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Exchange Market Intervention and the US Dollar

by Wolfgang Filc and Jörg Kuhlmann, Trier*

In the past years central banks of major Western industrialised countries have repeatedly attempted to change the trend of the US-Dollar rate by means of intervention in the foreign exchange markets. Our authors analyse the objectives, effects and chances of success of such exchange market interventions.

Over the last decade, none of the economic summit conferences of the heads of government of the major Western economies or of the central-bank governors and finance ministers of the Group of Five or other high-level meetings has ended without issuing a final communiqué containing a declaration of the participants' intention to strive for greater exchange rate stability.¹ They have repeatedly expressed their desire to work towards closer economic co-ordination with the common objective of stemming inflation, increasing employment and achieving an adequate and steady rate of economic growth. They have also declared their readiness to intervene in the foreign exchange markets if conditions on those markets were disorderly and if central-bank intervention were considered helpful. Until well into 1985, however, no tangible progress had been made in that respect.

Decisions of the Group of Five

The exchange markets apparently see the decisions taken by the finance ministers and central-bank governors of the Group of Five in September 1985 as an important step, going beyond mere declarations of intent, towards the international co-ordination of economic measures flanked by exchange market intervention by their monetary authorities, including those of the USA, to bring about a controlled reduction in the excessively high dollar exchange rate.² The very fact of holding the meeting, which was generally described as a conference about the dollar, triggered the sharpest fall in the dollar in a single day since the suspension of regular interventions against that currency; it was not until the following day that the movement was reinforced by co-ordinated official sales of dollars, mostly in exchange for Deutsche Mark and yen. The public

relations effort surrounding the conference did more than the decisions themselves to signal the readiness of the US Administration to pay heed to the problems caused by the overvalued dollar. Consensus among the major Western industrialised countries is often regarded as an important precondition for achieving lasting exchange rate effects by means of co-ordinated market intervention.³

The final communiqué of the meeting of the Group of Five showed ministers and governors unanimous in their view that the dollar exchange rate did not adequately reflect recent shifts in fundamental economic conditions among their countries, in particular the convergence in real rates of growth and the narrowing in interest rate differentials.⁴ Veiled allusions pointed to agreement to bring about "some further orderly appreciation of the main non-dollar currencies against the dollar"⁵ by means of exchange market intervention. This interpretation was confirmed. In addition, it was announced that the USA and Japan, the two countries with the most pronounced bilateral trade imbalances, would take concrete economic measures

¹ A compilation of the statements by the heads of government of the leading Western economies on monetary problems at the economic summit conferences between 1975 and 1984 is contained in C. Köhler: *Bedingungen für mehr Stabilität im Weltwährungssystem*, in: W. Filc, C. Köhler (eds.): *Stabilisierung des Währungssystems*, Berlin 1985, pp. 269 ff.

² The Council of Economic Advisers calculated the average overvaluation of the dollar at the beginning of 1984 to be 32 %. Cf. H. Hesse: *Weltwirtschaftliche Entwicklung und Wirtschaftspolitik in wechselseitiger Abhängigkeit*, in: J. Langkau, C. Köhler (eds.): *Wirtschaftspolitik und wirtschaftliche Entwicklung*, Bonn 1985, p. 136.

³ Cf. M. L. Greene: *U. S. Experience with Exchange Market Intervention: September 1977 – December 1979*, Board of Governors of the Federal Reserve System, Staff Studies, No. 128, Washington, D. C., October 1984, p. 39.

⁴ Cf. Announcement of the Ministers of Finance and Central Bank Governors of France, Germany, Japan, the United Kingdom and the United States, New York, 22nd September 1985.

⁵ *Ibid.*, p. 4.

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to redress external disequilibria (see Chart 1). Japan undertook to implement an announced programme of action to open its domestic markets to foreign goods and services, internationalise the yen and liberalise its financial markets. In exchange, the US representatives committed themselves to reducing the US federal budget deficit in accordance with a package of measures that had already been adopted. The other participants at the meeting, by contrast, confined themselves to re-affirming their existing economic policies. There was no evidence of a willingness to take additional economic measures in order to support and strengthen the forces of growth in European countries and thereby help reduce the US current account deficit by stimulating increased imports of goods.

The international economic and monetary problems associated with excessively high dollar exchange rates, the current account disequilibria of a number of countries and the protectionist tendencies they foster are well known,⁶ as are the economic advantages that

European countries and Japan derive from the high dollar exchange rate and the US current account deficit.⁷ Rather than describe these problem areas once again, this article will examine ways of ameliorating the situation by means of internationally co-ordinated exchange market intervention. This entails several steps. First, the routes by which exchange market intervention influences the dollar exchange rate must be described and a number of reservations noted. Secondly, the reasons for and effects of dollar sales in past phases of dollar appreciation must be explained and assessed in order to gauge the prospects for successful exchange market intervention. In this connection, it will be necessary to examine how the

⁶ Cf. R. Pohl: Dollarkursschwankungen, Handelströme und internationale Kapitalbeziehungen, in: Wirtschaftsdienst, No. 6/1985, pp. 308 ff.; R. Hasse: Ursachen der Desintegration und Wege zu ihrer Überwindung, in: Zeitschrift für Soziale Marktwirtschaft, No. 24, September 1985, pp. 47 ff.; D. Lorenz: A GATT for the Mercantilists? in: INTERECONOMICS, No. 6/1985, pp. 255 ff.

⁷ Cf. Crossroads Europe, in: Morgan Guaranty Trust Company of New York, World Financial Markets, June 1985, pp. 1 ff.

Chart 1
Economic Measures announced at the Meeting of the Group of Five on 22nd September 1985

Country	Monetary policy	Fiscal policy	Foreign trade policy including exchange market policy
France	Vigorous continuation of fight against inflation	Reduction in public expenditure, the tax burden and the government borrowing ratio	Liberalisation of financial markets
	Attainment of money supply targets	Promotion of private investment	Resistance to protectionism
Federal Republic of Germany	Maintenance of a monetary policy conducive to an expansion in domestic demand and price stability	Reduction in the public sector's share of the economy Tax reductions Removal of impediments to market mechanisms, especially in the labour market	Continued resistance to protectionism
Japan	Flexible management of monetary policy with due attention to the yen rate Expansion of consumer and mortgage credit to stimulate domestic demand	Deregulation of markets Reduction of the government deficit Strengthening of private sector's growth potential	Internationalisation of the yen Liberalisation of financial markets Implementation of announced action programme for further opening up Japan's market to foreign goods
United Kingdom	Further progress towards price stability with rising output and employment	Continued reduction in public expenditure as a share of GDP Privatisation of state enterprises Reduction in the tax burden	Resistance to protectionism
USA	Pursuit of a monetary policy conducive to sustainable growth and continued progress towards price stability	Continuation of efforts to reduce the government share of GNP Full implementation of the package of measures passed by Congress and approved by the President to reduce the budget deficit by more than 1 % of GNP in the 1986 fiscal year Implementation of revenue-neutral tax reform to encourage private saving and non-inflationary growth	Resistance to protectionist measures

Source: Announcement of the Ministers of Finance and Central Bank Governors of France, Germany, Japan, the United Kingdom and the United States, New York, 22nd September 1985.

concept of "disorderly market conditions", which provides the justification for exchange market intervention under a system of managed floating in accordance with the guidelines of the International Monetary Fund, can be transformed into operational intervention rules, given that it is imprecise and thus open to different interpretations. Finally, it will be shown that exchange market intervention can be no more than one element in a scheme for the internationalisation of economic policy, though even the outlines of such a scheme have still to emerge.

Effects of Exchange Market Intervention

Whether exchange market intervention can successfully exert a lasting influence on the behaviour of the dollar exchange rate has been a contentious issue ever since the changeover to flexible exchange rates against the dollar. In the light of the widespread acceptance now given to the financial market approach to exchange rate determination, there are few who argue with the assertion that exchange market intervention can have a significant effect on the dollar exchange rate, at least in the short term, provided it is accompanied by a change in the central-bank money supply. If the central bank of a country with a currency depreciating against the dollar sells dollars to the market, it withdraws a corresponding amount of central-bank money from circulation, thereby creating excess demand in the money market while the monetary base of other countries remains unchanged, there are various routes whereby the depreciation of the domestic currency can be stayed.⁸

If central-bank intervention in the exchange markets is not accompanied by changes in the central-bank money supply, the transmission mechanisms of the monetary theory of exchange rates do not come into play, for if the withdrawal of central-bank money as a result of official sales of foreign exchange is offset by the provision of an equal amount of additional central-bank money by other means, such as the purchase of government securities by the central bank, the existing

balance in the market for central-bank money is not disturbed. Exchange market interventions of this kind, which are sterilised in the sense that they do not affect equilibrium in the market for central-bank money, merely alter the currency composition of the private sector's net financial assets, which are unchanged in amount. However, if there is perfect substitutability between comparable financial assets denominated in domestic and foreign currencies, sterilised interventions will have no effect on the exchange rate or on any other macroeconomic variable, because the existing equilibria in the markets will not be disturbed. Perfect substitution between similar financial assets issued by reserve currency countries is assumed to exist in purely monetary theories of exchange rate determination. One consequence of this view is that sterilised exchange market interventions are not deemed to have any effect on exchange rates.⁹ If sterilised exchange market interventions are to have an impact on exchange rates, investors must hold differing views as to the expected yields on comparable securities denominated in different currencies, taking exchange rate expectations into account. If this is the case, sterilised interventions disturb the previous balanced currency composition of private investors' portfolios. Action to restore the

⁸ For the monetary approach to exchange rates, see for example E. Baltensperger, P. Böhm: Stand und Entwicklungstendenzen der Wechselkursstabilisierung – Ein Überblick, in: *Außenwirtschaft*, Vol. 37, 1982, pp. 109 ff. and for the effects of exchange rate oriented monetary policy see W. Filc: Kurz- und langfristige Wirkungen einer wechselkursorientierten Geldpolitik, in: W. Filc, C. Köhler (eds.), op. cit., pp. 43 ff.

⁹ Cf. P. Bridel, K. Schiltknecht: Devisenmarktinterventionen als Mittel der Wechselkursstabilisierung? in: W. Ehrlicher, D. B. Simmert (eds.): *Geld- und Währungspolitik in der Bundesrepublik Deutschland*, Berlin 1982, pp. 525 ff. and for a survey of the literature R. W. Tryon: *Small Empirical Models of Exchange Market Intervention: A Review of the Literature*, Board of Governors of the Federal Reserve System, Staff Studies, No. 134, Washington, D.C., September 1983.

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optimum currency composition of net financial assets can trigger movements in exchange rates.

Even if this route is closed because expected yields on securities in different countries are the same, sterilised exchange market interventions can have two exchange rate effects, leaving purely monetary exchange rate theories aside:

- First, private participants in the foreign exchange market may take account of relevant information that was previously ignored. Interventions then help to increase the efficiency with which the market uses information.¹⁰
- Secondly, it is conceivable that monetary authorities have exclusive access to certain information and that exchange market intervention signals an imminent change in the direction of economic policy.¹¹

Empirical studies indicate that "one can strongly reject the joint hypothesis of perfect asset substitutability and the efficient use of information".¹² Accordingly, it is perfectly possible for sterilised exchange market interventions to have a lasting effect on exchange rates. Nevertheless, the effectiveness of temporary interventions without simultaneous changes in the central-bank money supply is generally considered to be slight.¹³

Exchange Market Efficiency

Probably the most telling argument against the effectiveness of exchange market intervention for influencing exchange rate behaviour stems from the hypothesis of the market's efficient use of information. If market participants know the "true" model for price formation, if their expectations of future price developments are based on consideration of all the relevant information and if this information is correctly interpreted, their idea of the equilibrium price will be identical to the price derived from the model. If the foreign exchange market uses information efficiently,

exchange rates will correctly reflect all relevant available data. Furthermore, current forward rates contain the currently available relevant information on future spot rates. It is then impossible to make systematic speculative gains by constructing some kind of forecasting model from the information available.

If the exchange markets are efficient, there can be little justification for exchange market intervention.¹⁴ If the amount of information available, the processing of that information and the certainty in the prediction of future spot rates are the same for both central banks and ordinary market participants, sterilised interventions will have absolutely no exchange rate effects, as foreign exchange sold by central banks would be fully absorbed by the market at the prevailing spot rate. At most, a short-lived surprise effect may cause deviations from equilibrium rates, but not lasting changes in the behaviour of exchange rates over time.

The question of the foreign exchange market's efficient use of information, which is central to assessing whether sterilised interventions can cause exchange rate movements, can only be resolved empirically. The results obtained from such studies are far from clearcut, owing as much to the choice of different concepts of market efficiency, different periods and different analytical methods as to the fact that there is no universally accepted method of measuring market efficiency. The findings suggest at least that the exchange market is not always efficient. For example, forward rates are bad predictors of future spot rates, significant risk premiums lead to systematic discrepancies between swap rates and international interest rate differentials, risk premiums vary over time and international interest rate differentials are unreliable indicators of expected changes in spot rates.¹⁵ Such findings are attributed partly to the fact that "speculators may not have extracted all useful information . . . , so that a systematic forecast error resulted."¹⁶ At times when there are signs that exchange rates do not reflect all the relevant data, sterilised exchange market interventions may therefore be an appropriate means of raising the

¹⁰ This is the view taken by the Jurgensen Report. Cf. Bericht der Arbeitsgruppe über Interventionen an den Devisenmärkten, in: W. Ehrlicher, R. Richter (eds.): Devisenmarktinterventionen der Zentralbanken, Schriften des Vereins für Socialpolitik, New Series, Vol. 139, Berlin 1984, pp. 83 ff.

¹¹ Cf. B. E. Loopesko: Relationship among Exchange Rates, Intervention, and Interest Rates: An Empirical Investigation, Board of Governors of the Federal Reserve System, Staff Studies, No. 133, Washington, D. C., November 1983.

¹² B. E. Loopesko, op. cit., p. 11. See also R. E. Cumby, M. Obstfeld: A Note on Exchange Rate Expectations and Nominal Interest Differentials: A Test of the Fisher Hypothesis, in: Journal of Finance, Vol. 36, 1981, pp. 697 ff. and the review of the literature in W. G a a b: Devisenmärkte und Wechselkurse, Berlin 1983, pp. 94 ff.

¹³ Cf. M. Obstfeld: Exchange Rates, Inflation, and the Sterilization Problem: Germany, 1975-1981, in: European Economic Review, Vol. 21, 1983, pp. 161 ff.

¹⁴ Cf. M. J. M. Neumann: Auf der Suche nach der Interventionsfunktion der Deutschen Bundesbank, in: W. Ehrlicher, R. Richter (eds.), op. cit., pp. 9 ff.; on the theory of efficient markets and its application to the foreign exchange market, see W. G a a b, op. cit., pp. 40 ff.

¹⁵ See the review of the results of earlier studies in W. G a a b, op. cit., pp. 99 ff. and 244 ff. and the results of his empirical studies, which at best indicate a weak form of efficiency. See also I. D. Saville, R. Fox: Exchange Market Efficiency, in: Bank for International Settlements (ed.): Exchange Rate Determination: Analysis and Policy Issues, Basle September 1983, pp. 125 ff. and R. Meese, K. Rogoff: Empirical Exchange Rate Models of the Seventies: Are any fit to Survive? International Finance Discussion Papers, No. 184, June 1981.

¹⁶ B. E. Loopesko, op. cit., p. 9.

efficiency of the market, in other words drawing the attention of private market participants to information they had previously ignored. This presupposes that periods in which the market is less efficient in its use of information can be identified.

In efficient markets, systematic profits cannot be made from speculative transactions.¹⁷ Accordingly, exchange market interventions can be classified as stabilising when they produce systematic profits for the monetary authorities. In this case, intervention agencies would use their superior information to boost market efficiency by signalling through market operations that private participants were paying insufficient heed to relevant factors affecting the exchange rate. An empirical study has shown that the US monetary authorities reaped substantial profits from interventions vis-à-vis the Deutsche Mark between 1973 and 1981. They were particularly high in periods in which

interventions in both directions were more or less equal.¹⁸ This finding also points to the stabilising function of exchange market intervention.

Phases of Intervention in 1984 and 1985

Monetary authorities sold substantial amounts of dollars in three phases between the beginning of 1984 and September 1985. A distinction should be made between

- the interventions by the Deutsche Bundesbank alone at the end of September 1984, with a peak on 21st September;
- the co-ordinated dollar sales in February 1985, mainly by European central banks, with a climax on 27th February; and
- the phase of intervention that began on 23rd September 1985 and continued into October, involving the central banks of European countries, the USA and Japan.

The Deutsche Bundesbank, for one, offset the withdrawal of liquidity from credit institutions resulting from the dollar sales by providing central-bank money

¹⁷ Cf. M. Friedman: The Case for Flexible Exchange Rates, in: Essays in Positive Economics, Chicago and London 1953, pp. 157 ff.

¹⁸ Cf. L. R. Jacobson: Calculations of Profitability for U.S. Dollar-Deutsche Mark Intervention, Board of Governors of the Federal Reserve System, Staff Studies, No. 131, Washington, D. C., September 1983.

Figure 1
Official Spot Rates for the US Dollar on the German Foreign Exchange Market
 (daily rates)



Source: Deutsche Bundesbank.

via other channels. At any event, the expansion of the central-bank money supply, which is the Bundesbank's monetary target variable, was unaffected by the dollar interventions. Dollar sales during that period can therefore be classified as sterilised interventions.

The behaviour of the dollar was very similar immediately before each of these three periods of intervention (see Figure 1). In each case there was a fairly long and steep appreciation of the dollar, only rarely interrupted by a fall in the exchange rate from one day to the next. This trend points to price-dynamic behaviour that the monetary authorities could interpret as a sign that market participants were climbing on the bandwagon and hence an indication of a lack of efficiency in the exchange market. It is necessary to examine whether this initial assessment is confirmed and what effects exchange market intervention had on the subsequent behaviour of the dollar.

Sequence of Dollar Movements

Speculative auction markets, including the foreign exchange market, are typically subject to wider price fluctuations than occur in goods markets where changes in net demand are frequently offset by quantity adjustments, for instance through variations in stocks. As a rule, prices in financial markets and in the foreign exchange market also display this high degree of

variability when they follow a trend. If the price of a currency or security is on a rising trend, it will repeatedly fall back briefly owing to profit taking if holders do not expect further gains once the price has reached certain thresholds. On the other hand, in efficient markets, price movements which are governed by (expectation-induced) transactions are not erratic in the sense that increases regularly alternate with decreases. Hence, speculative auction markets may be considered efficient if price rises do not continue for a long time without being interrupted by price reductions and if price rises do not regularly alternate with price reductions. The first phenomenon is a sign of price-dynamic reactions, the extrapolation of a price trend without taking full account of all price-related information. Such price behaviour is a feature of destabilising speculation. The second phenomenon indicates confusion about equilibrium prices and uncertain expectations that express themselves in erratic price behaviour. In markets that use information efficiently, neither of these price phenomena occur systematically.

Market efficiency can be evaluated by means of iteration tests, whereby price behaviour over time is examined to determine whether sequences of price changes with the same sign (runs) are consistent with a random process.¹⁹ An excessive number of runs indicates a regular alternation of price changes as a result of market confusion, while too few runs, in other words price-dynamic reactions in disregard of relevant price information, reveal the influence of destabilising speculation and a lack of market efficiency.²⁰

Applied to the daily changes in the dollar exchange rate from the beginning of 1984 to the end of September 1985, this test of the randomness of changes in a time series produces different results for different periods (see Table 1).²¹

Table 1
Iteration Tests to test for Randomness in Changes in Spot Dollar Exchange Rates

Period	Number of runs		\hat{z}	Number of observations
	Expected value	Actual value		
(1) 2. 1. 1984 – 30. 9. 1985	219	217	- 0.0998	437
(2) 2. 1. 1984 – 21. 9. 1984	92	85	- 0.8368	183
(3) 24. 9. 1984 – 30. 9. 1985	128	132	0.5751	254
(4) 30. 3. 1984 – 21. 9. 1984	58	55	- 2.1036	120
(5) 20. 12. 1984 – 26. 2. 1985	21	15	- 1.6921	45
(6) 3. 7. 1985 – 20. 9. 1985	30	33	0.9376	58

Source: For spot rates: Deutsche Bundesbank.

For the period as a whole, the number of iterations differed only very slightly from the expected value (row (1) in Table 1). This indicates that the foreign exchange market was efficient in its use of information and therefore does not suggest that exchange market intervention would have been appropriate and necessary to increase market efficiency. What holds good for a long period is not necessarily confirmed for all phases within it, however, for unduly long and short runs can balance one another out over time. Even advocates of temporary exchange market intervention accept the basic function of exchange rate adjustments in clearing the market, but they question whether reliance on market forces in auction markets that are particularly prone to speculative transactions is always justified, irrespective of fundamental changes in the economic environment, contradictory information affecting the market and fluctuating degrees of uncertainty. Temporary exchange market intervention is required if it is found that expectations have become rigid and are causing exchange rates to behave in a way that jeopardises macroeconomic objectives.²²

If the full time span is divided into two at 21st September 1984, the date on which the Deutsche Bundesbank first made massive sales of dollars, the first period has a smaller number of iterations than expected, whereas the second has too many sequences of dollar exchange rate movements in the same direction. Nevertheless, in neither case is the discrepancy of sufficient significance to be distinguishable from a random divergence (rows (2) and (3) in Table 1).

The interventions in September 1984 were preceded by a fairly long period of rising dollar exchange rates beginning at the end of March (see diagram). For this period, which ends on the day before the Bundesbank's interventions, the number of iterations – with a 5 % probability of error – is too small (row (4) in Table 1). This suggests a bandwagon effect, a one-sided view by the market, insufficient attention to information relevant to the exchange rate, in short a lack of market efficiency. Price-dynamic reactions, the extrapolation of a trend, indicates destabilising speculation. However one may define "disorderly market conditions", which are

supposed to be the trigger for official intervention in the exchange market, there can be little disputing that intervention is necessary if destabilising speculation can be ascertained. The Bundesbank's dollar sales at the end of September 1984 therefore occurred during a phase that called for exchange market intervention.

The interventions were followed by a brief weakening of the dollar, but this soon gave way to a renewed appreciation, which continued with greater intensity from the end of December onwards. For this period up to the February intervention the number of iterations at the 90 % level is significantly lower than expected (row (5) in Table 1). Here too, there are signs of inadequate market efficiency, though less pronounced than before the interventions in September 1984.

The behaviour of the dollar prior to the interventions in the dollar market from September 1985 onwards agreed between all the major Western industrialised countries was markedly different from that recorded before the two previous periods of intervention. If 3rd July is chosen as the start of the new phase of dollar appreciation that triggered exchange market intervention, the number of sequences of dollar movements in the same direction between that date and the day preceding the new interventions did not deviate significantly from the expected value. Hence the behaviour of the dollar over this period does not suggest that the foreign exchange markets were inefficient in their use of the information available. It is therefore possible to conclude that the interventions from September 1985 onwards were designed solely to bring down the dollar exchange rate, whereas during the two previous phases of intervention a further unstated but evident objective was to promote market efficiency.²³

Exchange Market Intervention and Dollar Trends

Over the years, critics of intervention have repeatedly pointed out the supposed futility of exchange market intervention if it is not accompanied by increasing economic convergence among countries. It is a criticism that was voiced particularly strongly whenever the dollar began to appreciate again after falling back briefly as a result of intervention.

The yardsticks used in assessing the effects of exchange market intervention must be defined. If short-term interventions are made to influence the

²¹ On the use of iteration tests for the analysis of destabilising currency speculation, see D. S. Kemp: *The U.S. Dollar in International Markets: Mid-1970 to Mid-1976*, in: *Federal Reserve Bank of St. Louis Review*, Vol. 58, No. 8, 1976, pp. 7 ff.

²² One feature of the hardening of the positions adopted by advocates and opponents of temporary exchange market intervention is the fact that central banks' transactions in other markets subject to speculative transactions are rarely commented upon. For example, central banks' purchases and sales of long-term securities, which are made partly in order to influence the level of interest rates on the capital market, are not a contentious issue.

²³ It is legitimate to enquire whether the seemingly technical concept of efficient markets can be applied unreservedly to the exchange market. Can the exchange market really be described as economically efficient if the behaviour of exchange rates over time suggests an efficient use of information but the level of rates is such as to reinforce adverse economic developments?

expectations of private participants in the foreign exchange market and draw attention to information that has not been sufficiently heeded, the interventions of September 1984 and February 1985 were both necessary and successful, for the dollar trend following the interventions shows that the rigid expectations prevailing previously were dispelled.²⁴ This perception of the need for exchange market intervention to improve market efficiency by influencing expectations²⁵ does not apply, however, to the interventions made after the meeting of the Group of Five at the end of September 1985.

By contrast, if the exchange rate level is used to evaluate official interventions, the intervention by the Bundesbank alone in September 1984 was ineffectual, as it managed only briefly to check the upward trend of the dollar. The co-ordinated intervention by European central banks from February 1985 onwards should be regarded as having been more successful.

Assessing exchange market interventions solely on the basis of the exchange rate level before and after intervention is a rough and ready method, however, as the object of intervention may also be to influence the exchange rate trend over time. Assessment of the effects of intervention must then be based on a comparison of exchange rate behaviour before and after intervention. If there is no significant difference in trend between the two periods, intervention has merely had a short-term impact effect but has not succeeded in permanently influencing exchange rate behaviour. Accordingly, interventions can be deemed successful if they produce such a change in trend.

For this purpose, the behaviour of the dollar exchange rate must be examined for structural breaks. "Structural breaks indicate a change in the underlying conditions whose constancy forms the basis of the statistical model."²⁶ Regression analyses for the dollar rate, using a temporal trend as independent variable, are made for periods in which a structural break is suspected; the full period in question is then split into two sub-periods, for which separate regression analyses are made. The greater the differences between the results for the two

partial regressions and those for the overall regression, the more pronounced will be any structural break. For this purpose, a test statistic F is calculated from the differences between the results for the overall and partial regressions as well as residual variations in the equation for the entire period.²⁷ The point at which a structural break occurs is indicated by the maximum observed value of F. If structural breaks in the trend of the dollar exchange rate coincide with exchange market interventions, this will indicate the effectiveness of interventions in influencing the trend.

One structural break can be detected on 1st March 1984, in a phase of dollar depreciation that did not give way to a rising trend until 14th March. In the period from 2nd March 1984 to 26th February 1985, the day before the internationally co-ordinated interventions in the dollar market, a further structural break can be detected on 24th September. The empirical value of F for that day is well above the values for the few days on either side of that date (see Table 2).

Table 2
Identification of Structural Breaks in the Dollar Exchange Rate Trend between 2. 3. 1984 and 26. 2. 1985

	18.9.	19.9.	20.9.	21.9.	24.9.	25.9.	26.9.
Dollar rate	3.098	3.085	3.091	3.1624	3.021	3.0605	3.0895
Value of F	2.99	5.33	4.71	4.38	10.55	7.71	7.49

The structural break took effect on the first trading day after the Bundesbank's intervention. No other factors can be discerned that could have produced this result, so that it may be stated with a probability of error of less than 1 % that exchange market interventions of limited duration caused a lasting change in the dollar exchange rate trend.

Comparison of the result of the regression analysis for the two subperiods separated by the structural break shows that:

- in both periods there was a significant trend in the behaviour of the dollar;
- the trend explained 91 % of the variance in the dollar rate before the Bundesbank's intervention and 61 % thereafter;

²⁴ Well-founded doubts whether market efficiency can be enhanced by reducing uncertainty by means of intervention rules under a system of fundamentally flexible exchange rates are expressed in B. Reszat: Die kurz- und langfristige Effizienz von Regeln für Devisenmarktinterventionen, Berlin 1984, especially pp. 167 ff.

²⁵ With regard to the lasting exchange rate effects of sterilised exchange market interventions as a result of their impact on expectations, see H. Genberg: Monetary Policy and Short Run Fluctuations in Exchange Rates, in: Außenwirtschaft, Vol. 37, No. 2/3 1982, pp. 10 ff.

²⁶ R. Hujer, R. Cremer: Methoden der empirischen Wirtschaftsforschung, Munich 1978, p. 268.

²⁷ Cf. R. L. Brown, J. Durbin, J. M. Evans: Techniques for Testing the Constancy of Regression Relationships over Time, in: Journal of the Royal Statistical Society, Series B, 1975, pp. 149 ff. and R. Hujer, R. Cremer, op. cit., pp. 268 f.

Table 3
Identification of Structural Breaks in the Dollar Exchange Rate Trend between 25. 9. 1984 and 20. 9. 1985

	11. 2.	21. 2.	22. 2.	25. 2.	26. 2.	27. 2.	28. 2.	1. 3.	25. 3.
Dollar rate	3.2573	3.348	3.38	3.4375	3.469	3.315	3.3225	3.3635	3.2247
Value of F	88.03	86.05	85.74	85.57	84.21	85.1	84.74	86.03	90.82

□ the standard error of the regression coefficient is considerably larger in the sub-period after the intervention than in that before it. This reflects increased uncertainty about the future exchange rate trend and is also a consequence of paying greater heed to additional determinants of the dollar exchange rate as well as rates in earlier periods.

The analysis shows no structural break between 25th September 1984 and 20th September 1985 in connection with the joint interventions by several central banks in late February 1985 (see Table 3). F assumes higher values for earlier and later dates than for that of the commencement of interventions. Local maxima can be detected on 11th February and 25th March (see Table 3). The value of F has the highest definition at the end of March, so that it is here that a structural break occurs.

No structural break analysis can be made in respect of the interventions from the end of September 1985 onwards, since insufficient data is yet available.

These findings should give cause to reconsider the scepticism frequently expressed about the feasibility of influencing the trend of the dollar exchange rate by means of temporary sterilised exchange market interventions.

□ Firstly, the dollar trend changed after the interventions in September 1984 and February 1985. Even sterilised and temporary interventions exhibit exchange rate effects.²⁸

□ Secondly, it is doubtful whether co-ordinated intervention by several central banks including the US monetary authorities can always achieve better results than intervention by one central bank acting alone. The Bundesbank's interventions in September 1984 immediately altered the trend behaviour of the dollar, whereas a month elapsed between the internationally co-ordinated interventions in February 1985 and the subsequent structural break.

□ Thirdly, occasional central-bank intervention can continue to influence exchange rates long after the

monetary authorities have ceased to intervene. The impact of exchange market interventions should not be assumed to be slight simply because central banks' foreign exchange reserves are extremely small in comparison with the daily turnover of the market.

□ Fourthly, however, it is also clear that central-bank intervention alone can neither peg the exchange rate permanently at a particular level nor reverse the exchange rate trend if the justification for such a fundamental change cannot be explained to private market participants.

Consequences for Exchange Market Intervention

The announcement of co-ordinated exchange market interventions at the meeting of finance ministers and central-bank governors of the Group of Five in September 1985 was followed by corresponding action. By the end of October this had reduced the dollar rate quite substantially and the currency had stabilised at a new level. Empirical analysis of the factors that triggered two previous periods of intervention and the effects it produced provides a number of guidelines for exchange market intervention vis-à-vis the dollar.

□ The interpretation of the concept of "disorderly market conditions" that might trigger exchange market interventions is a contentious issue. The interventions in the wake of the Group of Five meeting indicate that conditions in the dollar market are considered to need correction if the dollar exchange rate becomes a problem for the US economy. This is unsatisfactory, because the United States' present willingness to take account of the possible exchange rate effects of proposed economic measures may evaporate if the dollar returns to a level that is acceptable in American eyes. Regardless of the exchange rate level, disorderly market conditions may be suspected when there are signs of inefficiency in the use of information. Inadequate market efficiency is evidenced by long series of successive dollar exchange rate movements in the same direction. If the monetary authorities adopted such a yardstick, informed the public accordingly and intervened in the foreign exchange market as necessary, an automatic stabiliser that would attenuate

²⁸ The same conclusion is reached in B. E. Loopesko, *op. cit.*, p. 7.

price-dynamic reactions would be built into the managed dollar float.²⁹ Similarly, a constant alternation between dollar appreciation and depreciation indicates market confusion and rapidly changing expectations for which there is no sound justification. Here too, temporary exchange market interventions may be a suitable way to regulate the dollar rate by influencing the expectations of private operators in the market.

□ If the authorities intervene in order to draw the market's attention to other factors besides the exchange rate determinants heeded in the past and thereby to improve the efficiency with which it uses information, it cannot be described as an efficient information policy if interventions are carried out beneath the cloak of operational secrecy. The predominant view is that unexpected and covert exchange market interventions are to be preferred.³⁰ As a means of stabilising expectations, however, open interventions are superior, as there is then no room for false conjecture and the resultant false reactions on the part of the market.

□ Under systems of managed floating, monetary authorities should not announce firm exchange rate targets and they should avoid intervening to prevent each and every deviation from a target rate.³¹ If it appears to private market participants that exchange rates are firmly pegged by means of interventions, a belief that exchange rate movements will also be prevented in future may gain ground. The exchange risk

then disappears, so that the direction of international capital flows is determined solely by interest rate differentials between different currency areas, without exchange rate expectations playing any part. The central bank of a country with low interest rates that holds its currency's dollar exchange rate steady by means of dollar sales risks an increase in interest rates induced by an outflow of capital to the USA on interest rate grounds.

□ Intervention to improve market efficiency should be confined to giving an initial impulse. The credibility of interventions does not rise in proportion to the length of the period of intervention.

□ Sterilised interventions can influence exchange rates in different ways, as portrayed above. These include the signal effect of intended closer international co-ordination of economic measures. For that reason, co-ordinated intervention by the monetary authorities of several countries is preferable to isolated intervention by the central bank of a single country.

□ Exchange market intervention is no substitute for the necessary harmonisation of economic concepts and measures in the major industrialised countries. Intervention would lose credibility and become ineffectual if it were accompanied by increasing divergence in countries' economic policy concepts and fundamental parameters, which are relevant to exchange rate determination.

²⁹ Exchange market interventions in the event of technical exchange rate reactions are recommended in B. R e s z a t: Technische Ursachen kurzfristiger Wechselkursbewegungen, in: Kredit und Kapital, Vol. 18, 1985, pp. 428 ff.

³⁰ The supposed need for surprise exchange market interventions has been reaffirmed by the German Federal Minister of Finance, Dr. Stoltenberg; cf. Tagung der Finanzminister und Notenbankpräsidenten der fünf größten westlichen Industrieländer in New York, in: Bundesministerium der Finanzen, Finanznachrichten, No. 38, 26. 9. 1985, pp. 5 f.

³¹ Cf. H.-E. Scharer: Währungspolitische Perspektiven für die Bundesrepublik Deutschland in der Post-Bretton-Woods-Ära, in: WSI-Mitteilungen, No. 5/1976, p. 305.

Consequences for Economic Policy

The decisions taken by the finance ministers and central-bank governors of the Group of Five in September 1985 and the ensuing exchange market interventions are seen as a signal for greater heed to be paid to the international implications of economic measures. The excessively high dollar exchange rate and the external disequilibria displayed by several

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countries are symptoms of spreading disintegrative tendencies. The undermining of the GATT rules,³² other defensive or aggressive practices as a protectionist response to increasing international competition³³ and, particularly in the USA, the pursuit of economic objectives "in total disregard for the outside world"³⁴ are further signs that there is no longer a common area of agreement based on free trade and respect for the interests of other countries.

Ironically, neo-protectionism and the reversion to economic policies based on concepts of the nation state are partly a reaction to increased economic interdependence resulting from the mutual opening of markets. The increasing openness of the world trading systems³⁵ promotes international exchanges of goods and services but also increases countries' sensitivity to economic developments abroad. The increasing interdependence of national financial markets strengthens the linkage of interest rates throughout the world and casts doubts on the supposed advantages of flexible exchange rates for the pursuit of an independent monetary policy. Finally, the internationalisation of production is reflected in the fact that national frontiers are becoming ever less important as a factor in firms' decisions about the location of plant.

This internationalisation of product markets, financial markets and production has no counterpart in the internationalisation of economic policy. On the contrary, increasing economic interdependence and the structural change brought about by foreign trade have been met by economic measures tailored solely for the individual economy, with unregretting acceptance of their damaging effects on the economic development of other countries.

The decisions taken by the Group of Five, in particular those regarding co-ordinated exchange market intervention, can therefore be no more than a first step on the long path towards the international co-ordination of economic policy paying heed to the interests of the world economy. The first prerequisite for the stabilisation of international economic and monetary relations is action to co-ordinate monetary policy among countries of major importance in the world economy, thereby

going beyond non-binding declarations of intent. For the central banks to set jointly agreed monetary targets and to take account of their exchange rate implications is a long-term objective that cannot be achieved at present but should continue to be pursued.³⁶ Progress towards the internationalisation of monetary policy can be made by smaller steps, such as the institutionalised co-ordination of monetary measures by the central banks of the major industrialised countries, including the USA and Japan, as practised for many years already by the central banks of EC countries.

The intensification of world economic relations also calls for international harmonisation in other spheres of economic policy, especially fiscal policy. The creation of an economic affairs council of Group of Ten countries within the IMF could be beneficial in this regard. Its brief would be to elucidate macroeconomic objectives and economic measures countries considered necessary to achieve those ends and to forecast their impact on international trade and capital flows, exchange rate trends and the economic performance of other countries.

Disorderly international relations in the economic and monetary fields, which reflect tension between increasing interdependence between national economies and the determination to maintain an independent economic policy, cannot be rectified solely by improving the institutional basis for the international co-ordination of economic policy. Nevertheless, it is impossible to overlook the fact that "the world economy now taking shape . . . is posing an increasing challenge to the world's prevailing political system based on the sovereignty of nation states and is generating tendencies towards 'one world'. If countries resist these tendencies and are not prepared to countenance changes in the political system, a reversal of the trend in the world economy will be unavoidable: there will be a swing back towards greater international fragmentation."³⁷ Hence, if the decisions of the Group of Five are to contribute to better co-ordination of economic policy, they can be no more than the first link in a chain of further measures that must also include institutional changes in the world economic system.

³² Cf. R. H a s s e , op. cit.

³³ Cf. H. H e s s e , op. cit., pp. 129 ff.

³⁴ B. J. C o h e n : An Explosion in the Kitchen? Economic Relations with Other Advanced Industrial States, in: K. A. O y e , R. J. L i e b e r , D. R o t h s c h i l d (eds.): *Eagle Defiant. United States Foreign Policy in the 1980s*, Boston, Toronto 1983, pp. 116.

³⁵ On developments in the openness of various countries between 1953 and 1982 measured in terms of the quotient of imports as well as exports and gross national product, see H. H e s s e , op. cit., p. 117.

³⁶ See the detailed exposition of a concept of exchange rate oriented co-ordination of money supply targets by R. I. M c K i n n o n : *An International Standard for Monetary Stabilization, Policy Analysis in International Economics 8*, Institute for International Economics, Washington, D.C., 1984. A condensed and updated version is to be found in R. I. M c K i n n o n : *Protectionism and the Misaligned Dollar: The Case for Monetary Coordination*, unpublished manuscript, October 1985. For a critical appreciation of this proposal, see H.-E. S c h a r r e r : *Institutionalisierung der Geldpolitik. Eine Beurteilung des McKinnon-Ansatzes aus der Sicht der Bundesrepublik Deutschland*, in: W. F i l c , C. K ö h l e r (eds.), op. cit., pp. 235 ff.

³⁷ H. H e s s e , op. cit., pp. 128-129.