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## Exchange-market interventions and monetary policy: the German experience

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Working Paper No. 111

Exchange-Market Interventions and Monetary  
Policy: The German Experience

by  
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Exchange-Market Interventions and Monetary Policy:  
The German Experience.

The intervention policy of the German Bundesbank after 1973 has been subject to several studies (Artus 1976, Branson, Halttunen, Masson 1977, Vaubel 1979, Black 1980, Dornbusch 1980). The present paper deviates from the previous studies insofar as different sources of changes in the Bundesbank's net foreign position (interventions in the context of the European exchange-rate arrangement ("snake"/EMS), interventions in the DM/dollar-market, and transactions outside the exchange markets) are analysed separately. In the second part of the paper we examine to what extent changes in the Bundesbank's net foreign position have contributed to the deviations from the monetary target in 1975 - 78.

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+ The author wishes to thank the Deutsche Bundesbank for providing additional data on interventions in the DM/dollar-market and on transactions outside the exchange market.

I. The Intervention Policy of the German Bundesbank  
1973-80

The Bundesbank publishes data on its exchange-market interventions not on a daily basis but only for longer and variable periods of which the shortest is two weeks and the longest six months<sup>1</sup>. In its statistics the Bundesbank distinguishes between interventions in the context of the European exchange-rate arrangement and interventions in the DM/dollar-market (interventions against other currencies have played no role). Reserve changes due to transactions outside the exchange market are listed separately.

Chart 1 shows the cumulative changes of the Bundesbank's net foreign position and its components since March 1973<sup>2</sup>.

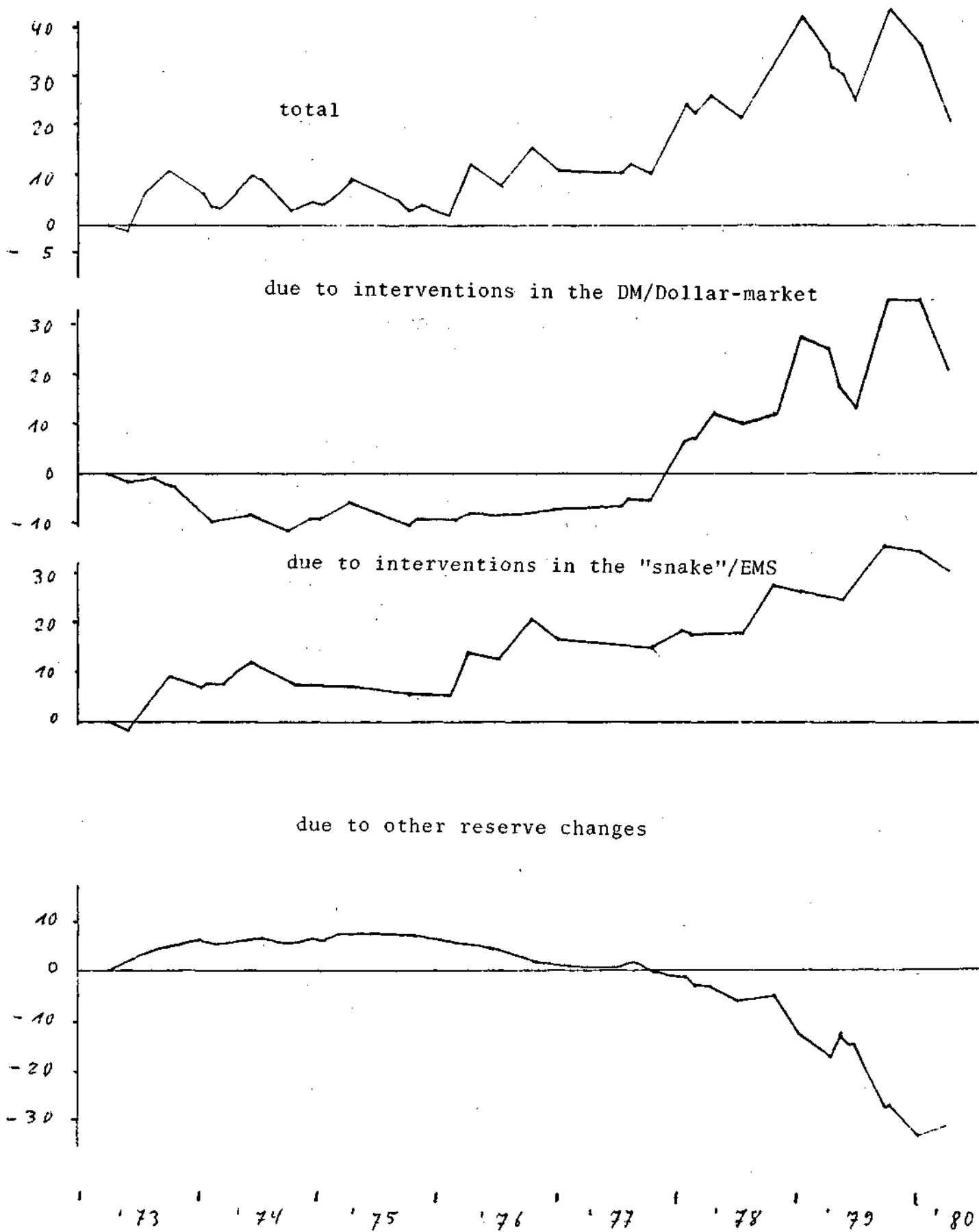
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<sup>1</sup> See table A in the appendix. In most cases the periods have been chosen in a way that subperiods with mainly equally directed reserve changes have been taken together.

<sup>2</sup> Excluding changes due to valuation adjustments.

The changes in the Bundesbank's net foreign position which are due to interventions also comprise interventions by other monetary authorities in which the Bundesbank participated indirectly, e.g., by giving a DM-credit to another central bank which, then, used this credit to support its currency in the exchange market.

Chart 1: Cumulative Changes in the Bundesbank's Net Foreign Position since End of March 1973 (bill. DM)



Three features are clearly brought out by the Chart:

First, from March 1973 to April 1980 the Bundesbank has accumulated a substantial amount of foreign reserves (total 21,6 bill. DM).

Second, this increase in the Bundesbank's net foreign position has been exclusively the result of interventions; transactions outside the exchange market ("other" changes) even led to a considerable loss of reserves in the 1973-80 period.

Third, since the outbreak of the dollar crisis in autumn 1977 changes in the Bundesbank's net foreign position have been more pronounced than in the preceding period.

To give an impression of the relative importance of the several components, an indicator of "reserve use" (Williamson 1976, Suss 1976) has been calculated. Table 1 shows the sum of reserve changes (irrespective of their sign) for each component<sup>1</sup>.

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The values in table 1 are smaller than the overall interventions, as the data which are provided by the Bundesbank do not refer to all sales and purchases of foreign currency but only to the balance of sales and purchases in the respective periods.

Table 1: The Intensity of "Reserve Use"

Period	Sum of absolute changes in the Bundesbank's Net Foreign Position <sup>a</sup> (bill. DM) due to		
	interventions in the DM/Dollar market	interventions in the "snake"/EMS	other reserve changes
April 1973 to April 1980	116,8	80,9	70,7
April 1973 to Sept. 1977	31,0	47,1	22,2
Oct. 1977 to April 1980	85,8	33,8	48,5

<sup>a</sup> irrespective of the sign of the change; calculations are based on the figures in table A.

As can be seen, the strongest influence on the Bundesbank's net foreign position in the 1973-80 period came from interventions in the DM/dollar-market. This result is mainly due to the development since autumn 1977, for in the preceding period (March 1973 to September 1977) interventions in the "snake" had been dominating. A remarkable phenomenon is the increasing importance of transactions outside the exchange market. In the period from October 1977 to April 1980 these transactions led to an even stronger "use" of reserves than the interventions in the European exchange-rate arrangement.

We shall now turn to the development of the several components of the Bundesbank's net foreign position in more detail.



Interventions in the Context of the European  
Exchange-rate Arrangement

When the adjustable-peg system of Bretton Woods finally collapsed in March 1973, the currencies of the "snake" members started to float jointly against the other currencies. The participating countries were the Benelux-countries, Denmark, France (from March 1973 to January 1974 and from July 1975 to March 1976), Germany, Norway (until December 1978) and Sweden (until August 1977). When the EMS was introduced in March 1979 France, Ireland and Italy joined the group of participating countries.

The cumulative changes of the Bundesbank's net foreign position due to interventions in the "snake" respectively the EMS show the typical pattern for a strong-currency country in an adjustable-peg system (Chart 2). Periods with relatively small exchange-rate changes and moderate interventions (as 1975, the first half of 1977 and the first half of 1978), are followed by periods with heavy revaluation-pressure on the D-Mark and large increases in the Bundesbank's foreign reserves resulting from either direct interventions by the Bundesbank or from credits which the Bundesbank gave to other member countries via the European Monetary Cooperation Fund (EMCF). Chart 2 shows that large inflows of reserves finally led to an appreciation of the D-Mark<sup>1</sup>.

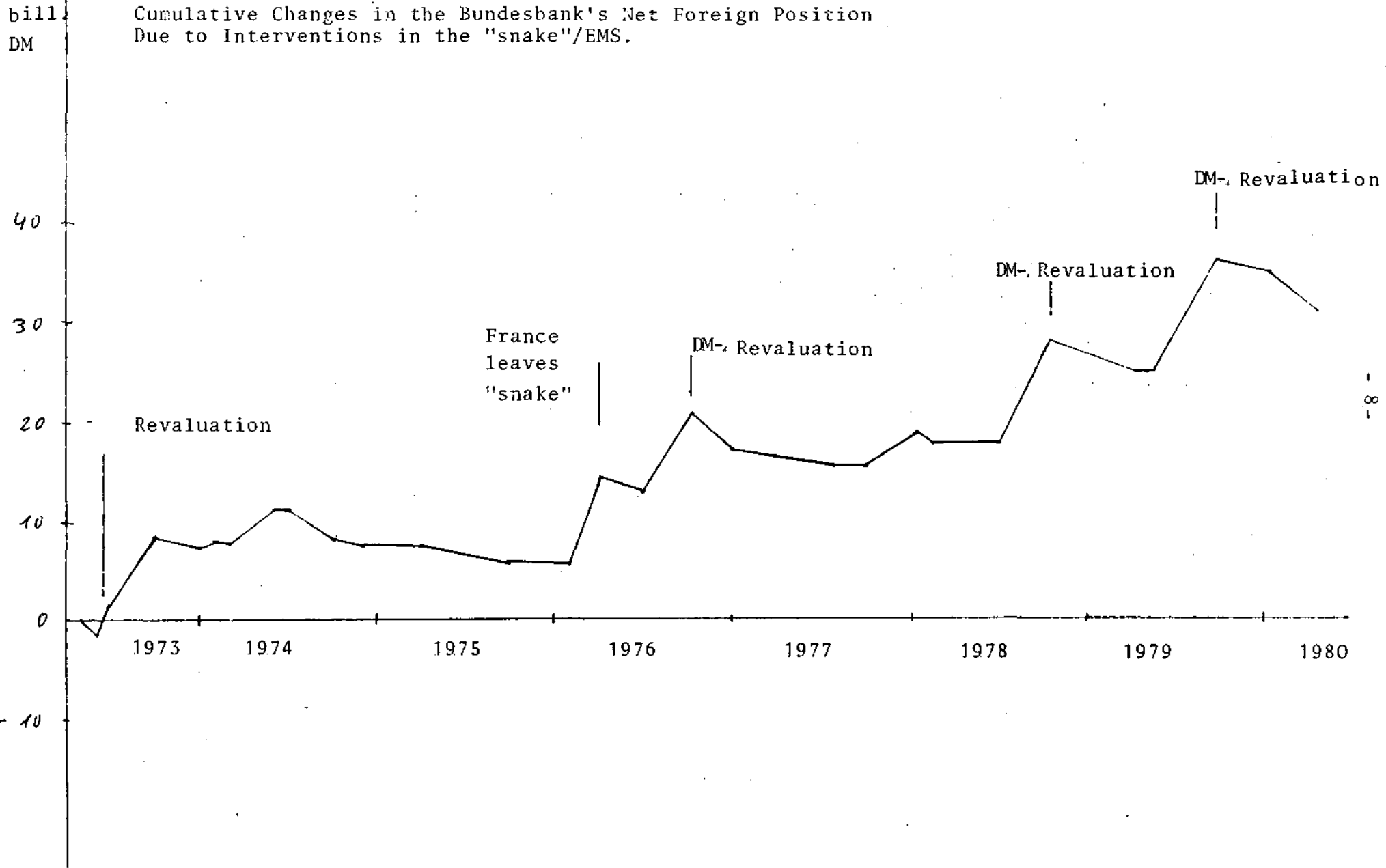
It should be noted that the size of the reserve inflow which preceded the appreciation of the D-Mark shows an increase over time. While the revaluation of June 1973 was preceded by a reserve inflow of 4 bill. DM, the respective amounts were 8 bill. DM in autumn 1976<sup>2</sup>, 10 bill. DM in

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<sup>1</sup>When France left the "snake" in March 1976 this step also led to an appreciation of the D-Mark against the French Franc.

<sup>2</sup>The inflow of reserves that took place before France left the "snake" in March 1976 has been of a similar size (8.8 bill. DM).

Chart 2



autumn 1978 and 11 bill. DM in autumn 1979<sup>1</sup>.

With the exception of the DM-appreciation in June 1973, when the change in central rates did not lead to an immediate reduction of revaluation pressure on the D-Mark, the appreciations of the D-Mark were followed by a reduction in the Bundesbank's stock of foreign reserves<sup>2</sup>. This outflow, however, has always been smaller than the preceding inflow of reserves, so that on balance interventions have led to a stepwise increase in the net foreign position. The total increase from April 1973 to April 1980 amounted to more than 30 bill. DM.

The observation that the Bundesbank experienced large inflows of reserves before the DMark was finally revalued indicates that there have been considerable delays in the adjustment of central rates in the "snake" (see also Vaubel 1979).

The introduction of the EMS has not led to more timely adjustments. The strong inflow of reserves in autumn 1979, which was larger than previous inflows in the "snake", even suggests that the EMS has worsened the chances for undelayed parity adjustments.

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<sup>1</sup> See Table 1; the figure for the increase in reserves preceding the appreciation in June 1973 cannot be seen from the table; it is taken from a statement of the German Minister of Finance (see: Deutsche Bundesbank 1973, p.1).

<sup>2</sup> A substantial part of this outflow results from the repayment of credits which other central banks had received from the Bundesbank under the EMCF arrangements.

### Interventions in the DM/Dollar Market

As the DM/dollar rate is officially floating since March 1973 the Bundesbank is not obliged to intervene in the DM/dollar market. Still interventions in this market have been considerable and even stronger than the interventions under the adjustable-peg system of the "snake" or the EMS (see table 1).

According to the Bundesbank (1978 a, p.48) the objective of these interventions has been to smooth fluctuations in the DM/dollar exchange rate. In the following we shall examine whether this attempt has been successful<sup>1</sup>.

Interventions in the DM/dollar market can be regarded as stabilizing if two conditions are met (Lehment 1980, Ch. 4):

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<sup>1</sup>In this paper we shall not discuss the question whether exchange-rate oriented interventions are appropriate from a general point of view as they may lead to violations of internal policy targets; to this point see, e.g., Lehment (1980, Ch. 3).

- (a) interventions have not been "aggressive"<sup>1</sup>,
- (b) the Bundesbank's purchases and sales of reserves resulting from interventions in the DM/dollar market have balanced over time.

Condition (a) implies that interventions have not intensified exchange-rate fluctuations (destabilizing interventions). Condition (b) - which goes back to Johnson (1939, p. 73) - implies that the Bundesbank has not intervened against the trend.

In order to make precise statements on whether or not the Bundesbank has intervened aggressively one would require data on daily interventions (in cases where the direction on the exchange-rate movement changed during a day figures for even shorter periods would be necessary). Since data on interventions are, however, only published for longer periods an evaluation of the Bundesbank's intervention policy is subject to some degree of uncertainty.

Chart 3 shows the exchange rate of the dollar against the DM and the cumulative changes of the Bundesbank's net foreign reserves caused by interventions in the DM/dollar-market<sup>2</sup>.

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<sup>1</sup>The Bundesbank would have intervened aggressively if it had purchased dollars when the dollar was appreciating and had sold dollars when the dollar was depreciating; see the IMF-guidelines for countries with floating exchange rates (IMF 1974, p. 203).

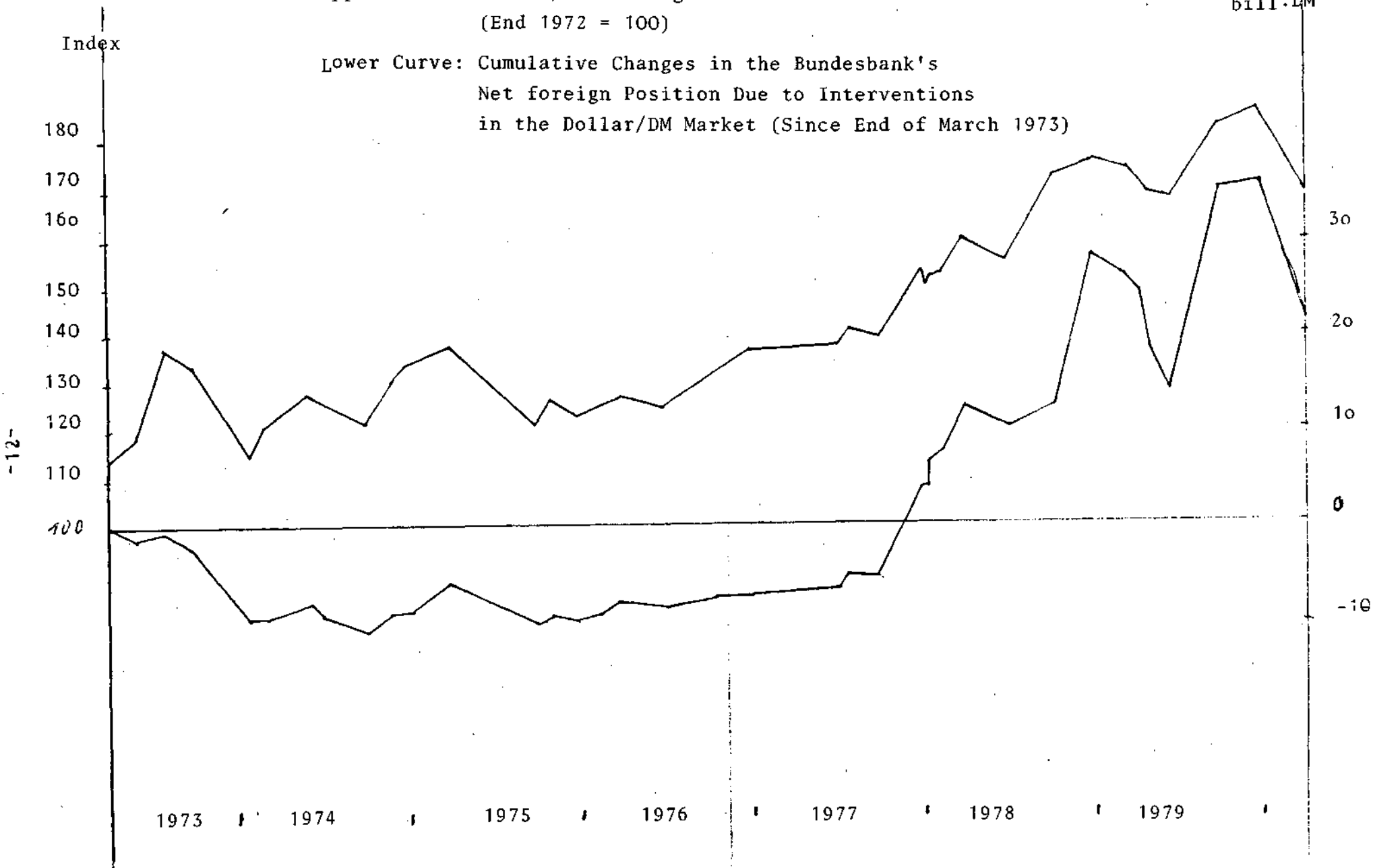
<sup>2</sup>In drawing Chart 3 we made use of the information that the increase of the net foreign position in the first half of January 1978 resulted exclusively from interventions in the second week (see Bundesbank 1978b).

Chart 3: Dollar/DM Rate and Changes in the Bundesbank's Net Foreign Reserves

Upper Curve: Dollar/DM Exchange Rate Index  
(End 1972 = 100)

Lower Curve: Cumulative Changes in the Bundesbank's  
Net foreign Position Due to Interventions  
in the Dollar/DM Market (Since End of March 1973)

bill. DM



A comparison of the two curves shows that an appreciation (depreciation) of the D-Mark went along with an increase (decrease) of the Bundesbank's reserves in nearly all periods. The only exception is the development in April/May 1973; during this period there was a net sale of dollars although the D-Mark appreciated against the dollar.

This result, however, is not a clear evidence for "aggressive" interventions. The comments which the Bundesbank gives in its weekly reports rather indicate that in April/May 1973 the Bundesbank pursued an asymmetrical "leaning-against-the-wind" (LAW) policy by selling a substantial amount of dollars during the slight appreciation of the dollar in April, while purchasing only relatively small amounts of dollars when the dollar depreciated in May - an asymmetry that can be explained by the huge increase of the Bundesbank's reserves in February/March 1973 during the last phase of the Bretton-Woods-System.

A comparison of the two curves in Chart 3 also shows that changes of the dollar/DM-rate and changes in reserves have been quite symmetrical from summer 1973 until to the outbreak of the dollar-crisis in autumn 1977. This observation is confirmed by the result of the following regression for the period August 1973 to September 1977<sup>1</sup>.

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1. The regression which should mainly serve to support the visual impression has to be treated with care; since it is based on periods of different length there is no time dimension. Thus, asymmetry in the present context implies that the Bundesbank reacts to a one percent appreciation in the same way as to a one percent depreciation irrespective of whether the changes in the exchange rate take place within two weeks or within several months.

$$\Delta \text{NFP}^{\$} = 0.0025 + 0.345 \Delta e^{\$/\text{DM}}$$

(1.302)      (9.28) <sup>+</sup>

$$\bar{R}^2 = 0.81 \quad \text{D-W} = 1.44 \quad \text{S.E.} = 0.0.87$$

with:  $\Delta \text{NFP}^{\$}$  = changes in the Bundesbank's net foreign reserves due to interventions in the DM/dollar market (in bill.DM)

$\Delta e^{\$/\text{DM}}$  = percentage-point change in the Dollar/DM rate

t-values are given in parentheses; <sup>+</sup> indicates significance at the 1 percent level.

The remarkable high explanatory content of the equation indicates that the Bundesbank's interventions in the DM/dollar market have been relatively symmetrical in the period under consideration: a revaluation (devaluation) of the DM against the dollar by one percentage point led to interventions in the DM/dollar-market which caused an increase (decrease) of the Bundesbank's net foreign position by an average amount of 0.35 bill.DM<sup>1</sup>.

If the regression is run for the period from October 1977 to April 1980 the explanatory content of the equation worsens considerably:

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<sup>1</sup>This result is very similar to the results obtained by Artus (1976) and Black (1980). It should be noted, however, that these results are not directly comparable, since the present calculation (a) covers a different period and (b) is restricted to reserve changes which are caused by interventions in the DM/dollar-market only whereas Artus and Black consider all reserve changes. Moreover, Black's calculations are not based on the bilateral DM/dollar rate but on an effective exchange rate for the DM.



$$\Delta \text{NFP}^{\$} = 0.309 + 1.09 \Delta e^{\$ / \text{DM}}$$

(0.19)                      (3.51)<sup>+</sup>

$$\bar{R}^2 = 0.45 \quad \text{D-W} = 2.71 \quad \text{S.E.} = 6.08.$$

It is striking that the coefficient of the independent variable is about three times as high as the coefficient in the regression for the preceding period. This indicates that "leaning-against-the-wind" in the DM/dollar market has become stronger in the recent years - a result that may to a substantial degree be due to the increasing interventions by the U.S. monetary authorities<sup>1</sup>.

The substantially lower explanatory content of the regression for the period after October 1977 may be due to the fact that the Bundesbank (and possibly also the U.S. monetary authorities) intervened in a relatively asymmetric fashion because of a stronger consideration of exchange-rate targets for the dollar. If one regards, e.g., the development of the two curves in Chart 3 from autumn 1977 to autumn 1978, one can see that the Bundesbank's reserves increased relatively strongly during the

<sup>1</sup> If U.S. authorities use their credit facilities with the Bundesbank to support the dollar, this leads to an increase in the Bundesbank's reserves which is counted as an "reserve change due to interventions in the DM/dollar-market".

the periods in which the dollar depreciated, whereas they declined only slightly in early January and in the second quarter of 1978 when the dollar appreciated. This asymmetrical behavior could be explained in the way that the Bundesbank regarded the fall of the dollar as excessive and, therefore, intervened relatively heavily, whereas the recovery of the dollar was regarded as a movement towards a more adequate exchange-rate level and dampened only to a very small degree<sup>1</sup>.

Since there is no evidence for aggressive interventions it can be argued that the Bundesbank's interventions in the DM/dollar market have not contributed to the fluctuations of the dollar rate in the 1973-80 period. This result, however, does not imply that the interventions have been stabilizing. For - according to the second condition - this will only have been the case if the reserve inflows and outflows of the Bundesbank have balanced over time. If one regards the development of the Bundesbank's foreign reserves in Chart 3 under this aspect, only the interventions up to autumn 1977 can be classified as stabilizing.

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<sup>1</sup> Swoboda (1979, p. 37) finds that since the transition to a floating DM/dollar-rate German authorities have on average leaned more heavily against a rise than against a fall in the D-Mark. Dornbusch (1980, p. 43) presents evidence for an effect of macroeconomic conditions on the level of German intervention policy: "With higher unemployment authorities use intervention to slow down real dollar depreciation ....with high inflation unanticipated dollar depreciation is opposed less strongly.....".

From autumn 1977 to Mid-April 1980 the interventions in the DM/dollar market have not balanced but have led to a considerable net increase in the Bundesbank's reserves so that part of the interventions must - at least so far - be classified as interventions against the trend. These interventions will only turn out to have been part of a stabilizing operation if the Bundesbank sells the additional reserves at a later point of time in order to dampen an appreciation of the dollar. Finally, it should be noted that interventions in the DM/dollar market do not only affect the DM/dollar rate but also the exchange rate of the D-Mark vis-a-vis the other "snake"/EMS currencies.

Thus, there is the possibility of mutually offsetting interventions in the separate markets. This may, e.g., happen if the Bundesbank on the one hand purchases D-Mark in order to dampen an appreciation of the dollar and on the other hand sells D-Mark in order to moderate an upward pressure on the D-Mark in the "snake"/EMS (which results from or is enforced by the interventions in the DM/dollar market). Such offsetting interventions can be observed in 11 out of the 38 periods listed in table A. They were especially pronounced in August/September 1973 and May/June 1979 when the interventions in the DM/dollar market led to a decline in the Bundesbank's foreign reserves by 1.6 bill. DM respectively 4.1 bill. DM while the interventions in the "snake"/EMS caused an inflow of reserves by an amount of 4.3 bill. DM respectively 2.3 bill. DM.

The role of "other" reserve movements

Those changes of the Bundesbank's net foreign reserves which are not due to interventions in the exchange markets consist of several quite different components:

- interest receipts on foreign assets; in 1979 these receipts reached an amount of about 6.2 bill.DM;
- inflows of reserves that result from conversions of dollars by allied forces in West-Germany;
- transactions which the Bundesbank carries out for the government and other official institutions (e.g. payments to the EC);
- outflows of dollars due to conversions through the Bundesbank of foreign D-Mark bonds and of notes and credits raised by foreigners; the fact that the Bundesbank explicitly mentions these transactions in its annual reports for 1978 and 1979 indicates that the importance of this component has increased in the last years;
- inflows and outflows of reserves that result from swap-operations with domestic banks; these operations have reached considerable amounts since March 1979 (see Bundesbank 1979, p. 57);
- repayments of swap credits which the U.S. monetary authorities have received from the Bundesbank and which are settled with D-Mark that the U.S. authorities have acquired through other transactions than interventions in the DM/dollar market;

- a reduction of the Bundesbank's net foreign position which results from the fact that U.S. authorities deposit part of the receipts from the issue of DM-bonds ("Carter-bonds") at the Bundesbank. Such an operation is similar to a restrictive open-market operation by the Bundesbank (with the difference that the Bundesbank's balance sheet does not show a reduction in assets but instead an increase in liabilities).

Chart 4 shows that reserve changes which did not result from exchange-market interventions made a negative contribution to the Bundesbank's foreign reserves in the period 1973-80, the main reason being the large outflow of reserves under this category since autumn 1977. This outflow was in the order of about 31 bill. DM and was higher than the inflow of reserves due to interventions in the DM/dollar market during the same period<sup>1</sup>. The loss of net foreign reserves caused by "other" transactions was most pronounced in 1979 when it amounted to 21 bill. DM.

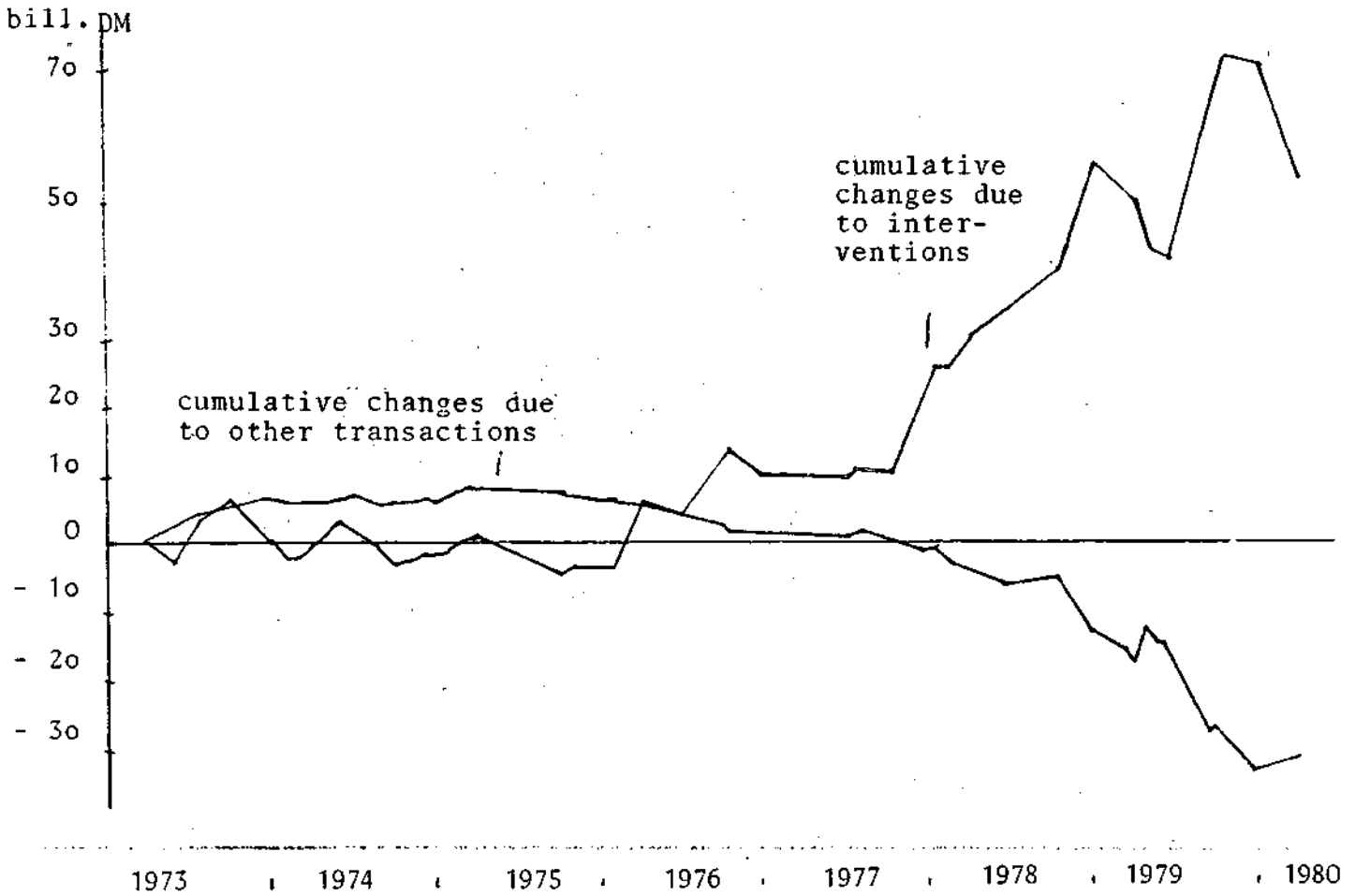
This development can be explained by three factors<sup>2</sup>:

- additional reserve outflows due to transactions for official institutions;
- larger conversions of foreign D-Mark bonds through the Bundesbank, and - probably most important -
- reductions in the Bundesbank's net foreign position which indirectly resulted from the additional intervention

<sup>1</sup>On balance, however, the Bundesbank's net foreign position increased considerably in this period as the Bundesbank also experienced a large inflow of reserves through intervention in the "snake"/EMS.

<sup>2</sup>Swap operations with domestic banks have not contributed to this loss of reserves in 1979; on balance they even led to a slight increase in the net foreign position (Bundesbank 1979, p. 57).

Chart 4: Cumulative Changes of the Bundesbank's Net Foreign Position Due to Interventions and Other Transactions Since March 1973



activity of the U.S. monetary authorities: on the one hand the U.S. authorities received D-Mark credits from the Bundesbank which they used for outright-interventions in the exchange market to support the dollar and which led to increases in the Bundesbank's net foreign reserves "due to interventions in the DM/dollar market"; on the other hand, the U.S. authorities settled a large part of these credits through transfers of D-Mark which they had acquired outside the exchange market (e.g., by the issue of "Carter-bonds") and which, hence, led to reserve losses "due to other transactions".

Chart 4 clearly shows the divergent movement of the intervention components and the "other" components of the Bundesbank's net foreign reserves - a divergence that can to a large degree be attributed to the specific way in which the U.S. authorities settle their liabilities with the Bundesbank. It should be noted, however, that the divergence only holds for the longer run. A short-run analysis shows that reserve changes caused by interventions and reserve changes caused by "other" factors have an opposite sign only in 13 out of the 38 subperiods in table A. It is, however, remarkable that an opposite sign is present in almost all cases in which the intervention-induced reserve changes have been relatively large<sup>1</sup>.

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<sup>1</sup>As can be seen from table A such an opposite sign appears in 5 out of 6 subperiods in which the intervention-induced reserve changes have been above 8 bill. DM.

This observation indicates, that in some cases the Bundesbank may have tried to neutralize the effect of the interventions on the monetary base not only through opposite movements of the domestic component of the monetary base (see the following part of this paper) but also through measures which - like swap operations - led to offsetting changes in net foreign reserves<sup>1</sup>.

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<sup>1</sup> Thus, in March/April 1979 interventions in the exchange market caused a decline in the Bundesbank's foreign reserves by 8.3 bill. DM while at the same time swap-operations with domestic banks added 4.7 bill. DM to foreign reserves. A similar - although reverse - development took place in the period from June to September 1979 when interventions raised reserves by 27.4 bill. DM whereas swap operations lowered reserves by 5.3. bill. DM (see Deutsche Bundesbank 1979, p. 57).



## II. Exchange Market Interventions and the Monetary Target

Interventions in the exchange market which lead to a change in the Bundesbank's net foreign reserves also affect the German monetary base. Empirical investigations for the Bretton-Woods-period, however, show that the Bundesbank neutralized the effect of its interventions on the monetary base to a very large extent through offsetting changes in the domestic component of the monetary base (Willms 1971, Herring, Marston 1977) - a policy that was continued also after March 1973. Chart 5 shows the quarterly changes of the Bundesbank's net foreign position (excluding changes due to valuation adjustments and new allocations of SDR<sup>1</sup>) and the quarterly changes of the domestic component of the extended monetary base<sup>2</sup> in the period 1973 II to 1980 I. As can be seen from the chart, changes in the net foreign.

<sup>1</sup> These changes are excluded as they lead to changes of the net foreign position which do not affect the monetary base.

<sup>2</sup> The extended monetary base  $B^e$  is defined as

$$B^e = B + B^r$$

with  $B$  = monetary base

$B^r$  = cumulative changes of minimum reserves since 1960 due to changes in reserve ratios (see Andersen, Jordan, 1968).

The changes of the domestic component of the monetary base

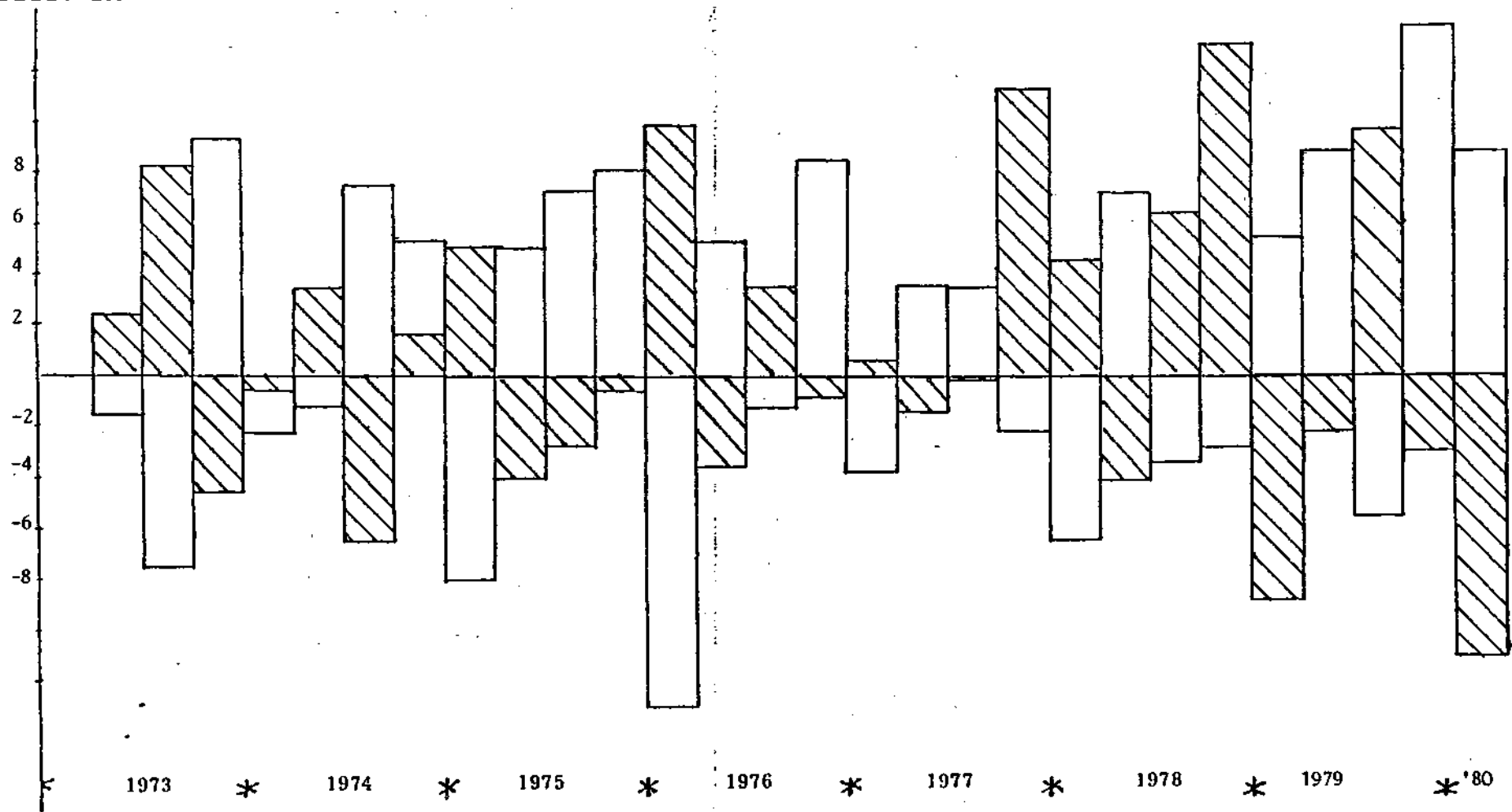
$\Delta B^I$  are calculated as:

$$\Delta B^I = \Delta B^e - \Delta NFP$$

with  $\Delta NFP$  = change in the net foreign position (excluding changes due to valuation adjustments and new allocations of SDR).

Chart 5: Changes in the Net Foreign Position (shaded) and in the Domestic Component of the Extended Monetary Base

bill. DM



Source: Deutsche Bundesbank, Monthly Reports; own calculations.

position and changes in the domestic base component have an opposite sign in 26 out of 28 quarters. This indicates that the effect of exchange-market interventions and other reserve changes on the monetary base has nearly always been neutralized by domestic policy measures (open-market operations, discount policy, minimum-reserve changes etc.)

Information on the strength of the neutralization policy can be obtained from the following regression<sup>1</sup>:

$$\begin{aligned} \Delta B^I &= 2.84 - 0.94 \Delta NFP - 5.76 S1 + 5.91 S4 \\ &\quad (5.28)^+ (22.92)^+ \quad (9.40)^+ \quad (8.63)^+ \\ RHO &= 0.39 \quad \bar{R}^2 = 0.96 \quad D-W = 2.44 \quad S.E. = 1.44 \\ &\quad (2.25) \end{aligned}$$

S 1 and S 4 are seasonal dummy variables for the first and the fourth quarter. The regression exhibits a significant negative relation between changes in the net foreign position and changes in the domestic component of the extended monetary base. In the period from 1973 II to 1980 I the Bundesbank on average sterilized 94 per cent of an in - or outflow of foreign reserves through off-setting domestic policy measures<sup>2</sup>.

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<sup>1</sup>Estimated with the Cochran-Orcutt transformation to account for autocorrelation of residuals.

<sup>2</sup>A similar result is found by Branson, Halttunen, Masson (1977) for the period 1974-76.

This sterilization coefficient is somewhat higher than the respective coefficients which have been found in investigations for the Bretton-Woods-period<sup>1</sup> - a result which indicates that the Bundesbank's neutralization policy has been more pronounced since the transition to a floating DM/dollar rate<sup>2</sup>.

Next we shall consider the question to which extent the exchange-market interventions have led - despite the sterilizing operations - to deviations from the Bundesbank's monetary target.

Since December 1974 the Bundesbank has regularly announced for the following year a monetary target which is stated in terms of central bank money as defined by the Bundesbank. This monetary aggregate which shows a similar behavior as M3 differs from the monetary base insofar as

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1

Willms (1971) obtains a coefficient of 0.86 for the period 1958-70; Marston, Herring (1977) find a coefficient of 0.91 for the period 1960-71.

2

It should be noted, however, that neutralization policies do not only offset the effect of exchange-market interventions on the monetary base. They also reduce the effect which the interventions have on the exchange rate - and may, thus, give rise to a new round of interventions and sterilizing operations.

- bank's deposits at the Bundesbank which consist of excess reserves or of minimum reserves on deposits of non-domestic residents are excluded;
- minimum reserves on deposits by domestic residents are calculated on the basis of constant reserve ratios<sup>1</sup>.

For each of the years 1975 to 1978 the Bundesbank had announced an increase of central bank money by 8 per cent<sup>2</sup>. For the years 1979 and 1980 the Bundesbank announced a target range of 6 to 9 per cent respectively 5 to 8 per cent for the growth of central bank money (fourth quarter as against the fourth quarter of the previous year). While the Bundesbank stayed within the target range in 1979 and - at least so far - in 1980, there have been substantial deviations from the target in the years 1975 to 1978. Thus, central bank money increased by 10 per cent in 1975, by 9.2 per cent in 1976, by 9.0 per cent in 1977 and by 11.4 per cent in 1978.

Table 2 shows the quarterly increase of central bank money for the period 1975-78 (seasonally adjusted, annual rates). If the announced increase in central bank money is distributed evenly over the quarters of the respective years the actual rates of increase are above the target rates in 14 out of 16 quarters; in 2 quarters (1975 II and 1976 I) they were below the

1

As to the problems of using central bank money as the basis for a monetary target see Neumann (1975).

2

For 1975 the Bundesbank stated the target in terms of the change from December 1975 to December 1974. For 1976 to 1978 the target was stated in terms of the annual average as against the annual average of the previous year.

target<sup>1</sup>.

To which extent have these deviations been the result of interventions in the exchange market and other reserve changes? The effect of this factor can be seen from column 2 in table 2. The figures show the hypothetical percentage change in central bank money that would have occurred if the domestic component of central bank money had remained unchanged.

Table 2 shows that in 6 out of the 14 quarters in which the monetary expansion exceeded its target value the deviation can be attributed to the strong increase in the Bundesbank's foreign reserves.

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1

The quarterly rates of increase that would have been consistent with the monetary target are (at annual rates): 7.8 p.c. for 1975; 6.0 p.c. for 1976; 7.6 p.c. for 1977; 6.1 p.c. for 1978. A regular quarterly increase by 7.8 p.c. (annual rate) in 1975 corresponds - because of the higher average base - to an annual increase by 8.0 p.c. The relatively low target figures for the other three years result from overhangs that existed when monetary targets were announced on the basis of annual averages:

2

These cases are characterized by the fact that the figure in the first column of table 2 is lower than the respective figure in the second column; this implies that the domestic component has changed in the negative direction and has, hence, not contributed the monetary expansion.

Table 2: The Effect of Changes in the Net Foreign Position on the Development of Central Bank Money

	Increase in Central Bank Money against Previous Quarter (seasonally adjusted, annual rate) <sup>a</sup>	Change in the Net Foreign Position <sup>b</sup> against Previous Quarter as Percentage of Central Bank Money (seasonally adjusted, annual rate)
1975 I	9,1 (+)	+ 19,8
II	7,0 (-)	- 15,5
III	9,9 (+)	- 10,3
IV	11,9 (+)	- 2,2
1976 I	5,8 (-)	+ 35,4
II	9,3 (+)	- 12,7
III	9,8 (+)	+ 12,1
IV	7,8 (+)	- 2,7
1977 I	8,0 (+)	+ 2,0
II	8,2 (+)	- 4,6
III	11,5 (+)	0
IV	10,6 (+)	+ 35,2
1978 I	13,1 (+)	+ 13,9
II	9,4 (+)	- 12,0
III	10,7 (+)	+ 18,1
IV	13,0 (+)	+ 36,4

<sup>a</sup>The sign in brackets shows whether the actual increase of central bank money was above (+) or below (-) the target-path (see footnote 1 on p.28 ).

<sup>b</sup>Excluding changes due to valuation adjustments and new allocations of SDR

The majority of these deviations occurred during the sharp decline of the dollar from October 1977 to December 1978.

In another 7 quarters, however, the target was overshoot although the Bundesbank's net foreign reserve remained unchanged or even declined. In the second quarter of 1978, e.g., central bank money increased at a seasonally adjusted annual rate of 9.4. p.c. despite a substantial outflow of foreign reserves. In these cases, therefore, the overshooting of the target has to be attributed to domestic factors<sup>1</sup>.

In respect to the two quarters in which the monetary expansion was below the target only the deviation in the second quarter of 1975 can be explained by changes in the foreign component as there has been a reserve outflow which dampened the monetary expansion. The deviation in the first quarter of 1976 cannot be attributed to exchange market interventions; without the decline in the domestic component the interventions would have even led to a substantial overshooting of the target. This observation also indicates that a judgement about the exchange-rate policy of a central bank which is based only on exchange-market interventions may be misleading; if one considers also the restrictive domestic policy measures and the resulting "undershooting" of the target it may well be that despite the large purchases of foreign currency the Bundesbank has intensified rather than moderated the revaluation of the D-Mark in the first quarter of 1976.

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The deviation in the first quarter of 1977 cannot be attributed to only one of the two components, as both components show an increase in this period.



### III. Conclusion

In concluding three aspects should be stressed:

- The volume of reserve changes which are due to transactions outside the exchange market has risen considerably in the last years. Therefore, the overall change in the Bundesbank's net foreign reserves may no longer give an adequate picture of the intervention activity.
- The changes in the Bundesbank's reserves also reflect interventions by other central banks - an aspect which has become more important in the last years due to the sometimes heavy interventions by the U.S. monetary authorities since the begin of the dollar crisis in autumn 1977. This raises difficulties especially for the interpretation of reaction functions in which changes of the Bundesbank's foreign reserves are the dependent variable. For the question arises to which extent the function describes the reaction of other monetary authorities rather than the reactions of the Bundesbank.
- The exchange - market interventions can only partly be made responsible for the overshooting of the Bundesbank's monetary target in the years 1975 - 78, since overshooting also occurred in periods when the Bundesbank's foreign reserves actually declined. A considerable part of the deviations was, therefore, due to domestic factors.

Appendix

Table A: Changes in the Bundesbank's Net Foreign Position  
April 1973 - April 1980 in bill. DM (excluding  
changes due to valuation adjustments).

Periods	Changes in the Net Foreign Position Total	Caused by interventions		other foreign exchange movements
		in the DM-dollar market	in the "snake" or EMS	
1973				
April-May	- 0.9	- 1.3	- 1.5	+ 1.9
June-July	+ 8.5	+ 0.7	+ 5.8	+ 2.0
Aug.-Sept.	+ 3.4	- 1.6	+ 4.3	+ 0.7
Oct.-Dec.	- 4.5	- 5.3	- 1.1	+ 1.9
1974				
Jan.	- 2.5	- 2.0	+ 0.3	- 0.8
Febr.	- 0.3	-	- 0.1	- 0.2
Mar.-May	+ 6.1	+ 1.4	+ 4.0	+ 0.7
June	- 0.4	- 0.8	+ 0.1	+ 0.3
July-Sept.	- 6.4	- 2.2	- 3.5	- 0.7
Oct.-Nov.	+ 2.0	+ 2.1	- 0.7	+ 0.6
December	- 0.4	+ 0.1	0	- 0.5
1975				
Jan.-March	+ 5.0	+ 2.8	0	+ 2.2
April-Sept.	- 6.6	- 4.0	- 1.8	- 0.8
October	+ 1.1	+ 0.8	0	+ 0.3
Nov.-Dec.	- 1.6	- 0.2	0	- 1.4
1976				
Jan.	+ 0.1	+ 0.1	+ 0.0	+ 0.0
Febr.-Mar.	+ 9.7	+ 1.6	+ 8.8	- 0.7
Apr.-June	- 3.6	- 0.6	- 1.4	- 1.6
July-Mid.				
Oct.	+ 6.7	+ 0.8	+ 8.0	- 2.1
Mid. Oct.				
December	- 4.1	+ 0.4	- 3.9	- 0.6
1977				
Jan.-June	- 0.8	+ 0.7	- 1.5	+ 0.0
July	+ 2.0	+ 1.4	+ 0.0	+ 0.6
Aug.-Sept.	- 2.0	- 0.1	- 0.3	- 1.6
Oct.-Dec.	+ 11.3	+ 9.3	+ 3.1	- 1.1
1978				
Jan. 1-Mid				
Jan.	+ 3.0	+ 2.5	+ 0.3	+ 0.1
Mid. Jan.-				
Mid. Febr.	- 2.0	+ 1.0	- 0.9	- 2.1
Mid. Febr.-				
March 31	+ 3.5	+ 4.4	- 0.1	- 0.7
April-June	- 4.1	- 1.5	- 0.1	- 2.5
July-Mid.				
Oct.	+ 12.8	+ 1.8	+ 10.1	+ 0.9
Mid. Oct.-				
Dec.	+ 7.3	+ 16.0	- 1.1	- 7.6

Table A (continued)

1979				
Jan.-March 12	- 6.9	- 2.2	- 1.3	- 3.4
March 13 -				
March 31	- 3.0	- 1.3	- 0.5	- 1.2
March 31 -				
April 30	- 1.7	- 6.4	- 0.1	+ 4.8
May - June 13	- 4.5	- 4.1	+ 2.3	- 2.7
Mid.June -				
Sept.23	+15.1	+18.6	+ 8.8	-12.3
Sept.23 -				
Oct. 8	- 2.8	- 2.4	+ 0.0	- 0.4
Oct.8-Dec.	- 7.0	+ 0.4	- 1.1	- 6.3
1980				
Jan.-Mid.				
April	-15.5	-13.9	-4.0	-2.4
Source: Deutsche Bundesbank				

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