was perhaps not a very important point, since their main interest was to see whether or not the flexible exchange rate system was stable; it was enough to ascertain that profitable speculation was stabilising, since the existence of (successful) speculators would not, then, create difficulties for the flexible exchange rate régime in that they would tend to stabilise rates. However, the fact that unprofitable intervention could still on balance have been stabilising very much reduces the usefulness of the profit criterion for evaluating the official intervention record.

Even if, in order to obviate this bias of the profit criterion of giving too little weight to stabilising and too much to destabilising intervention, we only look at situations in which official intervention has been solely of the stabilising kind, the profit criterion will in many situations not yield the right results. It amounts to measuring the profitability of official intervention over a preceding period with reference to the latest market rate without allowing for international interest rate differentials and without trying to evaluate the realism of

Diagram 2



the latest market rate (see, for example, Taylor*). It can be easily demonstrated, with the help of graphs, that this simplistic method, which seems to underlie quite a few judgements about the profitability of official intervention, is highly unreliable and, in many situations, even utterly meaningless.

Let us start with the simplest case. In Diagram 2 the solid line b depicts the value of the dollar in terms of the currency of country G. The dotted line c represents the exchange rate in the absence of intervention and line a the longer-term equilibrium exchange rate.

In the period ($t_0 \rightarrow t_2$) the dollar exchange rate undershoots, despite official support purchases of dollars, and in the period ($t_2 \rightarrow t_4$) it overshoots despite dampening official dollar sales. For the sake of simplicity, it is assumed that:

(i) the actual exchange rates in the two phases are mirror images of each other, and

(ii) the intervention is spread uniformly over the whole period under review – say, purchases of $10 million a day during $t_0 \rightarrow t_2$, and

* See footnote on page 4.

sales of $10 million a day during $t_2 \rightarrow t_4$. These two assumptions are made here only for expository purposes and the argument would be equally valid if the exchange rate movements were asymmetric and intervention occurred only sporadically.

These simplifying assumptions allow us to interpret the horizontal axis both as a time and as a quantity axis. Moreover, the amount of dollar reserves acquired in the first phase is equal to the amount sold in the second, so that the total reserves of country G remain unchanged.

Given these assumptions, the shaded area A in the diagram would represent the amount of domestic currency spent on supporting the dollar, while area B would measure the amount of domestic currency received through intervention against the dollar. It is obvious that in terms of domestic currency the net result of the intervention operations would be B–A, which is equal to the sum of C and D. Put in another way,C represents the profit made by buying the dollar below the exchange rate prevailing at t_4, i.e. x_4, and D is the profit made by selling dollars above x_4.

This is a textbook example of profitable and stabilising intervention. However, it should be noted that this is a special case in that x_4 coincides with the equilibrium rate. If, however, we were to choose the period $t_0 \rightarrow t_1$ and exchange rate x_1 to gauge the profitability of official intervention, we would obtain a loss, since all the purchases then were made above the reference rate x_1, although the intervention was of a stabilising nature. Therefore, to arrive at the right result regardless of the period chosen, the intervention has to be assessed by using the equilibrium rate ($x_0 = x_2 = x_4$) rather than the actual rate prevailing at the end of the period. This problem does not arise if it is assumed that the excess-demand curve of non-speculators is linear* and intervention is closed, i.e. total purchases during the

* Strictly speaking, the assumption that the amount of intervention remains constant which was made above for expository purposes is in contradiction with the assumption of linear excess demand function; the right assumption would be that intervention is proportional to the difference between the solid and the dotted lines. However, this does not affect the conclusion reached.

period equal total sales. For example, the net profit during $t_1 \rightarrow t_5$ would be identical with C+D, even if x_5 is taken as the reference rate.

However, even if the equilibrium level of the exchange rate or its proxy is known, or we choose a period in which the intervention is closed, a problem arises with the profitability criterion if the equilibrium rate is not static but is subject, as it will usually tend to be, to some kind of trend.

Let us assume that in Diagram 3, because of country G's lower domestic inflation rate, a constant real exchange rate for country G would imply that the price of the dollar in terms of currency G declines at the rate indicated by line a, the slope of which is identical with the inflation differential. This diagram is otherwise identical with Diagram 2 on page 12.

It is obvious that in terms of domestic currency the net result of the intervention operations is B–A, which is negative and therefore amounts to a loss. This loss occurred even though official intervention in both periods clearly had a stabilising influence on the real exchange rate (assume, for example, that in the absence of official intervention exchange rates would have moved in the way indicated by the dotted curves) and even though the equilibrium level of the exchange rate was used as reference rate.

In Diagram 4 the situation is exactly the same except that the exchange rate cycle is now reversed. The dollar first overshoots and then undershoots against currency G. The authorities continue to take stabilising action, selling dollars in the first phase when the dollar is unduly strong and supporting the dollar during its bout of weakness in the second phase. The net result of official intervention in terms of domestic currency is now A–B, which is obviously much greater than zero, implying that official intervention has yielded a comfortable profit.

Thus, although official intervention policy is identical and clearly of a stabilising nature, in the two graphs application of the simple profitability criterion leads to a different assessment, implying in the first situation (Diagram 3) that intervention was unprofitable and therefore destabilising. Moreover, what is even worse, if evaluated

Diagram 3

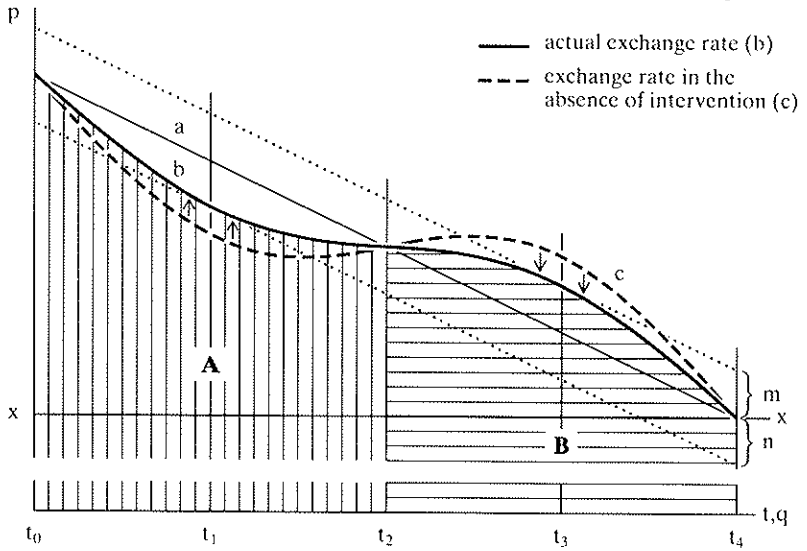
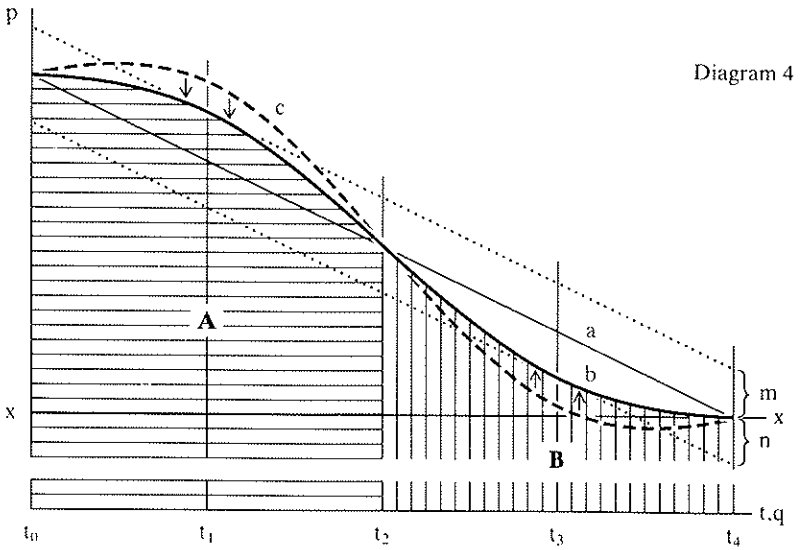


Diagram 4



individually the two phases in each graph assessed by the profitability criterion would be classified differently. In Diagram 3, for example, phase 1 ($t_0 \rightarrow t_2$) would show a loss and phase 2 ($t_2 \rightarrow t_4$) a profit, although in both phases intervention had the same kind of stabilising effect. The explanation for this breakdown of the naive profitability criterion is that, by evaluating positions taken at earlier value dates in terms of the exchange rate prevailing at t_4, it makes an implicit assumption about interest rates, namely that in nominal terms interest yields on the two currencies are identical and can therefore be disregarded for computational purposes. This, however, implies that in real terms there is a negative interest rate differential against the dollar which is equal to its inflation differential vis-à-vis currency G. Since the sequence of transactions depicted in Diagram 3 entails buying and holding dollars, this negative real interest rate differential makes it in real terms more costly than the sequence in Diagram 4, which entails going short on dollars to start with.

It is clear, therefore, that, in order to provide more meaningful results, the profitability criterion will have explicitly to take account of international interest rate differentials. But even in this amended form the profitability criterion will perform as a correct indicator of the exchange rate impact of official intervention only in one specific set of circumstances, namely when the nominal interest differential is equal to the path of the equilibrium exchange rate (line a), which in our example is in turn equal to the inflation differential. Only in this rather special case of parallelism between interest rate differentials and the trend of the equilibrium exchange rate will the profitability criterion classify intervention phases A and B in exactly the same way and produce identical results in Diagrams 3 and 4. This can easily be demonstrated graphically with the help of "discount" or "capitalisation" lines. If the nominal interest rate differential in the two diagrams is equal to the exchange rate trend, in Diagram 3 the capitalised cost at t_4 of buying dollars at t_1 will be (x–n), which means that this transaction will yield the same profit as selling dollars at t_3 at the capitalised price of (x+m), since /n/ would be equal to /m/. Conversely, it can be seen that if the interest differential is no longer

equal to the exchange rate trend, i.e. when the capitalisation line is no longer parallel to the trend line a, /n/ will no longer be equal to /m/. Commercial profits or losses will, of course, still be measured correctly, but they can no longer serve as a reliable indicator of the stabilising impact of official intervention.

Things become even more involved if, instead of a constant interest rate differential, we have a fluctuating one. In such a case, for the profit criterion to produce the right results, the equilibrium path of the exchange rate would have to be a curve with the specific property that if any two points on it were to be connected by a straight line, the slope of that line would be equal to the accumulated interest rate differential over the corresponding time stretch.

Instead of representing a constant real exchange rate allowing for inflation differentials, the exchange rate line in Diagrams 3 and 4 can also be interpreted as illustrating a different scenario. Let us assume that because of some gradual structural change (such as a declining dependence on energy or food imports) balance-of-payments equilibrium requires a gradual real appreciation of currency G against the dollar, as depicted by line a (which, it should be repeated, shows the amount of G currency units which would have to be spent to acquire a certain amount of dollars). Let us also assume that in both countries inflation rates are zero. If the interest rate differential is equal to the rate of real exchange rate movements, i.e. if the interest yield on currency G is lower by its appreciation rate than that on dollars, the capitalisation lines will again be parallel to the exchange rate path a, and the amended profit criterion will be a correct indicator of the stabilising impact of official intervention.

Our results can therefore be generalised: one necessary condition if the profitability criterion is to perform as a reliable indicator of the stabilising impact of official intervention is that the interest rate differential should accurately reflect the underlying trend of the equilibrium exchange rate between the two currencies concerned; it makes no difference in this context to what extent this trend is made up of inflation differentials or real changes in underlying exchange rate relationships.

Viewed from a rather different angle, one problem of the profitability criterion as used in academic literature lies in the definition of stability. Assume, for example, that in Diagram 3 the situation is reversed, i.e. the solid line b is the exchange rate in the absence of intervention and the dotted line c the actual exchange rate; the authorities *sell* dollars during $t_0 \rightarrow t_2$ and *buy* them back in the second phase. This would look like a case of profitable *but* destabilising intervention, the possibility of which has been rejected in the academic studies, albeit on certain assumptions. However, in these studies (in)stability is defined in terms of the variance (or some similar statistic) of the exchange rate during the whole period, rather than the distance from an ideal path as in our case. If measured in terms of variance, line c is more stable (smaller variance) than b. The "capitalisation" line,* or, more broadly, the interest rate differential, used in Diagram 3 is a kind of "filter" normalising the exchange rate movement to make it possible to apply the simplified theory to reality, but even that filter will only perform adequately if the interest rate differential reflects the underlying exchange rate trend, a condition which would generally be satisfied only in a world of near-perfect market foresight.

Summing up, for the profit criterion, even if used only in the more restrictive sense explained on pages 10–11 above, to perform well the following conditions must be fulfilled:

(i) the interest differential must be taken into account;

(ii) the interest rate differential must be equal to the slope of the underlying trend of the equilibrium exchange rate level;

(iii) if the intervention is not closed, instead of taking the last market rate to gauge the profitability of intervention, the equilibrium rate for that date must be used; and

(iv) strictly speaking, the slope of the excess demand function of the non-speculators should be both linear and constant; in other words, the effectiveness of intervention over the whole observation period has to be constant.

* See Appendix.

It should be clear that these conditions rule out, for all practical purposes, the use of the profitability criterion. For one thing, in view of the variety of debt instruments, there are usually a large number of interest rate differentials between any pair of currencies, and any choice will be to some extent arbitrary. Secondly, identity of interest rate differentials and the equilibrium exchange rate trend is a condition that will tend to be fulfilled in a world of near-perfect foresight, whereas in the imperfect world in which we live it will be the exception rather than the rule. Thirdly, since official intervention will usually not add up to zero over the period under review, correct use of the profitability criterion presupposes exact knowledge of the longer-term equilibrium level or trend of the exchange rate against which the profitability of past official intervention can be evaluated. Even a small error in the identification of the current level of this equilibrium rate may have a strong effect on the outcome of the profitability calculation. And, finally, it should be clear from the argument in the first section that the effectiveness of official intervention in influencing exchange rates will differ strongly depending on circumstances and the volume of intervention.

Looking at the profitability criterion the other way round, in its simplest form, as supplied for example by Taylor, its validity requires interest rate differentials to be zero and the equilibrium time-path of the exchange rate to have been a flat straight line extending backwards through the present exchange rate. Allowing for a constant interest rate differential, the optimum exchange rate path would be a straight line whose slope is equal to the interest rate differential. And assuming changing interest rate differentials, the past equilibrium path implied by the profitability criterion would be a curve made up of points which, if connected up with the present exchange rate, would all produce a line the slope of which would be equal to the accumulated interest rate differential between that point of time and the present observation point. It should be quite clear that these past equilibrium paths of the exchange rate implied by the profitability criterion, even if the rate prevailing on the reference date is a realistic one, will hardly ever coincide with what in an

ex post sense might be regarded as a desirable path of the exchange rate.[1]

In practice, it will therefore be advisable to drop the profitability criterion and, instead of evaluating official intervention with reference to only one exchange rate level, to try to evaluate its impact more directly, namely by establishing whether intervention at the point of time at which it occurred tended to push the market rate towards its then prevailing equilibrium level or away from it. This approach based on the assumption of a moving equilibrium level has the advantage that it makes it possible to disregard interest rate differentials and that the validity of the whole calculation does not depend on a single exchange rate.[2] This difference in computational characteristics reflects a basic difference in the philosophy underlying these two sets of criteria. The profit criterion is based on a static concept of exchange rate equilibrium; for example, in the form it was applied by Taylor, it implicitly assumes that (except as modified for interest rate differentials) in the past the equilibrium level of the exchange rate was the same as the present (i.e. the reference) exchange rate. In contrast, the criteria used here allow for changes in the underlying fundamentals and therefore movements in the equilibrium level of the exchange rate itself. It thereby acknowledges the fact that what may be regarded as the right exchange rate level at time b would not necessarily have been the equilibrium level at time a.

The difficulty with this second approach is that it requires knowledge of the equilibrium path of the exchange rate. As the discussion in Section I should have made clear, the exact identification of such an equilibrium path will not only be well-nigh impossible, but it is even highly questionable whether in an a priori sense such a determinate equilibrium path ever existed. Fortunately, however, in an ex post sense there is a fairly simple pragmatic method

[1] See Appendix.

[2] Interesting studies along these lines were made by Paul Wonnacott, "US Official Intervention in the Exchange Market for DM: Theoretical Issues and Empirical Evidence", *University of Maryland Working Paper*, No. 39, 1980; Victor Argy, "Exchange Rate Management in Theory and Practice", *Princeton Studies in International Finance*, No. 50, October 1982.

by which the path of the longer-term equilibrium level of the exchange rate can be approximated, namely by taking a longer-term moving average of the actual exchange rate. This approach, too, throws up a number of technical questions and difficulties, which are discussed in more detail in the following section. In addition to these technical difficulties, there are, however, a number of more basic considerations which suggest that even this dynamic approach towards evaluating the stabilising impact of official intervention with reference to the longer-term equilibrium trend of the exchange rate cannot be fully conclusive.

For one thing, it is by no means clear that the fairly smooth and continuous equilibrium path of the exchange rate depicted on pages 30–32 of the following section would have constituted an optimum path for the spot rate. For example, in the case of a sudden one-time change in fundamentals (other than inflation differentials), avoidance of wrong price signals could require a rapid and abrupt shift of the exchange rate to its new equilibrium level. And in the case of unchanged fundamentals but temporary disturbances, such as changing interest rate differentials, temporary divergence of the spot rate from the longer-term equilibrium path would be part of the equilibrating mechanism. Although intervention aimed at preventing such a temporary divergence can probably not be called destabilising with regard to spot rates, it might, because of its distorting impact on forward rates, not be very meaningful either.

Secondly, to the extent that intervention succeeds in affecting the spot rate, it may, through the resultant impact on the domestic inflation rate, also influence the equilibrium path of the exchange rate itself. By pushing the exchange rate away from its equilibrium path, intervention may thus to some extent pull along, straighten out and stabilise the equilibrium path of the nominal exchange rate. Or, in less abstract terms, if, by temporarily producing an overvalued exchange rate, intervention succeeds in preventing a vicious circle produced by the cumulative interaction of inflation and depreciation, it is doubtful whether this intervention should really be qualified as destabilising.

Thirdly – and this partly contradicts what was said here under point one – exchange rate movements in a world of pronounced uncertainties may tend to develop a momentum of their own with a resultant tendency to overshoot. It might therefore make sense for the authorities to "lean against the wind" and try to break this momentum even before the exchange rate has reached its preconceived equilibrium rate, although the "equilibrium rate reference criterion" would qualify such intervention as destabilising. Moreover, too rapid and abrupt exchange rate movements might tend to create such uncertainty among market participants as to jeopardise the orderly functioning of the market. In such a situation intervention that "leans against the wind" might be justified, even where the wind is blowing in the right direction, so to speak. In the present world of pronounced uncertainty, in which, consequently, psychological factors play a major rôle, these considerations are very important, and an effort has been made in the next section to strike a compromise between the "leaning against the wind" and the "equilibrium rate" criterion.

Fourthly, the official intervention pattern may be influenced by the demand for reserves. For example, when a country has spent a large part of its foreign exchange reserves on mitigating an excessive decline in its currency's exchange rate, it may be keen to exploit a sudden turn-round in the market situation in order to recoup some of its foreign exchange losses, even if at this point the currency is still undervalued. Here again, it may not be justified to qualify this behaviour – which might, if anything, tend to strengthen confidence in the country's currency – as destabilising.

All this amounts to saying that, even disregarding the imperfections of the data themselves, the results of the stability test of intervention presented in the next section can only be suggestive. Every situation will have its individual characteristics and there is certainly no universally valid optimal pattern of intervention. To arrive at more definite conclusions about the rôle of official intervention, therefore, each intervention episode would have to be studied individually, taking into account the full economic and

political background and the climate in the exchange markets. Nevertheless, in order to arrive at an overall view it may be useful to try a second-best approach.

III
Empirical evidence

In this section an effort is made to evaluate, along the lines suggested in Section II (namely with reference to an implied equilibrium path), the past performance of official intervention in the case of the Deutsche Mark, the pound sterling and the Japanese yen. These three currencies were chosen not only on the grounds of their international importance, but also because they are among the few real "free floaters".* The assessment of intervention in the case of currencies that are pegged to some other major currency or basket of currencies would be not very meaningful without studying the situation from a rather different angle, namely from that of the pros and cons of the particular currency arrangement as a whole. In such a system, the authorities may have to intervene even if they are acting against the basic trend and thus in a destabilising sense from a longer-term point of view. The relevant questions here would be whether concomitant micro and macro-economic costs outweigh the benefits of the short and medium-run stabilisation effect or not; this is certainly not the subject of the present paper.

Three alternative criteria are employed below.

Firstly, the simple "divergence from equilibrium" criterion, according to which intervention is considered to be stabilising (destabilising) when it tends to push the exchange rate towards (away

* Although the Deutsche Mark is a member currency of the European Monetary System, it works in effect as the key currency within that system. In other words, the intervention of the German authorities in the dollar market can generally be regarded as being independent of the Deutsche Mark's position within the system, with the other currencies being pegged to the Deutsche Mark. However, it is also true, as we shall see later in the section, that in certain situations the Deutsche Mark's membership of the EMS may reduce the relevance and validity of the criteria used in this paper.

from) its equilibrium path. Apart from the more fundamental weaknesses mentioned in the previous section, this method has one technical drawback: it ranks the stabilising effect of intervention in the same way whether this intervention occurs when the exchange rate is very close to (but not quite at) its equilibrium path or whether it occurs when the exchange rate is quite out of line. This may not be very satisfactory, since it could be argued that there was no need for intervention as long as the exchange rate was in any event quite close to what could be considered its equilibrium level. Moreover, since for any point of time this equilibrium level cannot be defined with certainty and exactitude, there will be a serious danger of mis-identification. For example, it would not be very convincing to classify as "stabilising intervention" dollar purchases that occur when, say, the exchange rate is quoted ¼ percentage point above its hypothetical equilibrium value, and to classify them as equally destabilising when the spot rate is ¼ per cent. below this level.

To make up for this deficiency, a second criterion is used which might be called "the weighted divergence from the equilibrium level" criterion. Here intervention is weighted by the amount of the divergence of the actual exchange rate at the time of intervention from its equilibrium path.* The advantage of this approach is that intervention that occurs at a time when the exchange rate is close to its equilibrium level is given little weight, which means that identification errors with regard to the equilibrium rate will not be so important as under the first criterion. Moreover, if the assumption holds good that intervention is likely to have a bigger impact on exchange rates when it occurs at a point in time when the exchange rate is clearly "out of line" in relation to its longer-term equilibrium

* It may be noted that this "weighted equilibrium criterion" comes close to the profit criterion insofar as it takes into account not only the sign of the divergence of the actual exchange rate from its equilibrium value, but also the distance from the equilibrium level (although only in logarithmic terms). The basic difference between the two criteria, however, is that the profit criterion uses a single exchange rate (adjusted or not adjusted for interest differentials) as the reference rate, whereas the weighted equilibrium criterion uses the implied equilibrium level at the time when intervention actually occurred as the reference point (see also Appendix).

level, this second criterion not only provides evidence as to whether official intervention has been in the right direction, but also allows fairly loosely for the effectiveness of official intervention. On the other hand, this weighted equilibrium, like the profit criterion, has the disadvantage that its results may be significantly distorted by the impact of intervention on the exchange rate. For example, starting with an exchange rate 15 per cent. away from its equilibrium level, a stabilising intervention that succeeded in pushing the exchange rate 10 percentage points closer to its equilibrium level would be given much less weight than an intervention that moved the exchange rate by only 2 percentage points. In more general terms, in the case of stabilising intervention, the weight given to it would be, ceteris paribus, in inverse proportion to the strength of the actual stabilising impact on the exchange rate and to the amount of intervention. In contrast, in the case of destabilising intervention, the criterion would work well, and the weight accorded to intervention would increase proportionately to the effectiveness of intervention in pushing the exchange rate away from its equilibrium level. This combination of an understating bias in the case of stabilising intervention and a normal bias in the case of destabilising intervention means that this second criterion, like the profit criterion (see pages 10–11), will tend to convey a too unfavourable picture of the stabilising (or destabilising) impact of official intervention.

To avoid some of the drawbacks of the preceding two approaches, a third criterion is used which will be called "hybrid" since it incorporates some elements of the "leaning against the wind" (LAW) criterion.* Applied indiscriminately, the LAW criterion runs very much counter to the general line of argument adopted in this paper, since it implies that the authorities take a rather "agnostic" view of the exchange rate, i.e. that they always view the prevailing exchange rate level as the best one and therefore consider that all exchange rate movements should be dampened if not suppressed. Applied

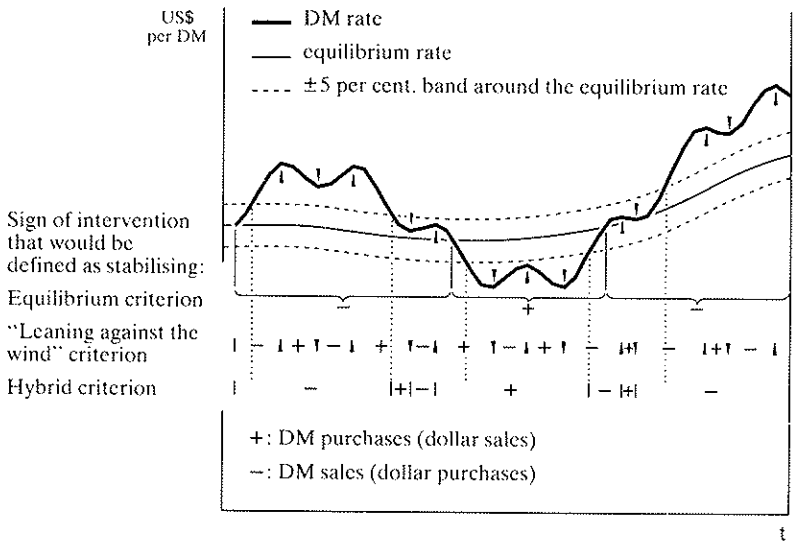
* According to the LAW criterion, intervention is defined as being stabilising when it tends to push the exchange rate towards the last observed level.

selectively, namely when the exchange rate threatens to move away from what is considered to be its equilibrium level, the LAW criterion can, however, make good sense, and will coincide with the equilibrium criterion. But there will be an outright conflict between the two criteria when the exchange rate is away from its equilibrium level to start with and tends to move back to it. The LAW approach would tend to delay this movement, whereas, according to the "equilibrium" criterion, intervention should, if anything, support this return to the equilibrium level. If the exchange rate is still far away from its equilibrium level, it should be quite clear, according to the line of argument adopted in Section I of this paper, that the "equilibrium" approach should prevail; but the closer the exchange rate gets back to its equilibrium zone the more the balance of the argument tends to shift in favour of LAW. For one thing, as already repeatedly stressed, the equilibrium level cannot be ascertained with exactitude, and there is therefore the possibility of misjudgement. And, secondly, there is the danger of the exchange rate movement acquiring a momentum of its own and therefore of overshooting. In order to obtain a smooth landing in the equilibrium zone, it might therefore be advisable to "lean against the wind" already somewhat before the hypothetical equilibrium level is reached.

Therefore, in order to take account of these considerations, the hybrid criterion distinguishes between two types of exchange rate zones. Firstly, a band around the hypothetical equilibrium rate within which the stabilising impact of intervention is judged according to the LAW criterion. And, secondly, the exchange rate zones outside this band, where official intervention is evaluated in terms of its impact in pushing the exchange rate towards, or away from, its equilibrium level. In theory, the width of the "leaning against the wind" band should be a function of the prevailing degree of exchange rate uncertainties and might therefore change over time. For practical purposes, however, in this paper a stable band of ± 5 per cent. around the hypothetical equilibrium level has been chosen.

Diagram 5 provides a graphical explanation of these various criteria.

Diagram 5 Graphical explanation of the criteria



Finally, for a proper understanding of the results of the tests it is necessary to say a few words about the nature of the data used.

The equilibrium path of the exchange rate has been computed as the 35-month moving average of the actual exchange rate level.* This eliminates the very violent short-run exchange rate fluctuations and smoothes out the large medium-term fluctuations that have been observed during recent years. The disadvantage of such a medium-term moving average lies in the fact that recent values of the equilibrium rate cannot be computed. To extend the test to more recent intervention periods, the forward exchange rates were used to calculate the recent path of the equilibrium rate. No attempt has been

* We also applied the same criteria using 13, 23 and 45-month moving averages and achieved generally similar results.

made to produce an estimate of the equilibrium level after mid-1982. The more basic weaknesses of using such a smoothed-out exchange rate path as a proxy for the equilibrium level of the exchange rate have already been discussed in the preceding section.

For official intervention, the actual monthly intervention figures were used in the German case. The proxy used in the case of the United Kingdom was the underlying movement of official reserves, i.e. movement of reserves after adjustments for valuation changes, SDR issues and the capital element of all public-sector, IMF and central-bank debt transactions. In the Japanese case, the balance of receipts and payments of the Foreign Exchange Fund was used. Although these proxies seem to reflect actual intervention rather well, it cannot be denied that they may be a source of some mis-assessment. But even if actual monthly intervention data were available, they would represent an abstraction and contain an element of arbitrariness. For example, such monthly figures would net out offsetting daily interventions carried out in order to maintain orderly market conditions. In this sense, even the two pure equilibrium criteria still contain some elements of a "leaning against the wind" strategy. Moreover, there is the problem of which exchange rates to associate with these monthly intervention figures. In this study the monthly average of the daily exchange rates of the respective month was used for the equilibrium criterion and, in the case of the hybrid criterion, for checking whether the exchange rate was within the ±5 per cent. band or not; when the exchange rate moved within the band, the change over the month was taken to see whether the intervention qualified as "leaning against the wind" or not. This may, however, give a biased picture when intervention is heavily concentrated on days when the exchange rates are quite different from the average for the month. Similar problems arise when the direction of the exchange rate movements on those days differs from that for the month as a whole.

The results of the survey are reproduced in the graphs on the following pages and summarised in the table on the next page, which gives the ratios between those interventions which, according to the

Summary of the assessment
(ratios of "stabilising" to "destabilising" interventions)

Country	unweighted 'equilibrium' criterion		weighted 'equilibrium' criterion		'hybrid' criterion		*Memorandum item: 'LAW' criterion*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Germany	1.85	1.83	2.41	2.47	6.11	5.78	*5.16*	*4.56*
Japan	1.67	1.72	4.13	4.17	6.00	5.62	*4.13*	*3.46*
United Kingdom	0.80	2.58	1.14	10.90	2.24	5.80	*4.08*	*3.87*

The figures shown in this table are the ratios of the sum of positive values to the sum of negative values as measured by the different criteria.
(1) January 1974 to June 1982. (2) March 1979 to June 1982.

respective criterion, were classified as stabilising and those that were classified as destabilising.*

This table suggests the following main conclusions:

(i) With only one exception, the various criteria suggest that in the period under review amounts of "stabilising" interventions significantly exceeded "destabilising" ones.

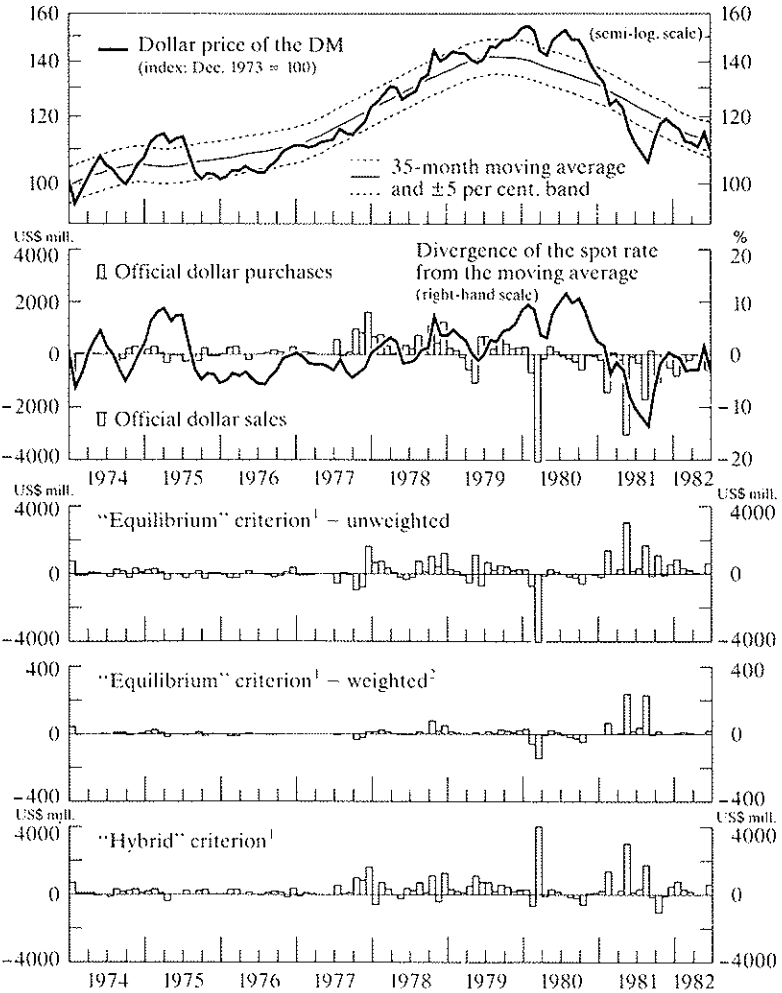
(ii) The best marks were given to official intervention by the hybrid criterion, which, as argued above, is probably the most realistic of the three criteria. It is, moreover, noteworthy that the hybrid criterion produced a more favourable evaluation than the pure LAW criterion (which, according to the line of argument adopted in this paper, would, in any event, not be the right criterion for judging the stabilising impact of official intervention). As regards the pure equilibrium criteria, the weighted one produced a significantly more favourable evaluation of official intervention than the unweighted one. This suggests that intervention in the "wrong" direction occurred mainly when the exchange rate was fairly close to its equilibrium level and/or that intervention in the "right" direction was concentrated on

* It should be noted that this summary table ranks official interventions simply from the point of view of whether or not they were in the right direction. There is no weighting on the basis of their effectiveness in actually influencing exchange rate movements.

Graph 1

Germany

Assessment of official intervention

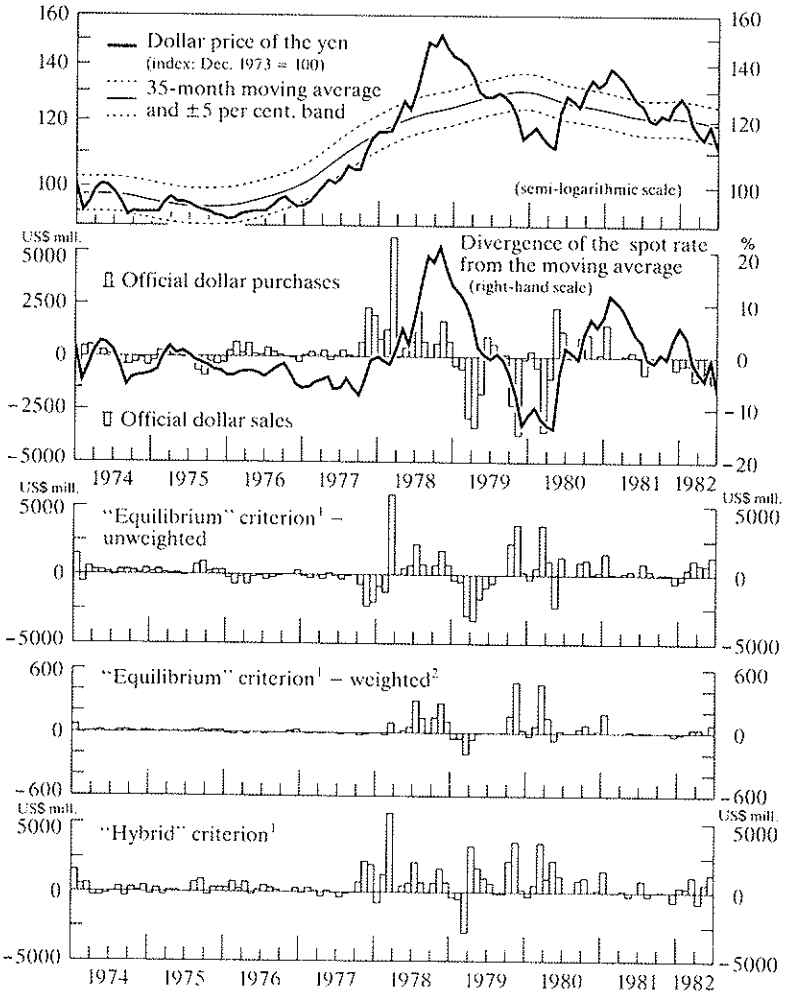


[1] A bar above the line indicates stabilising intervention, a bar below the line destabilising intervention. [2] The weighted "equilibrium" criterion is the product of intervention and the divergence of the spot rate from the moving average, expressed as a natural logarithm.

Graph 2

Japan

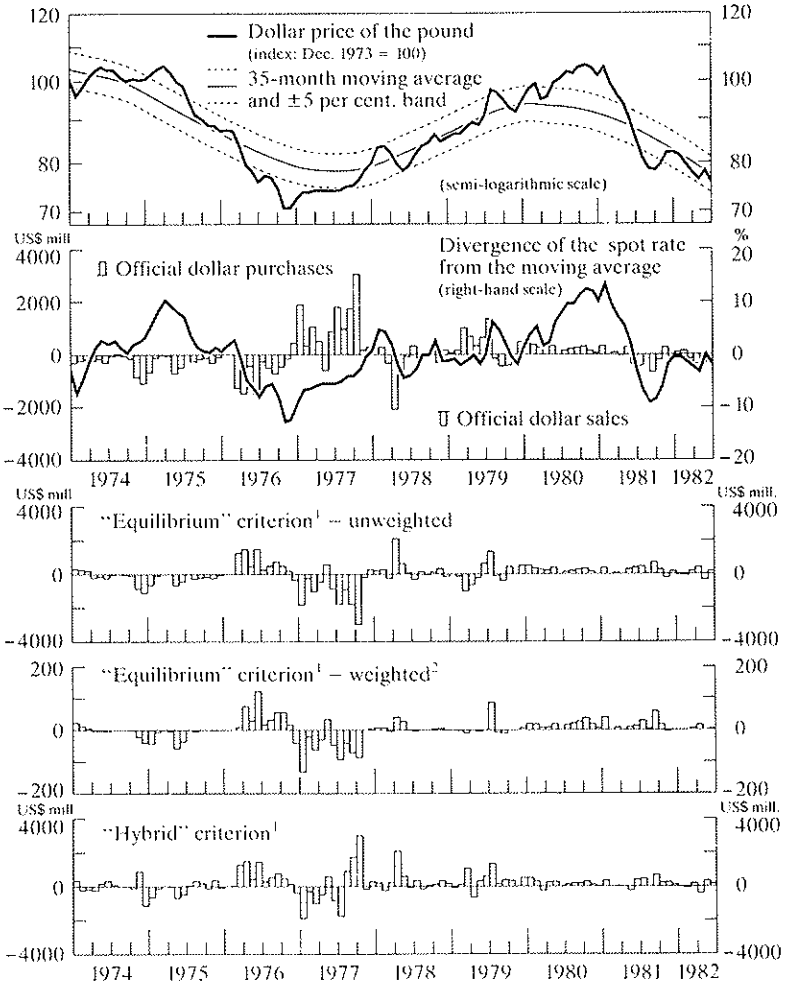
Assessment of official intervention



[1] A bar above the line indicates stabilising intervention, a bar below the line destabilising intervention. [2] The weighted "equilibrium" criterion is the product of intervention and the divergence of the spot rate from the moving average, expressed as a natural logarithm.

Graph 3 United Kingdom

Assessment of official intervention



[1] A bar above the line indicates stabilising intervention, a bar below the line destabilising intervention. [2] The weighted "equilibrium" criterion is the product of intervention and the divergence of the spot rate from the moving average, expressed as a natural logarithm.

periods when the exchange rate was quite out of line. The positive picture of official intervention conveyed by the weighted equilibrium criterion is all the more remarkable since, as argued on page 25 above, it tends to exaggerate the weight of destabilising intervention.

(iii) Comparing the sub-period from March 1979 (when the European Monetary System came into effect) to June 1982 with the total period under review, two main factors emerge: firstly, the generally better performance of official intervention in terms of the two equilibrium criteria, particularly in the case of sterling; secondly, the fairly sharp deterioration of the performance of the LAW criterion in relation to the other three criteria. This would seem to suggest that the authorities have become more selective in their intervention policies and that, instead of trying to suppress all exchange rate movements, they let themselves be guided more by the direction of the movements in relation to an implied equilibrium level or equilibrium range of the exchange rate. If that was the case, this would be in accordance with the philosophy advocated in this paper.

Turning to individual currencies, the only and partial exception to the overall positive picture of official intervention appears to have been *sterling*, for which over the period as a whole, according to the two equilibrium criteria, destabilising interventions equalled or barely exceeded stabilising ones. This negative result was, however, due only to the rather special developments in the aftermath of the near-collapse of sterling in autumn 1976. Thus, in 1977 UK official dollar reserves soared by $15.8 billion, although sterling was not to regain its longer-term "equilibrium level" until the end of the year. This very large reserve gain, however, has to be seen in the light of two special influences: firstly, heavy support of sterling during the preceding period of excessive weakness had led to a dangerous erosion of the official reserve position and it was thus quite understandable that the authorities should use a turn-round of the market to rebuild their reserve position. Secondly, boosted by the United Kingdom's emerging rôle as an oil exporter, the recovery of sterling proceeded with a speed and momentum that apparently gave rise to official fears that, unless counteracted, it might lead to

disorderly market conditions and overshooting in the opposite direction. Altogether, it may thus be very doubtful whether during this period the official rôle in the exchange market in 1977 was really as undesirable as the three criteria seem to suggest. And, in fact, in the following years the three criteria give UK official intervention policy the best grades. It can be seen from the table on page 29 that, for the period since March 1979, according to the hybrid criterion, stabilising interventions outnumbered destabilising ones in the ratio of nearly 11:1 and for the period from August 1977 to mid-1982 the results are similar.

In the case of the *Deutsche Mark* dollar intervention has been influenced to some extent by EMS considerations. Although the three criteria do not make allowance for this special factor, they all show, on balance, official intervention as stabilising, with such interventions, according to the hybrid criterion, outnumbering destabilising ones in a ratio of over 6:1. According to the graph, the most striking episode was the heavy intervention in early 1980 when, after its strong appreciation over the preceding years, the Deutsche Mark showed pronounced signs of weakness for the first time. The equilibrium criteria qualify this intervention as destabilising, whereas the hybrid criterion bestows good grades on most of it, and, in view of the sharp turn-round of the exchange rate that occurred immediately afterwards, one is indeed tempted to say that the hybrid criterion delivers the right message. Moreover, the heavy dollar sales during March 1980 were at least partly motivated by a bout of DM weakness within the European Monetary System.

Poor grades are given by all three criteria to the official support to the Deutsche Mark that was extended in autumn 1980, very much at the beginning of its long, steep decline. These DM purchases occurred at a point in time when the currency was still considerably overvalued in relation to its longer-run equilibrium rate and when the persistent deterioration of Germany's current-account balance had already suggested the need for an exchange rate correction. But here again, official behaviour was influenced by EMS requirements. Low German interest rates had, in the absence of the prospect of EMS

realignments, already led to a weakening of the Deutsche Mark's position within the system. With the sharp upturn of the dollar, the downward pressure on the Deutsche Mark within the EMS band strengthened and the Bundesbank intervened in both dollars and EMS member currencies to keep it above the lower intervention point. Similarly, the dollar sales in autumn 1981, a period when the dollar was in any case quite weak against the Deutsche Mark, were due to the need for temporary DM support within the EMS.

Turning finally to the *yen*, there was one episode during the more recent period when, according to all three criteria, official intervention did not exert a helpful influence. This was in early 1979 when the yen, after peaking out in late 1978, continued to go down sharply and the authorities intervened heavily to mitigate its decline even before the exchange rate was back near to its equilibrium level. However, in view of the steepness of the decline, it could be argued that this effort to prop up the yen at a fairly early stage was in the interests of maintaining orderly market conditions. Moreover, the official strategy has to be seen in the light of the macro-economic environment at the time. The downturn of the yen had coincided with the onset of the second oil crisis and the authorities were concerned that the depreciation of the yen would amplify the inflationary impact of the oil price hike and might trigger a "vicious circle" like the one experienced in the aftermath of the first oil shock. This is apparently also what the markets feared and, despite the fact that Japan's inflation rate was among the lowest in the world, the yen, in contrast to the Deutsche Mark and the Swiss franc, came under heavy speculative attack. The authorities were all the more intent on counteracting this attack since new wage bargaining was heavily concentrated in the spring and there was a threat that an excessive decline of the yen might set a wage spiral in motion.

That this danger did not materialise, wage increases were modest and domestic goods prices remained stable may have been due in part to the authorities' success in temporarily stabilising the yen rate during the spring and early summer of 1979. Here again, the three criteria might have passed too stern a judgement on official

intervention. Moreover, apart from this episode, intervention in the case of the yen, especially according to the weighted equilibrium and the hybrid criteria, was overwhelmingly of a stabilising nature.

In conclusion, it can probably be said that, although the three criteria used in this study may not represent the ultimate wisdom, they do, particularly if applied in combination with each other, provide a less arbitrary and more realistic evaluation than the naive profit criterion. Moreover, their results strongly suggest that official intervention was predominantly of the stabilising kind and thereby put the burden of proof on those who, under the slogan "the market always knows best", claim the opposite.

Appendix

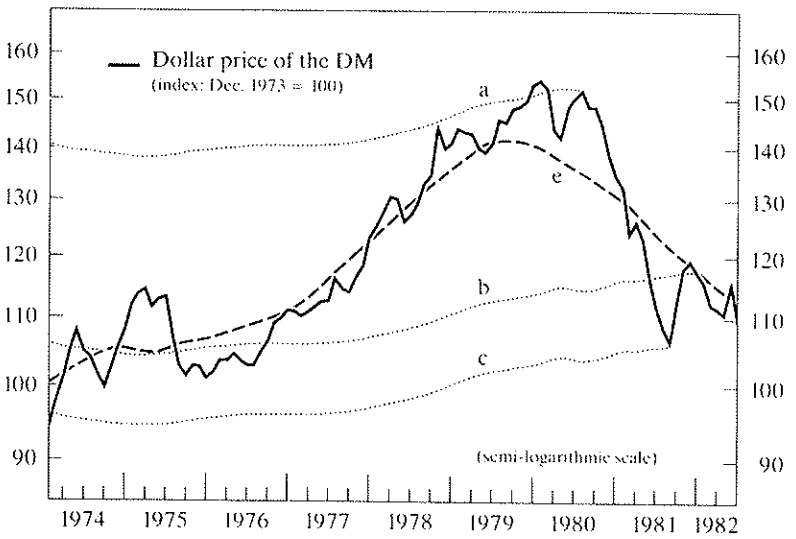
The graphs on the following pages illustrate the difference between the stability criteria used in this essay and the profitability criterion (adjusted for interest rate differentials*). For the application of the stability criteria, the 35-month moving average of the actual exchange rate has been used as the implied equilibrium path of the exchange rate (line c). For the profitability criterion, by contrast, there is a virtually infinite number of implied equilibrium paths (for which lines a, b and c are chosen as arbitrary examples), depending on the exchange rate chosen for the comparison. The slopes of these various equilibrium paths are determined by the (changing) interest rate differentials and are therefore identical. Ignoring interest rate differentials, the equilibrium path of the exchange rate implied by the profit criterion would simply be a flat straight line extending from the reference exchange rate to the left. This comes close to postulating a fixed exchange rate ex post (at the exchange rate level currently prevailing) and there is no allowance for shifts in the equilibrium level of the exchange rate which might have been caused by changes in the underlying fundamentals. It is,

* For the interest rate differentials used for these calculations, see the footnotes to the tables on pages 39–40.

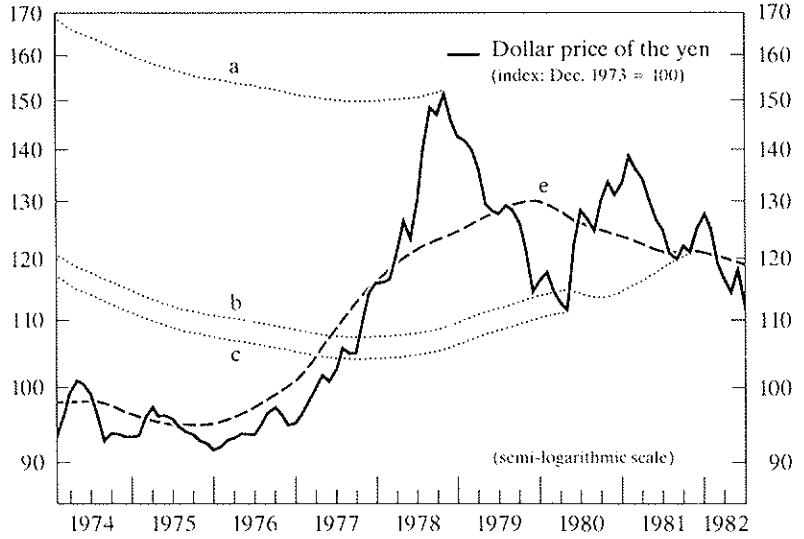
moreover, quite clear from the graphs that the realism of the profit criterion will depend very much on the reference exchange rate used for the comparison. In the case of the Deutsche Mark, for example, it is fairly obvious that equilibrium path b, based on an early 1982 exchange rate, is not quite as bad as paths a and e, based on mid-1980 and August 1981 exchange rates respectively. Using the mid-1980 exchange rate, for example, the profit criterion would imply that all DM purchases (=dollar sales) at a price lower than equilibrium line a would have to have been considered as stabilising – a policy recommendation which, if followed in 1977–78, would certainly have produced dire results.

Moreover, the fact that where the profitability criterion is applied there is a virtually infinite number of implied equilibrium exchange rate paths means that official intervention in a specified time period will be evaluated differently each time a new comparison is made. This point is illustrated by the tables on pages 39–40.

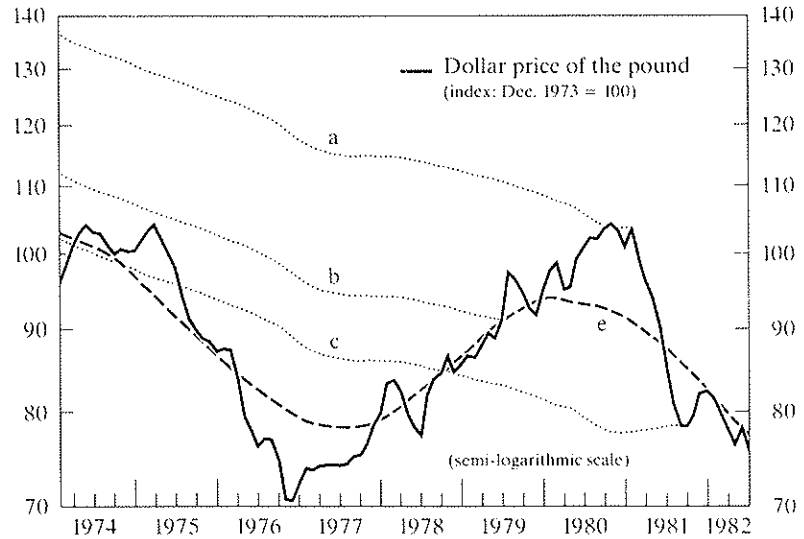
Germany



Japan



United Kingdom



Official intervention evaluated according to the profitability criterion
— in millions of dollars —

1. Exchange rate profits

Germany

Evaluated at the end of:	Interventions in: 1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	105								
Dec. 1975	87	18							
Dec. 1976	109	22	– 55						
Dec. 1977	137	27	–183	– 249					
Dec. 1978	176	34	–362	– 923	–502				
Dec. 1979	192	37	–438	–1209	–877	– 8			
Dec. 1980	156	30	–271	– 581	– 52	190	– 322		
Dec. 1981	120	24	–105	46	772	388	– 993	161	
June 1982	100	21	– 13	393	1227	497	–1364	–569	–84

Japan

Evaluated at the end of:	Interventions in: 1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	87								
Dec. 1975	70	– 16							
Dec. 1976	121	69	– 52						
Dec. 1977	406	543	– 635	– 262					
Dec. 1978	769	1145	–1377	–1729	–1663				
Dec. 1979	407	544	– 637	– 265	1435	– 910			
Dec. 1980	688	1010	–1211	–1402	– 971	1294	620		
Dec. 1981	548	777	– 924	– 834	231	193	643	189	
June 1982	310	383	– 439	126	2261	–1666	681	178	–242

United Kingdom

Evaluated at the end of:	Interventions in: 1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	30								
Dec. 1975	–487	–297							
Dec. 1976	–996	–745	–383						
Dec. 1977	–674	–461	377	–1152					
Dec. 1978	–469	–281	795	–2047	274				
Dec. 1979	–167	– 16	1469	–3367	527	–190			
Dec. 1980	87	207	2037	–4479	739	–468	–88		
Dec. 1981	–659	–449	369	–1215	115	349	465	132	
June 1982	–938	–694	–254	5	–118	655	671	31	–18

2. Profits adjusted for cumulative interest rate differentials*

Germany

Evaluated at the end of:	Interventions in:								
	1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	126								
Dec. 1975	108	19							
Dec. 1976	142	23	– 53						
Dec. 1977	188	28	–185	– 242					
Dec. 1978	248	35	–355	– 818	–428				
Dec. 1979	283	40	–428	–1034	–644	– 2			
Dec. 1980	243	37	–234	– 286	386	246	– 386		
Dec. 1981	196	33	8	652	1693	562	–1356	94	
June 1982	161	31	166	1253	2512	757	–1962	–818	–101

Japan

Evaluated at the end of:	Interventions in:								
	1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	126								
Dec. 1975	165	– 11							
Dec. 1976	268	125	– 94						
Dec. 1977	679	706	– 785	– 273					
Dec. 1978	1193	1431	–1648	–1738	–1540				
Dec. 1979	667	640	– 697	82	2382	–1191			
Dec. 1980	1185	1355	–1543	–1284	– 166	1112	693		
Dec. 1981	905	897	– 984	– 73	2667	–1202	808	282	
June 1982	448	211	– 160	1503	6059	–4073	873	298	–287

United Kingdom

Evaluated at the end of:	Interventions in:								
	1974	1975	1976	1977	1978	1979	1980	1981	1982 (first half)
Dec. 1974	90								
Dec. 1975	–313	–242							
Dec. 1976	–753	–595	–162						
Dec. 1977	–221	–167	890	–1278					
Dec. 1978	158	138	1684	–2645	334				
Dec. 1979	873	714	3151	–5174	778	–295			
Dec. 1980	1835	1488	5109	–8553	1371	–925	–185		
Dec. 1981	361	305	2613	–4147	549	142	488	154	
June 1982	–241	–177	1611	–2376	217	580	768	62	–17

* TB rate (USA) minus money-market loan rate (Germany), Gensaki (Japan), interbank deposit rate (UK), 3-month rates.