Intervention, stabilisation and profits[1]

It is sometimes argued that the measured profitability of intervention should be one factor in assessing whether intervention has exerted a stabilising influence in exchange markets. This idea stems from the everyday proposition that speculators make money by buying cheap in order to sell dear in the future, and by doing so tend to equalise prices through time. If, then, there is a shortage of private speculation, governments might make money and stabilise the exchange rate by intervention in the exchange market, provided they have a good idea of its future path. This article:

- *considers the circumstances in which this appealingly simple proposition might be valid;*
- *suggests that the notion of stability needs to be defined with care—a constant nominal exchange rate may not be the most appropriate standard against which to measure instability;*
- *investigates the likely consequences for profitability and stability of 'leaning into the wind', an intervention strategy used by the authorities in a number of countries.*

It has been suggested[2] that the authorities in major countries have made losses on their intervention in recent years. This article:

- *presents some illustrative calculations for the United Kingdom, which tend to suggest that profits have been made; but*
- *points to the difficulty of arriving at a satisfactory measure of the profitability of intervention.*

It concludes that profitability is unlikely to be a useful measure of the success of intervention.

Stabilisation and profits

A number of economists have considered whether the profitability of speculation in a market and the stabilisation of the price in that market are necessarily connected. Much of the analysis has been couched in very general terms, but its relevance to official operations in the exchange market has long been apparent. Friedman claimed in 1953 that 'people who argue that speculation is generally destabilising seldom realise that this is largely equivalent to saying that speculators lose money, since speculation can be destabilising in general only if speculators on the average sell when the currency is low in price and buy when it is high'. Although generally opposed to official intervention in the exchange market he conceded that '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'.

Other authors[3] have considered this question in the context of simple models of the exchange or other markets. In essence, the kind of model these authors had in mind might be represented as follows. Suppose that in the absence of speculation the exchange rate evolves in an erratic manner about a horizontal trend, as a result of the interplay of commercial supply and demand. Commercial transactors are defined as those who respond only to the current price of foreign exchange, whereas speculators buy foreign exchange with a view to selling later (or vice versa). Speculators will earn profits if they buy foreign currency when it is cheap and sell it when it is expensive. Speculators' profits are most easily measured when a series of such purchases and sales is complete (when net purchases of foreign exchange are zero).

Speculators' purchases and sales will move the rate from where it would otherwise have been. If speculators bought and sold at random they would tend to increase the variability of the exchange rate. (Their random demand would be added to the fluctuating demand from commercial sources.) It is only if speculators time their deals to offset fluctuations in commercial demand that their activities will stabilise the rate. If they tend to buy foreign exchange when it would otherwise be cheap and sell when it would otherwise be expensive they will smooth out the peaks and troughs in commercial demand and thus in the exchange

(1) This article is based on material offered to the Working Group on Exchange Market Intervention, which was established at the Versailles Summit in June 1982 to carry out a study of experience with intervention. The report of the Working Group was published in January 1983.

(2) Taylor, 1981 and 1982.

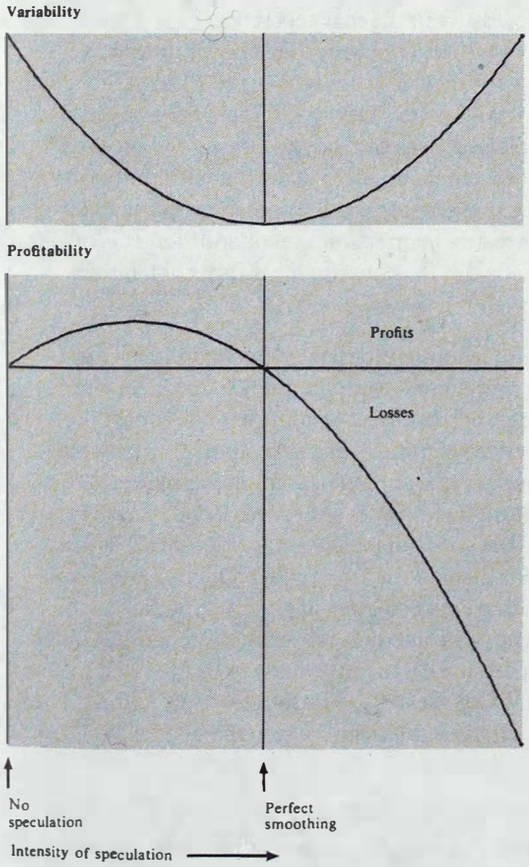
(3) Baumol, Farrell, Kemp, Telser, Schimmler.

rate's path. If their purchases exactly offset fluctuations in commercial demand the exchange rate will be perfectly smooth.

It is also necessary for speculators to time their deals in a similar way if they are to make a profit. Purchases and sales in themselves tend to move the exchange rate against those initiating the deal. If speculators bought and sold at random that factor would be enough to ensure that they made losses. (On average they would enter the market when the exchange rate was at its average level; but because their presence in the market would move the rate against them they would tend to buy foreign exchange at an above-average price and sell at a below-average price.) But if speculators show sufficient skill in buying foreign exchange when commercial demand is low and selling when commercial demand is high, they can make a profit.

There is thus a certain congruence between the requirements for smoothing and for profits. This is illustrated in the two panels of Chart 1. The upper panel shows how the variability of the exchange rate declines as speculation increases to offset an increasing proportion of fluctuations in commercial demand: beyond the point of perfect smoothing, speculation overcompensates for such fluctuations. The lower panel indicates the consequences for profits: these are at a maximum when smoothing is less than complete, and decline to zero when smoothing is perfect. Beyond that point, losses are incurred, even when the variability of the exchange rate is lower than in the absence of speculation.

Chart 1
The relationship between variability and profitability of speculation



It turns out, then, that (in the rather simple models considered by these authors) the requirements for profits[1] are more stringent than those for smoothing. If speculation in these models is profitable it will have reduced the variability of the rate. But the converse is not true; not all stabilising speculation will be profitable.

To put the point another way, absence of profits is not in itself evidence that speculation has been destabilising.

The chart demonstrates that if the speculator is a monopolist (say a central bank operating in a market otherwise consisting entirely of commercial transactors) profits are maximised at a point where variability in the rate is less than it would be in the absence of speculation, but where variability is not completely removed. If, however, speculation is a competitive activity profits will be competed away to leave a perfectly smooth exchange rate.

These models ignore receipts of interest on assets acquired by speculators and payments of interest on the financing of these assets. And they also ignore any connection between interest rates at home and abroad and movements in the exchange rate. An alternative model would be one in which movements in the exchange rate on average compensated holders of assets denominated in different currencies for the difference between the interest rates payable on those assets (ie one in which on average uncovered interest parity held). In such a model the exchange rate, after taking account of the interest differential, would fluctuate about a horizontal trend. There would be the same relationship between profits and stabilisation of the exchange rate (after taking account of the interest differential in both cases) as between profits and stabilisation in the simpler model without interest: profits imply stabilisation, but the converse is not true.

All the conclusions presented so far depend on a number of strong assumptions. One is that the exchange rate is determined as the price which clears the market in the *flow* of purchases and sales of foreign exchange. It would be more normal nowadays to consider the exchange rate as to some extent determined in the market for *stocks* of assets: in such a model there is no presumption that profitable intervention has been smoothing. In the asset model the exchange rate is stabilised if the reserves are high when commercial demand for foreign exchange is low. But profits are made (as in the flow case) if intervention is high (ie if the reserves are rising) when commercial demand for foreign exchange is low.

(1) Where more than one speculator is involved (say a private speculator and an official intervention agency) their profits and the contribution they make to the stability of the rate will depend not only on the scale of their transactions and the timing, relative to fluctuations in commercial demand, but also on the extent to which each speculator tends to buy or sell at the same time as the others. But in these simple models it remains true for each speculator taken separately that profits are evidence that his speculation has stabilised the rate.

Stabilisation and welfare

The simple models considered so far are built on the assumption that there is no underlying trend in the exchange rate. Perfect stability is equated with a constant nominal exchange rate, and stabilisation is defined in terms of reducing the variance of the rate. The connection between stabilisation in the narrow sense, and economic welfare in a general sense, remains an issue for consideration.

There are a number of difficulties with equating a greater degree of exchange rate constancy with improved welfare. One is that speculators could keep the nominal rate constant in defiance of fundamental factors, only to see a very large adjustment eventually. If instability were measured by variance, the rate would by judged to be perfectly stable until the adjustment occurred. The pattern could perhaps be repeated over time, so that instead of varying about some rising (or falling) trend, the rate evolved in a series of sharp jumps separated by periods of perfect stability. Which exchange rate path should be considered more stable?

One way of making a judgement on this question would be to assess the costs and benefits of one exchange rate path as against another in the context of a well articulated economic model. Among the costs might be increased uncertainty engendered by random fluctuations in exchange rates: additional uncertainty may well be a potent factor in reducing investment and entrepreneurial activity below their optimal level. To the extent that exchange rate fluctuations led to movements in relative prices which were temporary but not recognised as such, resources would be misallocated, with further welfare losses. And the re-allocation of income brought about by movements in the terms of trade can be important in reinforcing inflation, as sections of society seek to maintain, or restore, windfall gains. However, economic models are not sufficiently detailed, or reliable, to allow evaluation of these effects.

Simple criteria of stability probably have to be found, therefore. But these should at least recognise underlying trends in the exchange rate. One approach[1] to this is to construct a centred moving average of the exchange rate: deviations of the actual exchange rate from this are counted as evidence of instability. However, the length chosen for the moving average introduces an element of arbitrariness. To choose a one-week moving average would be to concentrate on smoothing out variations within the week: to choose a year as the horizon would be to give a particular, arbitrary set of weights to high frequency (say daily) and low frequency (quarter by quarter) fluctuations. The state of economic knowledge, however, does not permit a proper evaluation of the comparative costs of fluctuations of different frequencies.

Another possible simple criterion would be to regard variations of the exchange rate about the path suggested by some reliable econometric model as constituting instability. This would amount to the market-optimistic assumption[2] that the exchange rate produced by fundamental economic forces was the one most likely to promote economic welfare. But reliable models of the exchange rate do not exist (and large or persistant divergences of the exchange rate from the path suggested by a model would certainly cast doubt on the continued validity of that model). The conclusion to be drawn is that although a constant nominal exchange rate may not provide an appropriate standard of stability it is not easy to identify any other against which to measure instability.

It is important to note, however, that if the standard of stability is not a constant nominal rate then there will be no necessary connection between profitability and stabilisation of the exchange rate around the chosen standard.[3] Profits will continue to depend on matching purchases of foreign exchange with below-average commercial demand, and sales with above-average commercial demand. Stabilisation by contrast will depend on matching purchases and sales with an *ex ante* price of foreign exchange below or above the chosen standard.

Leaning into the wind

In practice the authorities are unlikely to have a confident view of the future exchange rate. Given their uncertainty as to whether pressure in the markets reflects a fundamental movement, or will be reversed, they may at times have recourse to a strategy of 'leaning into the wind'. Under such a strategy the authorities buy or sell their currency as its international value falls or rises, according to how large the *ex ante* movement appears to be, but without totally offsetting the movement, and without attempting to offset persistent pressure in one direction or another. It is of interest to consider the consequences for profit and for stability of such a strategy.

The essence of leaning into the wind is that intervention depends on present and (because it takes some time to recognise market pressures) to some extent on past pressure on the exchange rate. But it can take many forms, with greater or lesser resistance being offered to market pressures, and for shorter or longer periods. The effect of leaning into the wind on profits and stability will depend on the particular form of the strategy which is adopted, and the relationship between market pressure on the rate in successive periods (whether, for example, a period of high or upward pressure on the rate tends to be followed by more of the same, or by pressure in the opposite direction). There can be no guarantee that leaning into the wind will be stabilising or profitable.

In the simple models considered earlier (flow models with no trends in the underlying exchange rate) leaning into the

(1) See, for example Wonnacott.

(2) If the exchange rate model were embedded in a fuller model it could, of course, still be possible to assess the welfare consequence of choosing to drive the exchange rate away from that which fundamentals alone would produce.

(3) Except where the trend allowed for in the exchange rate reflects or is reflected by interest differentials, and profits are measured after interest.

wind will often be stabilising. If, for example, pressure in successive periods tends to be rather similar it will do little harm to pay attention to recent pressure as a guide to current intervention, but where pressure in successive periods tends to be in opposite directions, an intervention strategy which gives too much positive weight to past pressure may be destabilising. In these models the general proposition on profitability and stabilisation holds for leaning into the wind as for all other intervention strategies. In these models, if leaning into the wind is profitable it will be stabilising, but unprofitable leaning into the wind can also be stabilising.

In the stock model (still with no underlying trend in the exchange rate) leaning into the wind again may or may not be stabilising. (In this case stabilisation will depend on whether past pressure is a good guide to the appropriate level of the reserves, as well as on the precise form of leaning into the wind adopted.) Some delay in responding to commercial pressure might well lead to profits. Stabilisation in this model would require that the authorities sell foreign exchange when commercial demand is rising and that they buy foreign exchange when commercial demand is falling. An intervention strategy which led them to sell foreign exchange after commercial demand had been rising (ie when the price of foreign exchange was high) and which led them to buy foreign exchange after commercial demand had been falling (ie when the price of foreign exchange was low) would tend to be profitable. Thus, as in the general case considered earlier, in a stock model the profitability of leaning into the wind is not an indicator of stabilising intervention.

Simple models with no underlying trend are not perhaps the most important cases in which to consider leaning into the wind. More significant are cases in which there is a trend, and the authorities' objective is to stabilise the exchange rate around that trend. A strategy of leaning into the wind may tend to smooth out short-term fluctuations (again depending on the particular strategy adopted and the nature of fluctuations in the underlying rate in successive periods). But a strategy which prevents large-scale cumulative intervention in one direction or another will by the same token prevent the exchange rate being taken far from its longer-term trend. But here again stabilisation around a trend has no necessary connection with profits, except where that trend is systematically reflected in the international interest rate differential, and profits are measured after interest.

Measuring the profitability of intervention

The report of the Working Group on Exchange Market Intervention considered various definitions of intervention. In the illustrative calculations which follow, intervention is defined very broadly—as the balance for official financing in the UK balance of payments. It represents the underlying change in the UK official reserves, after taking account of borrowing in support of the reserves, including borrowing by public sector bodies under the exchange cover scheme. It is not suggested that this is the only or even the best possible definition; but in the absence of any reliable models of exchange rate determination it is difficult to draw a hard and fast distinction between those official transactions which influence the exchange rate and those which do not.

The use of the flow of currency into and out of official hands as a measure of intervention is consistent with the flow approach to exchange rate determination. This amounts to saying that, if the authorities keep their reserves constant (and with constant composition) in foreign currency terms, there will be no effect on the exchange rate. If, instead, the exchange rate was thought to be determined by asset stocks available to private participants, it would be necessary to concentrate on official transactions which altered those stocks in a non-neutral[1] way, and thus affected exchange rates.

Most of the calculations presented here cover the period from late 1977 (after attempts to cap the exchange rate were abandoned) to end–1982. They are based on published monthly dollar figures for total intervention (the balance for official financing) which are displayed in the second panel of Chart 2. The purpose of the calculations is to compare the sterling cost of net acquisition of dollars by the UK authorities over a run of months with the sterling value of those dollars at the end of the run of months. Calculations are made including and excluding interest (the interest paid on the sterling used to finance purchases of dollars, and interest earned on dollar assets bought). In more detail:

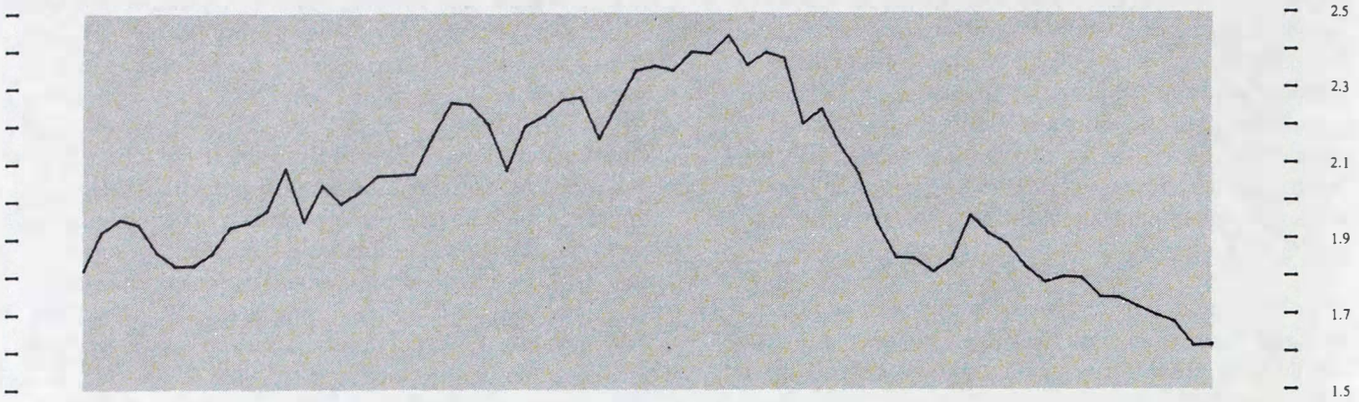
(a) An estimate is made of the sterling capital used to purchase dollars over a number of months. This estimate is derived by dividing intervention in each month by the average sterling/dollar rate during that month, and summing the resulting series. This is shown as 'Cumulative sterling capital employed in intervention' in the third panel of the chart; the figure shown for any month represents the capital employed in intervention from November 1977 to the month in question.

(b) The value of the dollars bought over the same period of months is calculated. The cumulative total of intervention from November 1977 to the month in question is converted at the exchange rate ruling at the end of the month in question. This is shown as the 'sterling value of cumulative intervention' in the third panel of the chart.

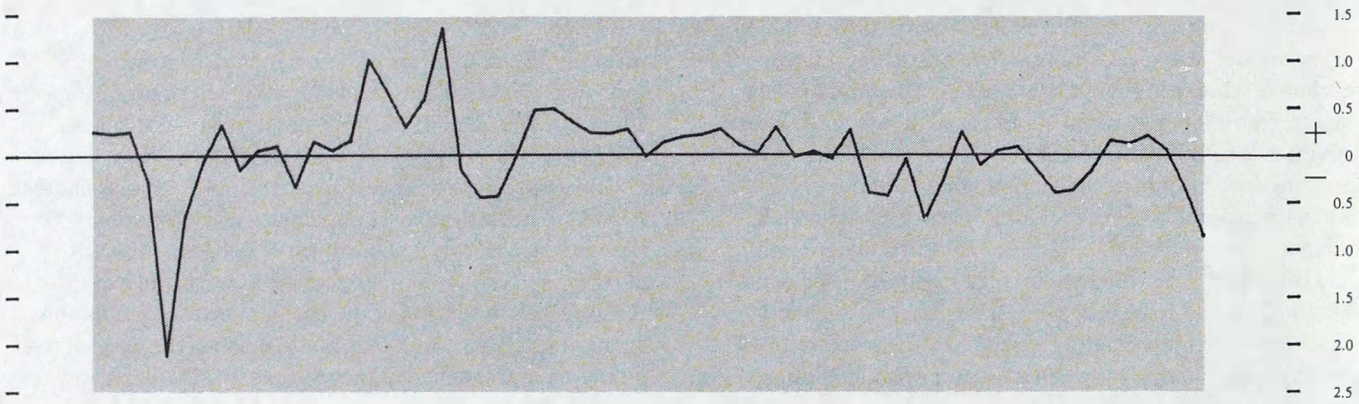
(c) Cumulative dealing profits (without interest) are simply calculated as the difference between (b) and (a). They are shown in the fourth panel of the chart. Profits including interest take account of the interest received on dollar assets and the sterling cost of funding the capital employed, using representative one-month sterling and dollar interest rates.

(1) For example, so long as interest payments are predominantly an early repayment of capital, it is neutral to keep interest receipts in the currency of the debt to which they relate.

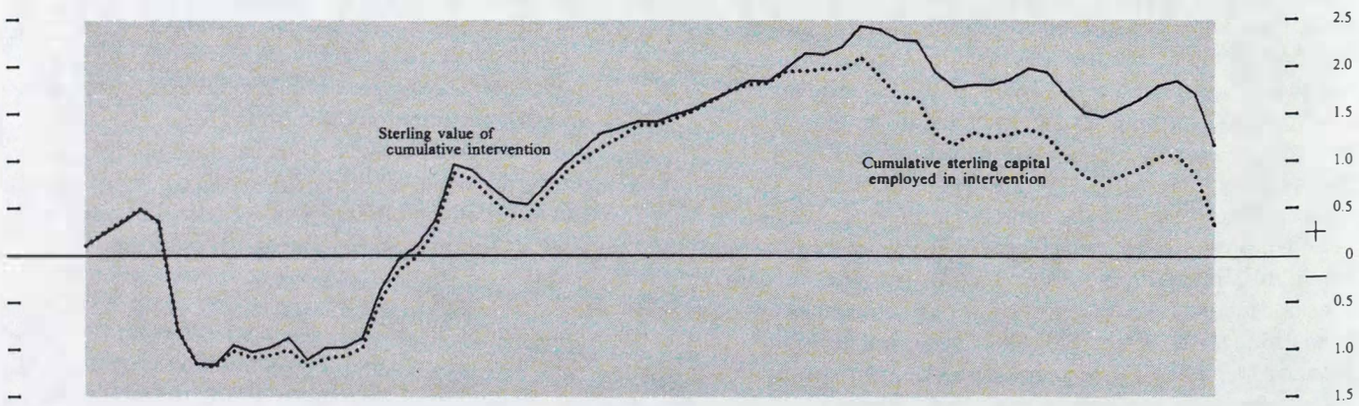
Chart 2
Profitability of intervention: illustrative calculations
Sterling/dollar exchange rate



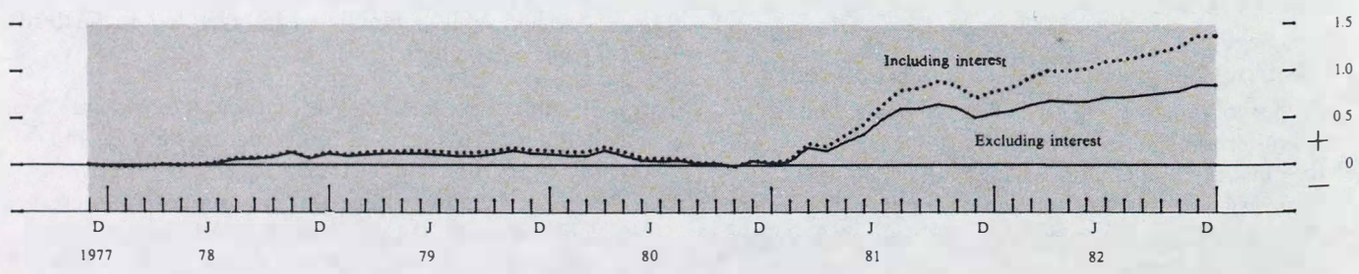
Intervention (balance for official financing) — $ billions



Cumulative intervention — £ billions



Cumulative profit — £ billions



The calculation thus assumes:

- That all intervention is in dollars.
- That intervention is evenly spread through the month; this is unlikely to be the case.
- That there is no profit or loss from deals within the month (calculations based on individual deals or on a periodic inventory of assets and liabilities would be needed to measure such a profit or loss).
- That net purchases over the period could be closed out at the exchange rate observed at the end of the period.

The last assumption is particularly troublesome. It amounts to assuming that intervention does not affect exchange rates at all, and it will tend to bias the calculated profits upwards in any period when there has been net intervention (positive or negative). If intervention does indeed influence the exchange rate, closing out an official position would tend to move the rate against the authorities. If they have acquired dollars over a period, selling those dollars would drive the dollar down, and receipts from the sale would be less than the value put upon them in the profit calculations.

No such problems arise in periods where net intervention has been zero; in fact there are no periods of months in the span of time considered in these calculations when net intervention is exactly zero but a number of periods are shown in Table A in which net intervention was small and the problem of valuing it correspondingly minor. For most of these periods (some of which overlap) the calculations suggest that profits were indeed made.

Where net intervention is not zero the calculation of profit will be much influenced by the exchange rate which happens to rule at the end of the period covered. Consider a period in which net intervention is positive, followed by one of no net intervention. Cumulative intervention in the first period will be valued at the rate ruling at the end of the first period. The same net intervention will be carried forward to the end of the second period and cumulative intervention over the two periods combined will be valued at the rate ruling at the end of the second period. If, in the meantime, the price of foreign currency has risen intervention will appear to have become more profitable; if it has fallen intervention will appear to have become less profitable.

Table A
Profitability of intervention[a] over periods when positions are approximately closed out
£ millions

	Excluding interest			Including interest		
	Cumulative intervention	Cumulative sterling capital	Profit	Cumulative intervention	Cumulative sterling capital	Profit
	1	*2*	*1–2*	*3*	*4*	*3–4*
Period covered (months are inclusive)						
Nov. 1977–Apr. 1979	– 40	–158	118	–117	–263	146
Apr. 1980–Aug. 1982	3	–241	244	267	–101	368
May 1980–Apr. 1982	– 2	–226	224	193	–118	312
Aug. 1980–Nov. 1981	10	–152	162	108	– 98	206
Nov. 1980–July 1981	– 22	– 82	61	6	– 67	73
Mar. 1978–Oct. 1979	118	– 78	196	– 14	–268	253
June 1978–Nov. 1978	– 24	– 22	– 2	– 21	– 19	– 2
Aug. 1979–Aug. 1982	371	29	342	769	259	510
May 1980–Nov. 1981	242	43	199	399	144	255
Oct. 1980–July 1981	136	38	98	187	67	120
Oct. 1981–Mar. 1982	– 31	– 35	4	– 32	– 37	5

(a) Converted into sterling using the dollar/sterling rate at the end of the relevant period.

Table B
Profitability of intervention—alternative calculations
£ millions

	Excluding interest			Including interest		
	Cumulative intervention	Cumulative sterling capital	Profit	Cumulative intervention	Cumulative sterling capital	Profit
	1	*2*	*1–2*	*3*	*4*	*3–4*
Intervention:						
Jan. 1976–Oct. 1976 inclusive						
Valued at exchange rate ruling at:						
End-Oct. 1976	–4,245	–3,728	–518	–4,339	–3,902	–437
End-Aug. 1982	–3,921	–3,728	–193	–7,778	–8,048	270
End-Dec. 1982	–4,163	–3,728	–435	–8,538	–8,329	–209
Nov. 1976–Oct. 1977 inclusive						
Valued at exchange rate ruling at:						
End-Oct. 1977	6,479	6,866	–386	6,610	7,039	–429
End-Dec. 1982	7,369	6,866	503	14,289	13,655	634

Some effects of this kind can be seen in Chart 2. Intervention through 1978, associated with support for sterling, shows a small profit by the end of 1978 at market rates. In 1979 and 1980, the rebuilding of the reserves as the dollar fell against sterling wiped out this profit by October 1980. In the subsequent period, the dollar regained ground against sterling, making this substantial switch into dollars look extremely profitable by the end of 1982. These findings are thus dominated by changes in the observed exchange rate as the period under review is altered: changes in the value of large stocks accumulated far outweigh later transactions.

Intervention in the most recent period shown (from July 1982) appears to show a small profit following official action to smooth the downward adjustment of sterling. The dramatic change in results which is produced by taking a longer view of earlier investment should act as a warning against judging the final profitability of recent intervention on this basis, however.

Table B attempts to indicate more directly the sensitivity of these calculations to the choice of period. Thus, between January and October 1976 intervention to support sterling appeared to make a substantial loss of over £400 million (including interest): if, however, there had been no further dealings, and that accumulated position had been run on to December 1982 and then liquidated at market rates, the loss would have been reduced to about £200 million. If the position had been deemed to be closed in August 1982, the result would have been a profit of close to £300 million. Similarly, the rebuilding of the reserves during the year after the sterling crisis of October 1976 would have made an

unrealised loss of over £400 million by October 1977: if the position had been held till December 1982 the unrealised loss would have been turned into a profit of over £600 million.

These estimates are of value chiefly in illustrating how sensitive calculations of this type are to the choice of period, and of closing exchange rate. In general, there is some evidence that intervention as defined here has tended to yield profits, most convincingly perhaps in periods of nearly zero net intervention. However, the whole tenor of the earlier argument should prevent any simple conclusions being drawn from this finding.

Conclusions

The arguments presented in this paper suggest that profitability alone is unlikely to be a useful measure of the success of intervention. Even if stabilisation of the nominal exchange rate is taken to be the aim, considerable doubt has been thrown on the notion that there is a precise connection between any profit earned by intervention and the contribution it may have made to stability (quite apart from the problem of measuring profit in an unambiguous way). Intervention, as is argued in the broader context of the report of the Working Group on Exchange Market Intervention, is in any event unlikely to have any substantial or long lasting impact on the exchange rate unless combined with policy changes. And in practice the pursuit of exchange rate stability will rarely be the only aim of national authorities. They will have other, possibly conflicting, aims—a reflection of the many interests that have to be balanced within government policy. There may often, for example, be a choice between instability in the exchange rate and in domestic interest rates. Any mechanical assessment of intervention and exchange market stability will have to be interpreted with great care against this background.

References

Baumol, W J 1957. 'Speculation, profitability and stability.' *The Review of Economics and Statistics*, 39 (1), pages 263–71.

Farrell, M J 1966. 'Profitable speculation.' *Economica*, 33 (129), pages 183–93.

Friedman, M 1953. 'The case for flexible exchange rates.' *Essays in Positive Economics*, pages 157–203.

Johnson, H G 1976. 'Destabilising speculation: a general equilibrium approach.' *Journal of Political Economy*, 84 (1), pages 101–8.

Kemp, M C 1963. 'Speculation, profitability, and price stability.' *The Review of Economics and Statistics*, 45 (1), pages 185–9.

McCormick, F 1979. *A simple model of the welfare effects of central bank intervention in the foreign exchange market.* Board of Governors of the Federal Reserve System, International Finance Discussion Paper No. 147.

Salant, S 1974. *Profitable speculation, price stability and welfare.* Board of Governors of the Federal Reserve System, International Finance Discussion Paper No. 54.

Schimmler, J 1973. 'Speculation, profitability, and price stability—a formal approach.' *The Review of Economics and Statistics*, 55 (1), pages 110–14.

Taylor, D 1981. *The mismanaged float.* Mimeo for the Carolina Currency Conference.

Taylor, D 1982. 'Official intervention in the foreign exchange market, or, bet against the central bank.' *Journal of Political Economy*, 90 (2), pages 356–68.

Telser, L G 1959. 'A theory of speculation relating profitability and stability.' *The Review of Economics and Statistics*, 41 (1), pages 295–301.

Wonnacott, P 1982. *US official intervention in the exchange market for DM.* University of Maryland Working Paper 8210.