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This paper analyzes the implications for the formulation and execution of national monetary policy of a shift of significant size over a short period (a few days or weeks) in the Eurocurrency market from deposits denominated in dollars to deposits denominated in marks. We analyze the immediate and short-run implications of such a shift under alternative assumptions about the orientation of monetary policy in Germany and the United States and about official exchange market intervention policies.

Our conclusion is that a strategy of sterilized intervention could virtually eliminate any real economic disturbance resulting from the assumed deposit shift. However, this many not be the best strategy from Germany's viewpoint alone, nor would it be an easy strategy to implement.

Since the early 1970s, policymakers and economists increasingly have focussed their attention on the phenomenon of currency diversification or, more technically, on shifts in demands for financial assets denominated in different national currencies. Such shifts are frequently assumed to be unrelated to current or immediately prospective economic and financial conditions in the countries whose currencies are used to denominate the assets. In this respect they are conceptually distinct from shifts in quantities of assets demanded as a

result of fundamental economic developments working through expectations. These two types of shifts are difficult to distinguish empirically, however.

A number of developments have contributed to the increased interest in this topic: the move to a more flexible exchange rate regime and the observed exchange rate variability that has been associated with it, the build-up of financial wealth by OPEC investors, and the increased integration of national and international financial markets. One important aspect of the last phenomenon has been the of growth and development the Eurocurrency market.

Our approach is informal and verbal, but it is based on formal, portfolio balance models of exchange rate determination such as that presented by Girton and Henderson (1977). We have three reasons for proceeding as we do: (1) to make the intuition concerning the diversification issue contained in the formal models accessible to a wider audience; (2) to illustrate how such models apply in a specific, complex institutional environment -- one that includes the Eurocurency markets, more than two countries and the operational techniques employed in the conduct monetary policy and exchange market intervention; and (3) to suggest how short-run developments in financial markets can exert an influence on real economic developments.

A few words on the framework we use will provide some background for the analysis that follows. First, our interest is in two countries, the United States and Germany, but we do not assume a two-country world. The rest of the world is treated explicitly as the location of the Eurocurrency market; economic agents in the rest of the

world participate in this market as depositors and borrowers, and their behavior is the source of the disturbance we study. Moreover, none of the three areas is treated as "small." Actions by economic agents and policymakers in one country have implications for economic developments elsewhere. The asset market adjustments we consider, however, are restricted to those involving the U.S. dollar and the German mark.

Second, in both the United States and Germany, monetary policy is expressed as a matter of practice in terms of the achievement of target growth rates for monetary aggregates over one-year periods. However, monetary policy in the short run may be primarily oriented in either country toward the supply of bank reserves (as has been the case for Federal Reserve policy since October 6, 1979) or toward interest rates (as was the case for Federal Reserve policy before October 6, 1979 and as generally is the case for Bundesbank policy). One of the purposes of our analysis is to explore the short-run implications of these two types of possible operating procedures in the context of the assumed deposit shift in the Eurocurrency market.

Third, we see the Eurocurrency market as an international banking market with links to banks in national markets and as doing business with nonbank depositors and borrowers in currencies other than that of the country in which the Eurobank is located. The Eurocurrency market is nurtured in large part by the absence of regulations that are applied in domestic banking markets, including importantly reserve requirements and interest rate ceilings. Some countries, including from time to time the United States and Germany, impose reserve requirements on their banks against borrowings from the Eurocurrency market. We view the Eurocurrency markets as normally

having close links with the relevant domestic financial markets even with such regulations. In fact, the initial deposit shift is assumed to take place in the Eurocurrency market not only because that market has been the focus of much of the discussion of the potential for such shifts but also in order to illustrate how disturbances in that market are propagated to domestic financial markets.

Fourth, the time frame for our analysis might usefully be thought of in terms of months or, at most, a few quarters. This allows us to focus primarily on immediate impacts and on the techniques of monetary policy and to ignore in large part the longer-run adjustments induced by the Eurocurrency market disturbance.

The next section of the paper considers the initial and short-run implications of the deposit shift in the Eurocurrency market assuming no official exchange market intervention. In the subsequent section, we assume that official exchange market intervention (sterilized or unsterilized) maintains the dollar-mark exchange rate unchanged. The final section pulls together the implications of our analysis for policy choices.

Case I -- No Official Exchange Market Intervention

In this section we consider the effects of a shift from Eurocurrency deposits denominated in dollars to deposits denominated in marks when authorities choose not to use exchange market intervention to resist the resulting pressure on the dollar-mark exchange rate. We focus first on the initial disturbance in the Eurocurrency market and then examine the consequent financial and real adjustments in Germany and the United States. We consider two alternative short-run orientations

of monetary policy in the United States and Germany: toward interest rates or toward bank reserves.

Initial International Financial Pressures

The assumed shift in the Eurocurrency market will create an excess demand for mark assets and an excess supply of dollar assets. These excess demands and supplies will place upward pressure on the foreign exchange value of the mark against the dollar, which may be accompanied by downward pressure on interest rates on assets denominated in marks and upward pressure on interest rates on assets denominated in dollars.

Changes in the exchange rate and interest rates would tend to eliminate the initial market disequilibrium in two ways: First, expected rates of return would be reduced on mark assets and increased on dollar assets. Second, the valuation of mark assets would rise relative to the valuation of dollar assets. This valuation change may lead some asset holders to restore the original shares of mark and dollar assets in their portfolios. In the absence of official exchange market intervention, the sum of all sales of mark assets and purchases of dollar assets induced in these ways must exactly offset the initial shift from dollar deposits to mark deposits in the Eurocurrency market.

The relative magnitudes of the exchange rate and interest rate movements cannot be determined from an analysis of the Eurocurrency market in isolation. However, before proceeding to wider ramifications, it is helpful to consider the nature of the partial

adjustments in the Eurocurrency market. Three types of adjustments may occur: (1) Nonbank depositors and borrowers may respond to changes in expected yields. (2) They may also react to valuation effects. (3) Banks may alter their exchange risk exposures.

Any reduction in Euromark interest rates and rise in Eurodollar interest rates, combined with an appreciation of the mark to a level from which market participants would expect it subsequently to appreciate less than was expected before the shift in deposits occurred, would reduce the expected yield on Euromark deposits relative to Eurodollar deposits. The change in expected relative rates of return would induce some depositors in the Eurocurrency market to shift from mark deposits to dollar deposits. The change would also induce borrowers to switch from borrowing dollars to borrowing marks. These responses by depositors and borrowers would bring supplies and demands for mark and dollar assets toward balance following the initial disturbance in the Eurocurrency market. Over an extended period of time, a significant proportion of a one-time, exogenous shift in the denomination of Eurocurrency deposits might be accommodated by an adjustment in the currency composition of borrowing. However, in the short run, the size of this adjustment is likely to be small because of the relatively long maturities of many Eurocurrency credits.

The changes in valuation would induce different responses by net depositors and net borrowers. An appreciation of the mark would raise the relative value of mark deposits in the portfolios of the holders of these deposits. Depositors who were previously content with the share of mark deposits in their portfolios would be expected to

sell some mark-denominated assets. This response would also act to bring supplies and demands for mark and dollar assets toward balance following the initial disturbance in the Eurocurrency market by offsetting part of the initial excess demand for mark deposits and excess supply of dollar deposits.

Net borrowers of marks and dollars may also be induced by changes in valuation to adjust the currency composition of their borrowing. The reduction in the relative value of borrowing denominated in dollars and the increase in the relative value of borrowing denominated in marks brought about by the appreciation of the mark would induce net borrowers to borrow more in dollars and less in marks. Thus, in contrast to the response by net depositors, the response by net borrowers to valuation changes will tend to exacerbate the initial imbalance in the Eurocurrency market.

Whether the stabilizing adjustments to changes in valuation of depositors predominate or the destabilizing adjustments of borrowers predominate depends on the relative sensitivity of each group and on the relative size of the positions of the two groups. Theoretical work generally assumes that the sensitivity of net asset holders (depositors) and net debtors (borrowers) is the same. While in the Eurocurrency market assets equal liabilities, financial market participants as a group, other than the U.S. and German governments, are net holders of both mark and dollar assets representing the government debts of the United States and Germany. Consequently, general equilibrium models generally assume that the behavior of net asset holders predominates.

Banks in the Eurocurrency market may accept some change in their foreign exchange exposure as the result of taking more deposits in marks while continuing to lend in dollars. Banks would behave in this manner in response to a lower expected cost of Euromark deposits relative to the expected return on Eurodollar loans. This change in exposure may be spread widely among banks through interbank foreign exchange and Eurocurrency operations. Such a change in the exposure of banks would help to bridge the gap between the supply of mark deposits and the demand for dollar borrowing. However, available information on banks' behavior suggests that they do not normally accept large foreign exchange exposures in either the short or long run.[1]

Adjustments in Germany

Initial Financial Market Adjustments

We turn now to the links between the Euromark market and German financial markets. A downward movement of Euromark interest rates is normally accompanied by a downward movement of interest rates in Germany. In the absence of a parallel movement of interest rates in Germany, German corporations (and nonresident borrowers) would shift the locus of their borrowing toward the Euromark market. Depositors in the Euromark market would shift from Euromark deposits to time deposits at banking offices in Germany. Banking offices in Germany would also have an incentive to raise funds for lending in Germany wherever the costs, adjusted for reserve requirements, were lower. The potential for such shifts means that interest rates in the Euromark market and in

Germany, if they move in response to the disturbance under consideration, will move closely together.

Because of these linkages, the behavior of the general level of mark interest rates will be determined by the demand function for money in Germany, the derived demand function for central bank money, and the orientation of the Bundesbank in the execution of monetary policy. As we indicated earlier, we will consider two alternative orientations of Bundesbank policy: toward interest rates and toward bank reserves. Whether the Bundesbank will be confronted with an immediate need to choose between maintaining the prevailing level of interest rates and maintaining its path for bank reserves unchanged will depend on whether mark interest rates would tend to fall as a result of the initial deposit shift in the Eurocurrency market with unchanged bank reserves in Germany. If mark interest rates do come under downward pressure and the Bundesbank's policy orientation is to maintain the level of interest rates, the Bundesbank will have to allow bank reserves to grow more slowly and to allow slower growth in central bank money.

Crucial to the determination of whether mark interest rates would tend to fall is the influence, if any, on the quantity of money demanded in Germany of changes in the expected rate of return on dollar assets or of changes in the wealth of German residents as the result of a change in the exchange rate. These factors are unlikely to have a significant impact on the demand for money in Germany. Consequently, the Bundesbank is unlikely to have to choose between maintaining the level of mark interest rates and altering the amount of reserves

provided to the banking system. If downward pressure on mark interest rates is negligible, the appreciation of the mark will have to be large enough to maintain balance between supply and demand for assets denominated in marks.

Under these conditions, the mechanism through which balance is maintained relies heavily upon the assumption of stabilizing expectations in exchange markets: following a sharp appreciation of the mark, market participants expect a weaker trend for the mark than they expected before the deposit shift in the Eurocurrency market. If exchange rate expectations contained a bandwagon element, the exchange rate movement would have to be even larger before the overvaluation of the mark was sufficiently evident to bring about a reversal of expectations and contribute to a reduction in the expected relative rate of return on assets denominated in marks. In any event, the adjustment of interest rates and exchange rates (actual and expected) must induce market participants in Germany, in the United States, or in the Eurocurrency market to shift their exposures to offset the initial exogenous deposit shift. No net capital flow will occur among the three areas, but some changes in gross asset and liability positions may and probably will occur.

Subsequent Real and Financial Adjustments

If mark interest rates do not decline, or are not permitted to decline, as the initial result of the deposit shift, the appreciation of the mark will work to reduce the growth of nominal income in Germany through three channels: (1) Prices will rise less,

directly reducing nominal income below what it would have otherwise been. (2) A slower rate of price inflation will mean that unchanged nominal interest rates will imply higher real interest rates, reducing real domestic aggregate demand. (3) The contribution of the external sector to real aggregate demand will be reduced. Because of lower nominal income, the demand for money will be reduced and downward pressure on mark interest rates will emerge even if it was not initially present. To maintain the level of mark interest rates, the Bundesbank would have to reduce the stock of central bank money below what it otherwise would have been.

If the Bundesbank continued to provide reserves to maintain the growth of central bank money, some actual decline in mark interest rates would occur. Compared with an interest rate orientation of Bundesbank policy, the upward pressure on the mark exchange rate, both nominal and price-adjusted, would be reduced; the reduction in nominal income would be smaller; and the reduction in inflation would also be smaller. Real output would be higher than under an interest rate orientation of Bundesbank policy. Indeed, real output might be higher than without the deposit shift. This ambiguous result arises from the possibility that a decline in real interest rates could occur in Germany, which would stimulate domestic demand and might more than offset the drag from the external sector arising from the mark's appreciation. Thus, by maintaining the growth of central bank money the Bundesbank would offset some of the price effects and some or all of the ouptut effects of the deposit shift.

Under both orientations of Bundesbank policy, the short-run change in the German current account is indeterminant without a

quantitative specification of the influences arising from the appreciation of the mark and from changes in real aggregate demand in Germany -- to say nothing of the influences of economic developments abroad. It is clear, however, that in the absence of official exchange market intervention, a change in net private capital flows and any change in the German current account must balance one another.

Adjustments in the United States

The financial and real adjustments in the United States following the deposit shift in the Eurocurrency market will be opposite to those in Germany. Since the United States is a larger economy, however, the relative size of the impacts on U.S. ouptut and prices presumably will be less.

One additional financial adjustment is likely to be more important for the United States than for Germany for a policy oriented toward reserves. As dollar interest rates rose, the cost of satisfying domestic reserve requirements and the existence of interest rate limitations on some deposits would induce a movement from deposits bearing high reserve requirements to deposits bearing a lower or no reserve requirement and from deposits subject to interest rate limitations to assets not subject to such limitations. Other liquid asset holdings of nonbanks would also increase.

One manifestation of this phenomenon would be an increase in Eurodollar deposits held by U.S. nonbank residents. In the absence of official exchange market intervention, and ignoring the uncertain changes in the U.S. current account, any increase in Eurodollar

deposits of U.S. residents would have to be matched by a private capital inflow to the United States through other channels. This could occur through several channels. If there were no reserve requirement imposed on banks in the United States against their borrowings from the Eurodollar market, these banks would have an incentive to fund U.S. lending from reserve-free Eurocurrency deposits. If banks' Eurodollar borrowings were subject to a reserve requirement at a level comparable to the reserve requirement against domestic deposits, no incentive would exist for completing round-trip flows through this channel. However, an increase in direct lending to U.S. residents from foreign offices of foreign banks could still occur. And other channels could be utilized.

Summary of No Intervention Case

The adjustments in Germany and the United States following a deposit shift in the Eurocurrency market are summarized in table 1 for both monetary policy orientations, assuming no official exchange market intervention. Monetary policies oriented toward interest rates result in larger adjustments of the exchange rate, prices, and output than monetary policies oriented toward reserves. With an interest rate orientation, the direction of adjustment is contractionary in Germany and expansionary in the United States. Policies oriented toward reserves not only would result in smaller price adjustments but might lead to an increase, a decrease, or no change in output in either country.

If the Bundesbank and the Federal Reserve had the same monetary policy orientation, the expansionary and contractionary

Table 1

Effects of a Shift of Deposits from Eurodollars to Euromarks -- No Official Intervention

	Germany		United States	
	interest rate orientation	reserves orientation	interest rate orientation	reserves orientation
Exchange value of the currency	+	(+)	-	(-)
Interest rates	0	-	0	+
Monetary aggregates	-	0	+	0
Prices	-	(-)	+	(+)
Real output	-	(-), 0, +	+	(+), 0, -
Nominal income	-	(-)	+	(+)
Private capital flows, net	0 immediately; subsequent flows associated with changes in current account positions could be +, -, or 0.			
Official capital flows, net	0	0	0	0

Note: Parentheses indicate that the quantitative effect is smaller than for the other policy orientation.

results in the two countries would be roughly offsetting in their global impact, though presumably the relative impact on prices and output in Germany would be larger. With different orientations, a Eurocurrency deposit shift could have net inflationary or deflationary consequences for the global economy. For example, if the Bundesbank had an interest rate orientation and the Federal Reserve had a reserves orientation, the net result would be contractionary.

Case II -- Official Exchange Market Intervention

In this section we consider the effects of a Eurocurrency deposit shift when authorities choose to use official exchange market intervention to maintain the dollar-mark exchange rate unchanged. We focus primarily on intervention that is sterilized in the sense that it is not associated with any change in bank reserves in either country.

To provide background for our analysis, we consider first a number of the techniques for sterilized intervention that are available to the Bundesbank and Federal Reserve. These techniques have in common that they all change the net positions in dollars and marks of the two central banks combined. We assume that this change in positions will suffice to maintain the dollar-mark exchange rate unchanged by altering the size of the net positions in the two currencies that must be taken up by other market participants. Our assumption that sterilized intervention can affect exchange rates by this mechanism is consistent with our fundamental premise that an exogenous shift of demand in the Eurocurrency market from deposits

denominated in dollars to deposits denominated in marks would cause the dollar-mark exchange rate to change in the absence of such intervention. If demand shifts matter, then supply shifts must also matter!

Following our discussion of the techniques of sterilized intervention we consider the economic and financial implications of a Eurocurrency deposit shift when sterilized intervention maintains the exchange rate unchanged. We then consider unsterilized intervention and compare the results with those for sterilized intervention.

The distinction between an interest rate orientation and a reserves orientation of monetary policy is not central to the discussion in this section. It will be shown that for the sub-case of sterilized intervention the differences between the two orientations are technical and not fundamental. If intervention is not sterilized, either orientation must be subordinated to the objective of stabilizing the exchange rate.

Techniques of Sterilized Intervention

Either the Bundesbank or the Federal Reserve could undertake exchange market sales of marks and purchases of dollars to maintain the dollar-mark exchange rate unchanged in the face of a Eurocurrency deposit shift from dollars to marks. The financial and economic responses will be the same regardless of which central bank does the intervention, as long as it is sterilized in both countries.

Intervention and sterilization can take many forms. For example, the Bundesbank could purchase dollars with marks in the spot

market. To maintain bank reserves and central bank money unchanged, it would have to absorb the bank reserves supplied by the intervention operation. This absorption might occur automatically through a reduction in the use of Lombard credit by German banks as the supply of nonborrowed reserves increased; the Bundesbank could also undertake open market sales of mark assets from its portfolio; or it could engage in a simultaneous swap transaction, selling dollars spot for marks and buying them back forward. This last type of sterilization, in effect, converts the initial spot intervention into the equivalent of outright forward intervention.[2] The Bundesbank may be limited in the extent to which it can employ the first two types of sterilization techniques by the amount of Lombard credit outstanding or by the size of its holdings of mark assets. However, its scope for using the third technique, and variants upon it, is in principle unlimited.

Following its normal practice, the Bundesbank would invest the dollars it acquired through intervention in U.S. Treasury securities. If it bought these securities in the open market, no change would occur in the Federal Reserve's balance sheet. However, if the Bundesbank used the dollars to purchase the securities from the Federal Reserve, the Federal Reserve would have to undertake an offsetting open market purchase of securities to sterilize the effect of the transaction on the supply of bank reserves in the United States.

Intervention could also be undertaken by the Federal Reserve using marks held at the Bundesbank or obtained through its swap line with the Bundesbank. In the first case, the Federal Reserve would have to buy Treasury securities with the dollars acquired in intervention in

order to sterilize; in the second case, sterilization occurs automatically.[3] The response required of the Bundesbank to sterilize the intervention would be the same as when the Bundesbank intervenes itself. If the Treasury issued mark-denominated debt on the German market (Carter notes), reduced its sales of dollar-denominated debt correspondingly, and immediately sold the mark proceeds for dollars, neither the Bundesbank nor the Federal Reserve would need to take any action to sterilize the intervention operation.

In all of the cases discussed above, the essential feature of the sterilized intervention is that no change occurs in bank reserves in either country. Alternatively, either central bank could change its reserve requirements following an intervention operation. The Bundesbank has on occasion raised required reserves to prevent an increase in bank reserves induced by intervention from leading to an increase in the money supply. This technique forces banks to lend interest free to the Bundesbank and to reduce their holdings of interest-earning assets. Hence, bank profits are squeezed, which limits the practical scope for using this technique.

Effects of Sterilized Intervention

Sterilized intervention using any of the techniques described above would enlarge private market participants' net holdings of mark-denominated assets and forward positions and would reduce their net holdings of dollar-denominated assets and forward positions. The amount of intervention that would be required to keep the exchange rate unchanged would equal the initial, exogenous shift from dollar deposits

to mark deposits in the Eurocurrency market, but this shift normally would be unobserved. Intervention would have to meet exchange market pressure for as long as the Eurocurrency deposit shift was thought to be continuing.

As a consequence of such sterilized intervention, the general level of mark interest rates and of dollar interest rates would be unaffected. Hence, both a reserves orientation of monetary policy (with technical adjustment of the reserves path for sterilization through changes in reserve requirements) or an interest rate orientation would essentially require no further central bank action once the intervention and sterilization operations were completed.

Real output, prices, and current account positions in both countries would be unaffected by the disturbance if intervention maintained the exchange rate and interest rates unchanged. Private and official international capital flows generally would occur, however. It is worthwhile to consider some of the forms such flows might take and examine why they would not have expansionary or contractionary implications.

Most of the techniques of sterilized intervention discussed above would be recorded as official capital flows in the balance of payments -- generally as an increase in official reserve assets for Germany (official capital outflow) and as either a decline in official reserve assets or a rise in official liabilities for the United States (official capital inflow). These official flows would balance a net private capital inflow to Germany and a net private capital outflow from the United States involving, directly or indirectly, the

Eurocurrency market. These flows would eliminate the initial excess supply of dollar assets in the Eurocurrency market created by the deposit shift. The increased supply of mark assets and reduced supply of dollar assets created by the sterilized intervention in the two countries would reestablish equilibrium at an unchanged exchange rate without necessarily involving adjustments in the general levels of mark and dollar interest rates.

The principal channels for private capital flows from the Eurocurrency market to Germany would be: German firms' increasing their borrowing from the Euromark market, German banks' raising funds in the Euromark market for lending in Germany, and nonresidents' switching from borrowing in Germany to borrowing in the Euromark market and from deposits in the Euromark market to deposits in Germany.

The net private capital inflows to Germany would add to credit available to German residents. However, total credit available to private German residents would be unchanged because credit available from domestic sources would be reduced by an equal amount. The process of sterilization would bring about this reduction. Credit would be absorbed by Bundesbank sales of mark securities to German banks, through reductions in Lombard credit taken up by German banks to fund lending to nonbanks, or as a result of an increase in required reserves (against an unchanged stock of bank liabilities) that would necessitate a decline in other bank assets.

The financial flows that would occur involving the United States would generally correspond, but be opposite, to those involving Germany. An official inflow as a result of the sterilized intervention

would be associated with a net private capital outflow from the United States to the Eurocurrency market. The private sector would hold fewer Treasury securities and more net claims on foreigners, probably largely in the form of a shift in the net position of U.S. banking offices vis-à-vis affiliates in the Eurodollar market.

Forward market intervention to maintain the exchange rate would be an exception to these general patterns of recorded international capital flows, but the economic consequences would be essentially the same. No official capital flow or net private capital flow would occur. Rather such intervention would increase the supply of forward cover for short mark positions against dollars in the exchange market. Eurocurrency banks could take up such cover against the increase in their mark deposits and the decline in their dollar deposits. In this way they would be able to pursue an unchanged currency composition of their lending without incurring any change in their exchange rate exposures. Domestic financial markets need not become involved at all.

Unsterilized Intervention

A policy of unsterilized intervention would imply an increase in bank reserves is Germany and a decrease in the United States equivalent to the amount of the intervention. For example, intervention would be unsterilized in both countries if the Bundesbank purchased dollars in the spot market, used them to purchase Treasury securities from the Federal Reserve, and the Federal Reserve did not undertake any offsetting purchases of Treasury securities. Some types

of intervention operations might result in sterilization in one country and not the other.

Mark interest rates would fall if the Bundesbank did not sterilize, and dollar interest rates would rise if the Federal Reserve did not sterilize. These interest rate adjustments would help to eliminate the excess supply and demand created by the initial disturbance. Hence, a smaller volume of intervention would be required to maintain an unchanged exchange rate than if the intervention were sterilized. The corresponding private capital flows would also be smaller.

Monetary growth would be more rapid in Germany and slower in the United States than otherwise. Upward pressure on output and prices would develop in Germany, and downward pressure would develop in the United States. Thus, the effects on the price level would be opposite to those in the case of no intervention; the effects on real output would be opposite (compared with monetary policy oriented toward interest rates) or unambiguous (compared with monetary policy oriented toward reserves). The German current account would move toward deficit and the U.S. current account would move toward surplus. These current account developments would entail further net private capital inflows to Germany and net private capital outflows from the United States. If these flows did not occur at an unchanged exchange rate, the earlier intervention would have to be reversed at least in part to prevent a depreciation of the mark against the dollar.

The adjustments in Germany and the United States following a deposit shift in the Eurocurrency market are summarized in table 2 for sterilized and non-sterilized intervention.

Table 2

Effects of a Shift of Deposits from Eurodollars to Euromarks -- Official Intervention

	Germany		United States	
	Sterilized in both countries	Unsterilized in both countries	Sterilized in both countries	Unsterilized in both countries
Exchange value of the currency	0	0	0	0
Interest rates	0	-	0	+
Monetary aggregates	0	+	0	-
Prices	0	+	0	-
Real output	0	+	0	-
Nominal income	0	+	0	-
Private capital flows, net	+	(+)	-	(-)
Official capital flows, net	-	(-)	+	(+)

Note: Parentheses indicate that the quantitative effect is smaller than for the sterilized case.

Implications for Policy Choices

We shall conclude by making several observations concerning the domestic and international monetary policy choices available to the Bundesbank and the Federal Reserve in the face of a Eurocurrency market disturbance such as the one we have analyzed.

Our first observation is that the two central banks can, in theory, neutralize the economic effects of a deposit shift in the Eurocurrency market by undertaking sterilized intervention. Following such a policy may be difficult in practice, however. The Bundesbank and the Federal Reserve generally will not know to what extent a shift in asset preferences of the type we have postulated is the cause of pressure on the dollar-mark exchange rate and to what extent the cause of the pressure is some other disturbance. Exchange market pressures could result from monetary policies in two countries that were fundamentally inconsistent with an unchanged exchange rate, from disturbances involving the demand for money, or from real disturbances. These other causes of exchange rate pressures would entail monetary or real econmic adjustments. The adjustments that would occur with a policy of sterilized intervention could be more disruptive than those that would occur if the exchange rate were permitted to move. Hence, our analysis should not be interpreted as a general argument in favor of maintaining fixed exchange rates. Nevertheless, it suggests that, to the extent exchange market pressures can be identified with shifts in asset preferences, economic stability would be improved by sterilized intervention.

One indication that a shift in asset preferences lay behind exchange market pressures might be given by the simultaneous behavior of interest rates. Our analysis shows that such a shift would put downward pressure on mark interest rates, upward pressure on dollar interest rates, and upward pressure on the exchange value of the mark -- although we noted that the interest rate pressures might be slight or delayed. Most other disturbances that would put upward pressure on the exchange value of the mark would have opposite effects on interest rates. Indeed, appreciation of a currency is more often associated with rising interest rates on assets denominated in that currency and depreciation with falling interest rates. This correlation suggests that asset shifts are not the dominant explanation of exchange rate changes. It should also be noted that a contraction of nominal income in Germany relative to the money supply, for example, together with a sufficiently large decline in expectations of inflation in Germany would generate a decline in the mark interest rate and an appreciation of the mark. It would be much less clear under such circumstances that maintaining an unchanged exchange rate and unchanged domestic monetary policies would be an appropriate response. Nevertheless, examining exchange rate movements in the context of other financial developments may provide useful evidence concerning their origins.

German and U.S. officials might obtain better information about asset demand shifts by providing or favoring the international provision of special investment facilities to official holders as an alternative to investment in the Eurocurrency market. However, this benefit from establishing such facilities would need to be weighed

against the costs. For example, the costs of making such facilities attractive to potential official investors would have to be considered, as would the risk that asset shifts would be encouraged by offering such facilities. Moreover, it would be wrong to interpret all changes in asset holdings of official institutions as exogenous disturbances reflecting a change in preferences. Changes in official portfolios could also reflect responses to changes in interest rates and to the influence of changing expectations about prospective economic developments.

Efforts by the Bundesbank and the Federal Reserve to determine the origins of exchange market pressures will inevitably leave very large uncertainties. In the face of such uncertainties, the two central banks might modify the policies they would have chosen in a case when they knew for certain the underlying cause of the exchange market pressures. For example if they would have chosen to maintain the exchange rate unchanged, knowing for certain that a shift in asset demands had occurred, they might intervene to moderate, but not to prevent, an exchange rate movement, suspecting but not knowing that such a shift had occurred. This strategy would be an application of the principle of policymaking under uncertainty put forward by Brainard (1967).

Our second observation is that, while sterilization would neutralize the economic effects of an exogenous asset shift, the Bundesbank might prefer other policies. For example, it could achieve a short-run reduction in German inflation with little change in output if no intervention occurred and its monetary policy was oriented toward

reserves. For the Federal Reserve, no policy action would result in better combinations of inflation and output in the short run than the combinations that were available before the disturbance occurred. Thus, the Federal Reserve might be more favorably disposed toward intervention than the Bundesbank. On the other hand, the short-run advantage to Germany of an appreciation of the mark could well be offset by the longer-run implications of a possible deterioration in the external competitive position of Germany.

The asymmetry in the short-run advantages from sterilized intervention, which arises because a policy of active intervention to drive the exchange rate is precluded by international convention, could be an obstacle to central bank cooperation in dealing with disturbances of the type we have analyzed. The uncertainty concerning whether such disturbances lay behind any particular episode of pressure on the exchange rate and the question of how the exchange risk that would result from intervention should be divided between the Bundesbank and the Federal Reserve might pose other obstacles.

Our third observation concerns the choice of domestic monetary policy techniques. On the whole, our analysis suggests that a reserve orientation would yield more favorable results than an interest rate orientation, under the conditions we have considered. If the two central banks intervened and sterilized, either domestic monetary policy would lead to the same results. The economic effects of a shift in asset demands would be smaller with no intervention and a reserves orientation of monetary policy than with no intervention and an interest rate orientation or with intervention that was permitted to

alter the supplies of bank reserves (unsterilized intervention). This is true even though the quantity of reserves or of money has no direct effect on output and prices in our analysis but only influences these variables indirectly through interest rates and the exchange rate.

The multipliers relating the supply of reserves to monetary targets (central bank money in Germany and the family of monetary aggregates in the United States) cannot be expected to be absolutely stable when the exchange rate and interest rates change. Moreover, the relationship between a given monetary aggregate, on the one hand, and ouptut, prices, and even nominal income, on the other hand, may be altered by shifts in asset demands. Thus, our analysis highlights in this specific case a general conclusion of Bryant (1980): central banks should review periodically both the reserves path appropriate to achieving their stated monetary targets and the monetary targets themselves in terms of the ultimate objectives of policy -- price stability and output.

NOTES

* Division of International Finance, Board of Governors of the Federal Reserve System. Our thinking over the years about the issues analyzed in this paper has been stimulated and informed by discussions with our colleagues, especially Klaus Friedrich and Dale W. Henderson. However, the views expressed are solely those of the authors and do not necessarily represent the views of the Board of Governors of the Federal Reserve System or its staff.

1. For example, Lowrey and Smith (1980) found that U.S. banks' foreign exchange exposure was small and relatively stable during the period of intense exchange market pressures from September through November 1978.
2. The Bundesbank could also either sell mark-denominated participations in its holdings of U.S. Treasury securities or sell the securities outright with a promise to repurchase them at a specified later date at a fixed price in terms of marks.
3. The sterilization is automatic because the U.S. bank reserves absorbed by the intervention operation are normally replaced by reserves created as part of swap transactions. Should the latter step not complete the sterilization, open market purchases will do so (Kubarych 1977-78).

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