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March 28, 1984

To: Members of the Executive Board
From: The Secretary
Subject: A Note on Interest Rates on SDR-Denominated Assets

Attached for the information of the Executive Directors is a note on interest rates on SDR-denominated assets.

If Executive Directors have technical or factual questions relating to this paper, they should contact Mr. Bhuiyan (ext. (5)7800) or Mr. Roncesvalles (ext. (5)7807).

Att: (1)

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Department Heads

INTERNATIONAL MONETARY FUND

A Note on Interest Rates on SDR-Denominated Assets

Prepared by the Treasurer's Department

Approved by David Williams

March 27, 1984

I. Introduction

As requested at EBM/83/150 (10/24/83), this note provides information on interest rates on SDR-denominated assets, including information on various types of SDR-related interest rates used by the Fund in its borrowing agreements (Section II). The note also includes a brief discussion of interest rates on SDR-denominated assets in the private market (Section III).

II. Interest Rates on Fund-Related Assets

I. SDR interest rate, GAB interest rate,
and rate of remuneration

The determination of the SDR interest rate is closely related to the method of valuation of the SDR. The daily value of the SDR is determined in terms of the U.S. dollar, using fixed units of five major currencies, namely, the U.S. dollar, the Deutsche mark, the pound sterling, the French franc, and the Japanese yen and applying to them London noon quotations in terms of the U.S. dollar. For currencies other than the U.S. dollar, the value in terms of the SDR is determined by applying the representative rate of the currency concerned against the U.S. dollar to the dollar value of the SDR. Illustrative calculation of the value of the SDR in terms of U.S. dollars is shown in Annex I.

Following the unification of the SDR valuation and interest rate baskets in January 1981, the rate of interest on the SDR is calculated by using interest rates on selected short-term instruments in the domestic money markets of the five countries whose currencies are included in the valuation basket to determine a combined market rate. The SDR interest rate is a specified percentage of the combined market rate. These instruments, listed in Rule T-1(c), are: market yield on three-month U.S. Treasury bills, three-month interbank deposit rate in Germany, three-month interbank money rate against private paper in France, rate on two-month (private) bills in Japan, and market yield on three-month U.K. Treasury bills.

The method used to calculate the combined market rate is as follows: the reported yield or interest rate on the instrument for each component currency is multiplied by the number of units of that currency in the basket, and the product is then multiplied by the value of the currency unit in terms of the SDR; the resulting products for the five currencies are then added together. ^{1/} The total is rounded to the two nearest decimal places. Since May 1981, the SDR interest rate has been 100 percent of the combined market rate thus calculated. An illustrative calculation of the SDR interest rate is set out in Annex II.

Until August 1, 1983, the SDR rate was set quarterly on the basis of average interest rates in the 15 business days preceding the last two business days of the month before the calendar quarter for which the SDR interest rate applied, but since then the SDR interest rate is calculated weekly each Friday for the week beginning on the ensuing Monday. Interest on the holdings of SDRs accrue daily and is credited to the accounts of members and official holders on a quarterly basis; charges on net cumulative allocations, which are at the same rate as the SDR interest rate, are also debited to participants' accounts on the same day that interest amounts due are credited.

Under the revised and enlarged General Arrangements to Borrow (GAB), the interest rate paid by the Fund to the lender will be equal to the combined market interest rate computed by the Fund for determining the SDR interest rate. The interest rate payable on GAB claims will thus be equal to 100 percent of the combined market rate adjusted on a weekly basis. Interest payments will be made at the end of each financial quarter.

Since May 1981, the rate of remuneration ^{2/} has been 85 percent of the SDR interest rate, rounded to the nearest two decimal places, but this coefficient will increase by 3.33 percentage points to 88.33

^{1/} The combined market rate formula, in mathematical terms, is:

$$\sum_{j=1}^5 c_j r_j e_j$$

where c_j , r_j , e_j denote respectively, for the j th currency, the currency units in the SDR valuation basket, the interest rate (in percent per annum), and the exchange rate in SDRs per unit of currency.

^{2/} Remuneration is paid by the Fund on the amount by which the member's norm for remuneration exceeds the Fund's average daily balances of the member's currency held in the General Resources Account excluding balances acquired as a result of a member's use of the Fund's resources under a policy that has been the subject of an exclusion under Article XXX(c) (i.e., excluding purchases under: Compensatory Financing Facility, Buffer Stock Facility, Credit Tranches and Extended Facility, Supplementary Financing Facility, and Enlarged Access).

percent on May 1, 1984 and by the same amount on May 1, 1985 and on May 1, 1986. Further increases, subject to a maximum amount in any year, in this coefficient may occur up to April 30, 1987, depending on any fall in the SDR interest rate from its level on April 30, 1984 and beginning May 1, 1987, depending on falls in the SDR rate from its level on April 30, 1987. 1/

2. Interest rate on non-GAB borrowing by the Fund

Under the policy on enlarged access to the Fund's resources (EAR), interest rates on Fund borrowings under EAR are calculated using the same methodology as that used in calculating the SDR interest rate, except for rounding procedures and the financial instruments which have maturities of six months, one year, and five years (see Annex III).

The instruments used in the loan agreements concluded in 1981 are mostly claims on governments of the five countries whose currencies are included in the interest rate basket. Interest rates on borrowings under the 1981 agreement with the Bank for International Settlements (BIS) are calculated on the basis of domestic financial instruments each with a maturity of six months while the 1981 borrowing arrangements with central banks, other than the Saudi Arabian Monetary Agency (SAMA), are calculated on the basis of domestic financial instruments with maturities of either six months or one year. Interest rates on EAR borrowings from SAMA under the first and second tranches of the loan agreement with the Fund that was concluded in May 1981 are computed by using domestic financial instruments with five-year maturities. The interest rate on borrowings under the proposed third tranche of the loan agreement is being finalized. The calculation of the combined market rates is rounded up to the nearest one-sixteenth of one percent. Each call under the 1981 loan agreements is a separate loan and the interest rate calculation is made in connection with each call on these borrowed resources, and the rates are adjusted every six months thereafter. Interest payments are made semiannually from the date of the initial drawing.

The financial instruments and the calculation procedures for determining interest rates under the proposed new EAR borrowing arrangements with the BIS, Japan, and the National Bank of Belgium will be different from those enumerated above. Under these proposed new arrangements, offered rates on deposits in the eurocurrency market for the five currencies as notified by the Bank of England will be employed for calculating interest rates (if the London market is closed, the Paris rates as reported by the Bank of France will be used). The interest rate calculations will be made by applying to the offered eurocurrency deposit rates the corresponding percentage weights of the currencies in the SDR valuation basket determined two or three business days 2/ before

1/ For details of the decision on the remuneration coefficient, see EBS/84/3 (1/5/84).

2/ Two business days under the BIS arrangement and three business days under that with Japan and the National Bank of Belgium.

the value date of the drawing. The weighted average derived in this manner will be rounded up to the next 1/8 of one percent. The offered rate on three-month deposits will be used in connection with borrowings from the BIS and the National Bank of Belgium while six-month rates will be used for those from Japan.

Under the Supplementary Financing Facility (SFF) established in 1977, the Fund uses the market yield on a dollar-denominated asset--the average yield on U.S. government securities with a constant maturity of five years--even though the outstanding amount borrowed (SDR 6,918.7 million as of March 31, 1984) and the interest payment are denominated in SDRs. The SFF interest rate is adjusted every six months, for each half year ending on June 30 and December 31, as the arithmetic average of the daily yields over the period, rounded up to the next 1/8 of one percent. 1/

Time series on various combined market rates discussed above are shown in Table 1.

3. Charges on use of Fund credit

Charges on the use of Fund resources are payable in SDRs. On the use of the Fund's ordinary resources, in the credit tranches and under the Extended Fund Facility and the special facilities (i.e., Compensatory Financing Facility and Buffer Stock Financing Facility), the rate of charge is a single fixed rate, which is reviewed periodically and adjusted, if necessary, to attain the agreed net income target in the Fund's operation. 2/ The rate of charge for use of ordinary resources has been 6.6 percent since May 1, 1982; charges are payable at the end of each financial quarter.

As regards charges on the use of borrowed resources under the SFF, the rate of charge is determined by the actual interest rate on SFF borrowed resources plus a margin, which ranges from 0.2-0.325 percentage point, depending on how long the balances subject to charge have been outstanding. 3/ Under the EAR, a fixed margin of 0.2 percentage point

1/ Under the oil facilities established in 1974-75, the Fund paid fixed interest rates on amounts borrowed: 7 percent per annum under the 1974 facility and 7 1/4 percent under the 1975 facility.

2/ The Fund also applies a one-time 0.5 percent service charge for each purchase transaction other than those in the reserve tranche and a charge of 0.25 percent per annum on the amounts that could be purchased during that year under stand-by and extended arrangements; the charge is refundable on a pro-rated basis when the drawing is actually made.

3/ For purchases under stand-by and extended arrangements which took effect prior to the effective date of the SFF (February 23, 1979), the rate of charge to be applied to holdings of currency in excess of 200 percent of quota (under stand-by arrangements) or 140 percent of quota (under extended arrangements) is equal to the average yield calculated for purposes of determining the SFF interest rate, rounded up to the nearest 1/4 of one percent, plus 1/4 of one percent.

TABLE 1. ALTERNATIVE COMBINED MARKET RATES

(IN PERCENT PER ANNUM)

COMBINED DOMESTIC MARKET RATES				COMBINED EURO- OFFERED RATES 1/		
THREE-MONTH MATURITY (1)		SIX-MONTH MATURITY (2)	ONE-YEAR MATURITY (3)	FIVE-YEAR MATURITY (4)	THREE-MONTH MATURITY (5)	SIX-MONTH MATURITY (6)
1982 FEB	11,88	12,35	12,42	12,73	13,10	13,33
1982 MAR	12,45	12,51	12,49	12,81	14,26	13,99
1982 APR	12,10	12,16	12,22	12,44	13,61	13,49
1982 MAY	11,59	11,66	11,74	12,37	14,08	13,63
1982 JUN	12,12	12,43	12,58	13,00	13,63	13,85
1982 JUL	10,86	11,51	11,59	12,50	11,99	12,70
1982 AUG	8,83	9,70	10,10	11,31	11,01	11,57
1982 SEP	8,72	9,50	9,80	11,11	11,05	11,49
1982 OCT	8,54	8,88	8,93	10,45	10,20	10,28
1982 NOV	8,50	8,71	8,98	10,17	9,77	10,04
1982 DEC	8,58	8,65	8,74	10,05	10,40	10,30
1983 JAN	8,49	8,51	8,64	10,03	9,51	9,61
1983 FEB	8,39	8,49	8,57	9,89	9,77	9,70
1983 MAR	8,52	8,61	8,66	9,92	8,83	9,07
1983 APR	8,20	8,26	8,36	9,72	8,55	8,80
1983 MAY	8,45	8,48	8,66	10,02	8,73	9,06
1983 JUN	8,63	8,80	9,07	10,31	9,10	9,53
1983 JUL	8,73	9,02	9,39	10,65	9,20	9,72
1983 AUG	8,90	9,26	9,71	10,93	9,54	9,97
1983 SEP	8,59	8,88	9,24	10,48	8,99	9,27
1983 OCT	8,49	8,79	9,14	10,52	8,94	9,18
1983 NOV	8,64	8,86	9,20	10,42	9,14	9,32
1983 DEC	8,72	8,99	9,28	10,52	9,26	9,46
1984 JAN	8,62	8,87	9,09	10,36	9,06	9,24
1984 FEB	8,72	8,97	9,16	10,48	9,56	9,68
AVERAGE	9.37	9.63	9.83	10.93	10.45	10.65

SOURCE: TREASURER'S DEPARTMENT, IMF.

NOTE: THE DATA PERTAIN TO THE LAST WEDNESDAY OF THE MONTH.

1/ THE COMBINED RATE HAS BEEN CALCULATED BY WEIGHTING THE INDIVIDUAL INTEREST RATES BY THE SHARE OF EACH CURRENCY IN THE U.S. DOLLAR VALUE OF THE SDR AS CALCULATED BY APPLYING LONDON NOON EXCHANGE RATES ON THE FIXED CURRENCY UNITS IN THE BASKET.

is added to the net cost of borrowed funds expressed as an annual percentage rate of average daily balances of outstanding EAR purchases. The rates of charge under the SFF and EAR are calculated for each half of the calendar year. These charges are payable as of every end-June and end-December.

III. Interest Rates on Private Assets Denominated in SDRs

SDR-denominated financial assets are traded in the private market principally in the form of term deposits offered by commercial banks with maturities ranging from one to twelve months. Floating rate notes, certificates of deposits, and fixed coupon bonds have also been issued, and some syndicated bank loans were known to have been arranged. There is also a forward market in private SDRs. ^{1/} Although the private market in SDR-denominated assets expanded substantially shortly after the simplification of the SDR basket from sixteen to five currencies in January 1981, the private market remains quite small and has reportedly diminished in size over the last year. This is true for SDR-denominated deposits as well as for bonds denominated in SDRs. Comprehensive data on the total volume of SDR-denominated deposits are not available. However, at the end of 1983, such deposits, including floating rate notes issued by banks in the United Kingdom, which can be regarded as the largest market, aggregated the equivalent of SDR 1 billion, or 0.2 percent of the total foreign currency position held by these banks. Face values of SDR-denominated bonds registered in the Luxembourg Stock Exchange and outstanding at this time aggregate SDR 418 million. ^{2/}

Interest rates quoted by commercial banks on SDR-denominated deposits are especially important in the case of floating rate SDR-denominated notes, where the market practice has usually been to reset the interest rate--and hence, the coupon payment--at a fixed margin over an average of SDR-denominated deposit rates of specific reference banks. A similar method is also employed in determining the coupon on fixed rate SDR-denominated bonds when these bonds are issued, although they typically trade at a premium or discount over par.

The determination of interest rates in the private market for SDR-denominated financial assets is made by reference to the results of formulas employing euromarket interest rates for the SDR's component currencies. A number of formulas, all of which yield results that fall within a narrow range, are said to be used. These formulas can be broadly classified according to whether they employ spot or forward

^{1/} See "The Evolution of the SDR Outside the Fund," SM/82/93 (5/10/82).

^{2/} Yields on these bonds are published weekly in Yields for Straight Bonds Listed on the Luxembourg Stock Exchange by the Côte Officielle de la Bourse de Luxembourg.

exchange rates. As regards the formulas using spot rates, one of them constructs the private SDR as a composite of eurocurrency deposits and uses spot exchange rates to convert the individual returns on these deposits, which are then summed to derive the SDR deposit rate. This methodology is essentially the same as that used by the Fund for determining the SDR interest rate, except that eurocurrency deposit rates are employed. Another reference calculation in this category is one that employs the interest rate on a single vehicle currency for investment, normally the eurodollar, and deducts from it the forward premium (or adds to it the discount) of the other basket currencies against the U.S. dollar; the amounts of the currencies involved in the forward operations are those specified in the SDR valuation basket. Both these methods yield the same result in a perfectly arbitrated market. ^{1/} Some banks reportedly also use the percentage shares of the component currencies in the U.S. dollar value of the SDR as weights for combining euromarket interest rates to derive interest rates on SDR-denominated deposits. This method is the same as that described earlier in connection with the determination of interest rates on new borrowing arrangements with the BIS, the National Bank of Belgium, and Japan. A further method, which falls in the second category indicated above, involves the determination of a forward value of the SDR by using exchange quotations in the forward market and derives the interest earned on the dollar value of the SDR by adjusting it upward (or downward) by the forward discount (or premium) of the SDR against the U.S. dollar. This method as well as the single-currency investment covered in the forward exchange market described above are sensitive to any marked disturbances which affect, on occasions, forward exchange rates. However, the method that adjusts the U.S. dollar interest rate by the forward value of the SDR tends to result in a lower reference interest rate than the other methods described above, in the absence of perverse movements of interest rates in relation to forward exchange rates. This is because the calculation of a forward value of the SDR effectively lowers the implicit weight of high-interest currencies in the calculation. A number of reference formulas, including those discussed above, are set out in the mathematical Annex IV.

The averages of SDR-denominated deposit rates quoted by commercial banks (Table 2) are generally lower, usually by small margins, than the results, as calculated by Fund staff, using the reference formulas described above, perhaps reflecting transaction costs and/or profit margins, on which no information is available, and also the possible use of bid rates by the banks. There are also differences, sometimes significant, between the rates quoted by different banks which may be due to the use of different formulas, different reference time and also different

^{1/} It may be mentioned that forward quotations in the offshore markets are unlikely to be consistent with interest rate parity when domestic instruments are employed.

Table 2. Interest Rates on SDR-Denominated Assets

(In percent per annum)

Last Wed.	Combined euro- currency rates 1/			Average commercial bank deposit rates			BIS deposit rates		
	Three- month matu- rity	Six- month matu- rity	One- year matu- rity	Three- month matu- rity	Six- month matu- rity	One- year matu- rity	Three- month matu- rity	Six- month matu- rity	One- year matu- rity
<u>1982</u>									
Mar.	14.07	13.79	13.53	13.91	13.67	13.31	13.50	13.38	13.13
Apr.	13.49	13.37	13.12	13.28	13.18	12.88	13.00	13.00	12.75
May	13.93	13.48	13.13	13.71	13.34	12.84	13.31	13.00	12.69
June	13.51	13.73	13.70	13.30	13.51	13.48	13.06	13.31	13.38
July	11.89	12.59	12.64	11.77	12.46	12.45	11.50	12.25	12.31
Aug.	10.82	11.37	11.71	10.55	11.18	11.47	10.13	10.81	11.25
Sept.	10.85	11.36	11.60	10.79	11.23	11.45	10.50	11.00	11.25
Oct.	10.09	10.17	10.27	9.90	10.02	10.06	9.63	9.81	9.89
Nov.	9.69	9.93	10.03	9.50	9.75	9.88	9.25	9.50	9.69
Dec.	10.25	10.16	9.88	10.11	10.01	9.66	9.63	9.69	9.50
<u>1983</u>									
Jan.	9.37	9.50	9.70	9.16	9.28	9.27	8.88	9.06	9.06
Feb.	9.65	9.59	9.50	9.47	9.44	9.24	9.19	9.19	9.13
Mar.	8.73	8.97	9.28	8.58	8.86	9.02	8.25	8.56	8.88
Apr.	8.46	8.70	9.03	8.39	8.66	8.90	8.00	8.31	8.63
May	8.61	8.96	9.27	8.47	8.77	9.05	8.38	8.50	8.88
June	9.01	9.43	9.74	8.86	9.27	9.52	8.56	9.06	9.38
July	9.10	9.62	9.94	8.96	9.44	9.71	8.63	9.25	9.56
Aug.	9.44	9.87	10.18	9.26	9.65	9.96	8.94	9.44	9.81
Sept.	8.91	9.20	9.44	8.78	9.07	9.30	8.44	8.81	9.13
Oct.	8.84	9.08	9.40	8.70	8.91	9.14	8.38	8.63	9.00
Nov.	9.06	9.24	9.51	8.90	9.06	9.35	8.63	8.81	9.06
Dec.	9.17	9.37	9.59	9.05	9.23	9.40	8.56	8.88	9.25
<u>1984</u>									
Jan.	8.97	9.14	9.48	8.89	9.08	9.36	8.44	8.75	9.13
Feb.	9.48	9.57	9.90	9.31	9.44	9.75	9.00	9.19	9.50

Source: IMF, Treasurer's Department.

1/ Based on midpoint between bid and offered deposit rates.

margins incorporated in the reference calculations. Combined SDR interest rates based on eurocurrency deposit rates and average commercial bank SDR deposit rates for maturities of three months, six months, and one year together with combined rates resulting from the use of domestic instruments, are published in the monthly report on Foreign Exchange and Financial Markets issued in the Fund's DM series (see Annex V).

The BIS also offers term deposits for maturities up to 12 months, mainly to its member central banks and to the Fund. A large part of the resources of the Fund's Borrowed Resources Suspense Accounts has been invested in such deposits with the BIS. Interest rates on the Fund's SDR-denominated deposits are agreed between the Fund and the BIS at the time of each deposit. These deposits are of short-term character, averaging between 1 1/2 and 2 1/2 months. Interest rates quoted by the BIS for deposits of 1- to 12-month maturities are normally slightly lower than the average of the rates quoted by the commercial banks (see Table 2).

As might be expected, there are differences between interest rates presently calculated by the Fund and those offered in the private market on SDR-denominated assets. They reflect not only the differences in instruments used for the calculations but also the fact that exchange rates used by commercial banks may differ from those used by the Fund, reflecting differences in the rates in different markets ^{1/} and the use of different times in the day, and also because middle rates, used by the Fund, are hardly used in the private market. Furthermore, interest rates offered by different banks on SDR-denominated deposits differ among themselves, reflecting the underlying differences among these banks in their eurocurrency deposit rates even if they use the same basic formula.

The chart shows for different maturities, the average commercial bank deposit rates, the SDR interest rate and combined domestic rates, and the combined eurocurrency rates. The combined domestic rates are generally lower than the commercial bank deposit rates, reflecting lower rates on domestic instruments in most of the countries in relation to the corresponding rates in the euromarket. The SDR interest rate and other combined domestic rates have been generally more stable than those offered in the private market, reflecting the higher volatility of the individual interest rates in the eurocurrency market compared with those in domestic markets.

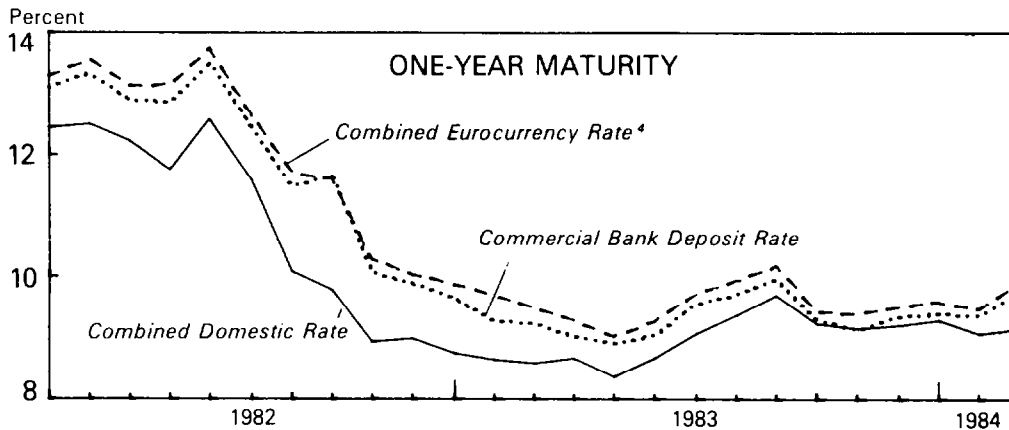
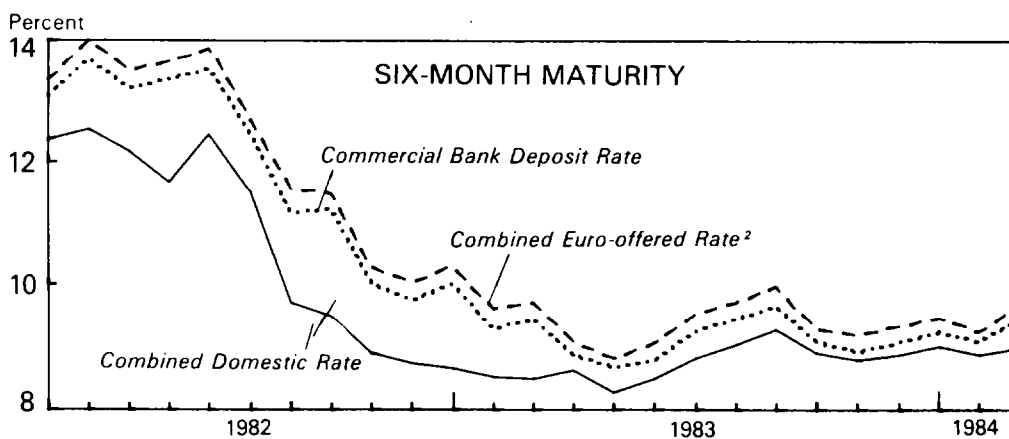
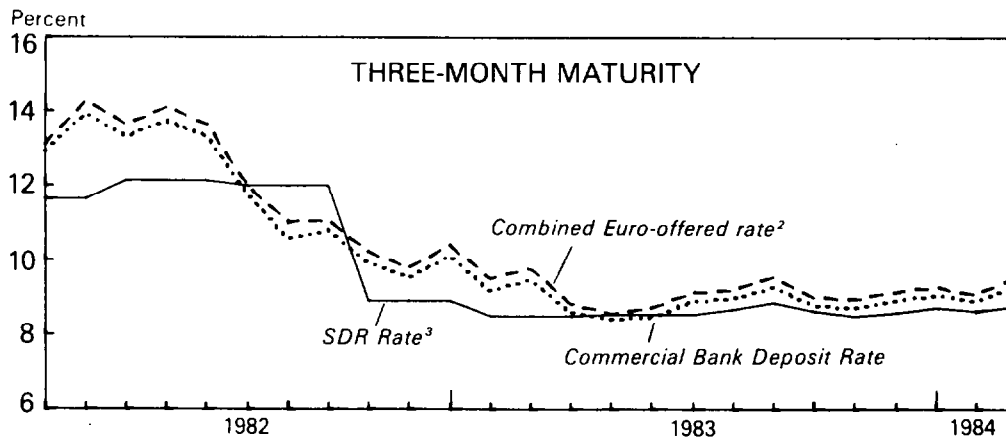
^{1/} As noted earlier, the Fund uses SDR exchange rates determined by applying the (domestic market) representative exchange rate for the currency, as advised to the Fund, on the dollar value of the SDR obtained on the basis of London noon quotations.

IV. Concluding Remarks

Interest rates on most Fund-related assets, including borrowings under the existing EAR arrangements, are based on combined market rates calculated by using financial instruments in the domestic money markets of the countries whose currencies are represented in the SDR valuation and interest rate basket. Interest rates on SDR-denominated assets in the private market are determined with reference to those on eurocurrency deposits. The maturities of the instruments used for calculating interest rates on Fund-related assets range from three months, e.g., SDR and enlarged GAB, to five years. The actual interest rates are set at certain levels of, or rounded up from, the result of the combined market calculations, e.g., 100 percent for the SDR interest rate and the GAB interest rate, and 85 percent of the SDR interest rate for the rate of remuneration as at present. Interest calculations for borrowings and charges in connection with the SFF are based on the yield of a U.S. dollar-denominated asset.

Interest rate calculations on new borrowing arrangements under the EAR will be based on the five currencies in the SDR valuation basket, but the instruments will be those in the eurocurrency market. The interest rate formula will employ as relative weights the shares of the currencies in the SDR valuation basket, i.e., on the basis of London noon quotations. The new borrowing interest rates are expected to bear a closer relationship to those in the private market for SDR-denominated deposits since the underlying instruments would be drawn from the same market.

SDR INTEREST RATE AND ALTERNATIVE COMBINED MARKET RATES: FEB. 1982 - FEB. 1984¹



¹Rates pertain to last Wednesday of the month.

²Calculated by weighting interest rates by shares of each currency in the U.S. dollar value of the SDR using London noon exchange rates.

³As of August 1, 1983, the SDR interest rate is fixed weekly by the Fund. Prior to this date, the rate was fixed at the beginning of each calendar quarter.

⁴Based on mid point between bid and offered deposit rates.

INTERNATIONAL MONETARY FUND
SDR VALUATION: FRIDAY, MARCH 23, 1984

CURRENCY (1)	CURRENCY AMOUNT UNDER RULE 0-1 (2)	EXCHANGE RATE* (3)	U.S. DOLLAR EQUIVALENT (4)	PER CENT CHANGE IN EXCHANGE RATE AGAINST U.S. DOLLAR FROM PREVIOUS CALCULATION (5)
DEUTSCHE MARK	0.4600	2.63550	0.174540	0.288
FRENCH FRANC	0.7400	8.12750	0.091049	0.178
JAPANESE YEN	34.0000	226.30000	0.150243	0.141
POUND STERLING	0.0710	1.42850	0.101424	-0.084
U.S. DOLLAR	0.5400	1.00000	0.540000	0.000
			1.057256	
<hr/>				
		SDR1 = US\$	1.05726	0.075**
		US\$1.00 = SDR	0.945845	

* EXCHANGE RATES IN TERMS OF CURRENCY UNITS PER U.S. DOLLAR EXCEPT FOR THE POUND STERLING WHICH IS EXPRESSED AS U.S. DOLLARS PER POUND.

** PERCENT CHANGE IN VALUE OF SDR IN TERMS OF U.S. DOLLARS FROM PREVIOUS CALCULATION.

INTERNATIONAL MONETARY FUND
TREASURER'S DEPARTMENT

3/23/84

CALCULATION OF THE COMBINED MARKET RATE OF INTEREST UNDER RULE T-1(C),
SDR INTEREST RATE, AND RATE OF REMUNERATION
FOR THE PERIOD MARCH 26, 1984 TO APRIL 1, 1984

CURRENCY	CURRENCY AMOUNT	INTEREST RATE	EXCHANGE RATE AGAINST THE SDR 1/ (3)	PRODUCT (1X2X3)
	(1)	(2)	(3)	(1X2X3)
DEUTSCHE MARK	0.460	5.9819	0.35879100	0.9873
FRENCH FRANC	0.740	12.8003	0.11632600	1.1019
JAPANESE YEN	34.000	6.3800	0.00417776	0.9062
POUND STERLING	0.071	8.5536	1.35114000	0.8206
U.S. DOLLAR	0.540	10.1500	0.94584500	5.1842
			TOTAL	9.0002

FOR THE WEEKS BEGINNING:

	3/26/84	3/19/84
COMBINED MARKET RATE	9.00	8.82
SDR INTEREST RATE	9.00	8.82
RATE OF REMUNERATION	7.65	7.50

1/ EXCHANGE RATES ARE EXPRESSED IN TERMS OF SDRS PER CURRENCY UNIT.

PREPARED BY FINANCIAL RELATIONS DIVISION

Domestic Instruments Employed in the Calculations
of SDR Interest Rates for Different Maturities

I. Three-Month Maturity (Rule T-1)

<u>U.S. dollar:</u>	The bond-equivalent yield of three-month U.S. Treasury bills calculated by the U.S. Treasury Department based on unweighted average of closing bid rates quoted by at least five dealers. The yield is calculated on an exact-day interest basis. <u>Source:</u> The bond-equivalent yield is reported daily to the Fund by the U.S. Treasury Department. The discount rate is published in the Federal Reserve Statistical Release, H.15(519) and the Federal Reserve Bulletin, Table A25.	<u>Deutsche mark:</u>	The middle rate derived from three-month domestic interbank money market rates which the Bundesbank has ascertained in the Frankfurt market. The rate is converted from a bank interest basis to an exact-day interest basis by the Fund. <u>Source:</u> The rate is reported daily to the Fund by the Bundesbank. Also published in the German business press (BOERSEN-ZEITUNG and HANDELSBLATT).
<u>French franc:</u>	The midpoint between bid and offered rates for three-month interbank money against private paper in France. The rate is converted from a bank interest basis to an exact-day interest basis by the Fund. <u>Source:</u> The rate is reported daily to the Fund by the Bank of France. Also published in the French business press (AGEFI).	<u>Japanese yen:</u>	The discount rate on two-month (private) bills in Japan. The rate is calculated on an exact-day interest basis. <u>Source:</u> The rate is reported daily to the Fund by the Bank of Japan.
<u>Pound sterling:</u>	The bond-equivalent yield for three-month U.K. Treasury bills. The yield is calculated on an exact-day interest basis. <u>Source:</u> The bond-equivalent yield is reported weekly to the Fund by the Bank of England.		

II. Six-Month Maturity

<u>U.S. dollar:</u>	The bond-equivalent yield of six-month U.S. Treasury bills calculated by the Federal Reserve Bank of New York, as an average between the bid and offered closing rates quoted in the government securities market. The yield is calculated on an exact-day interest basis. <u>Source:</u> The bond-equivalent yield is reported to the Fund weekly and on call dates by the Federal Reserve Bank of New York. The discount rates (bid and ask) are published in the daily quotation sheet on the New York Fed.	<u>Deutsche mark:</u>	The middle rate derived from six-month domestic interbank money market rates which the Bundesbank has ascertained in the Frankfurt market. The rate is calculated on a bank interest basis. <u>Source:</u> The rate is reported to the Fund weekly and on call dates by the Bundesbank. Also published in the German business press (BOERSEN-ZEITUNG and HANDELSBLATT).
<u>French franc:</u>	The midpoint between bid and offered rates for six-month interbank loans against private paper in the Paris market around noon. The rate is calculated on a bank interest basis. <u>Source:</u> The rate is reported to the Fund weekly and on call dates by the Bank of France.	<u>Japanese yen:</u>	The average rate for newly issued bank CDs in Japan with a maturity of between 150 days and 180 days. The rate is calculated on an exact-day interest basis. <u>Source:</u> The rate is reported to the Fund weekly and on call dates by the Bank of Japan. Also published in NIHON KEIZAI SHIMBUN (NIKEI) newsletter on bond and money.
<u>Pound sterling:</u>	The midpoint between current market bid and offered rates for six-month interbank deposits, as determined by the Bank of England based on observation of rates quoted at 10:30 a.m. by a range of market participants in London. The rate is calculated on a bank interest basis. <u>Source:</u> The rate is reported to the Fund weekly and on call dates by the Bank of England.		

III. One-Year Maturity

<u>U.S. dollar:</u>	The yield to maturity on actively traded U.S. Treasury notes and bonds, adjusted to constant maturity of one year by the U.S. Treasury. The yield (not compounded) is based on closing bid prices quoted by at least five dealers and it is adjusted to constant maturity by reading from a yield curve at fixed maturities. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the U.S. Treasury Department. Also published in the Federal Reserve Statistical Release, H.15 (519) and the Federal Reserve Bulletin, Table A25.	<u>Deutsche mark:</u>	The yield to maturity on notes and bonds of the Federal Republic of Germany, Railways and Post Office with a remaining period to maturity of one year. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Bundesbank. Also published in the Statistical Supplement to the Bundesbank Monthly Report, Series 2, Table 8D.
<u>French franc:</u>	The midpoint between the bid and offered rates for 12-month interbank loans against private paper in France. The rate is converted to an exact-day interest basis by the Fund. <u>Source:</u> The rate is reported to the Fund weekly and on call dates by the Bank of France. Also published in the French business press (AGEFI).	<u>Japanese yen:</u>	The yield to maturity of that ten-year Japanese Government bond with a remaining period to maturity closest to one year, based on the closing market price officially published by the Tokyo Stock Exchange. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Ministry of Finance. Also published in the Monthly Statistics Report of the Tokyo Stock Exchange.
<u>Pound sterling:</u>	The calculated redemption yield on British Government securities, adjusted to constant maturity of one year by the Bank of England. The yield is adjusted to constant maturity by reading from a yield curve at fixed maturities. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Bank of England.		

IV. Five-Year Maturity

<u>U.S. dollar:</u>	The yield to maturity on actively traded U.S. Treasury notes and bonds, adjusted to constant maturity of five years by the U.S. Treasury. The yield (not compounded) is based on closing bid prices quoted by at least five dealers and it is adjusted to constant maturity by reading from a yield curve at fixed maturities. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the U.S. Treasury Department. Also published in the Federal Reserve Statistical Release, H.15(519) and the Federal Reserve Bulletin, Table A25. <u>Note:</u> The interest rate paid to lenders and charges on drawings under the Supplementary Financing Facility are based on this rate.	<u>Deutsche mark:</u>	The yield to maturity on notes and bonds of the Federal Republic of Germany, Railways and Post Office with a remaining period to maturity of five years. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Bundesbank. Also published in the Statistical Supplement to the Bundesbank Monthly Report, Series 2, Table 8D.
<u>French franc:</u>	The yield to maturity on a representative sample of securities of major French public sector enterprises with an average remaining life in the range of four and a half to five and a half years, based on market prices and weighted by the volume of transactions in the securities during the previous week, as calculated by the Caisse des Depots et Consignations using the same method as it uses for the yield it publishes weekly. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Caisse des Depots et Consignations.	<u>Japanese yen:</u>	The yield to maturity of that ten-year Japanese Government bond with a remaining period to maturity closest to five years, based on the closing market price officially published by the Tokyo Stock Exchange. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Bank of Japan. Also published in the Monthly Statistics Report of the Tokyo Stock Exchange.
<u>Pound sterling:</u>	The calculated redemption yield on British Government securities, adjusted to constant maturity of five years by the Bank of England. The yield is adjusted to constant maturity by reading from a yield curve at fixed maturities. <u>Source:</u> The yield is reported to the Fund weekly and on call dates by the Bank of England. Also published in the Bank of England Quarterly Bulletin, Table 9.		

Eurocurrency Instruments Used in the Calculation of
Combined Rates for New Borrowing Under EAR

Three-month maturity (the BIS and the National Bank of Belgium):

The offered rate in the eurocurrency markets--at 11:00 a.m., London time--for the appropriate period, for each currency included in the SDR basket as notified to the BIS and the Fund by the Bank of England or, if the London market is closed, at 11 a.m., Paris time, as so notified by the Banque de France.

Six-month maturity (Japan):

The offered rate in the eurocurrency markets--at 11:00 a.m., London time--for the appropriate period, for each currency included in the SDR basket as notified to the BIS and the Fund by the Bank of England or, if the London market is closed, at 11 a.m., Paris time, as so notified by the Banque de France.

INTEREST RATES ON DOMESTIC INSTRUMENTS EMPLOYED IN CALCULATIONS
OF SDR INTEREST RATES OF DIFFERENT MATURITIES

(IN PERCENT PER ANNUM)

LAST WED.	UNITED STATES (1)	GERMANY (2)	FRANCE (3)	JAPAN (4)	UNITED KINGDOM (5)	COMBINED MARKET RATE (6)
<u>THREE-MONTH MATURITY</u>						
1982 OCT	8,25	7,45	13,18	7,15	8,88	8,54
1982 NOV	8,20	7,40	13,18	7,21	8,98	8,50
1982 DEC	8,43	6,64	12,93	7,15	10,25	8,58
1983 JAN	8,36	6,03	12,80	6,95	11,20	8,49
1983 FEB	8,24	5,83	13,05	6,89	11,00	8,39
1983 MAR	8,97	5,40	12,17	6,83	10,66	8,52
1983 APR	8,41	5,36	12,42	6,70	10,08	8,20
1983 MAY	8,82	5,42	12,67	6,63	10,29	8,45
1983 JUN	9,20	5,63	12,80	6,70	9,58	8,63
1983 JUL	9,44	5,63	12,29	6,76	9,71	8,73
1983 AUG	9,64	5,88	12,55	6,83	9,53	8,90
1983 SEP	9,13	5,91	12,67	6,83	9,14	8,59
1983 OCT	9,00	6,27	12,42	6,38	9,04	8,49
1983 NOV	9,24	6,49	12,29	6,38	9,04	8,64
1983 DEC	9,34	6,59	12,42	6,38	9,04	8,72
1984 JAN	9,29	6,24	12,42	6,25	9,07	8,62
1984 FEB	9,49	5,96	12,67	6,44	9,06	8,72
<u>SIX-MONTH MATURITY</u>						
1982 OCT	8,91	7,25	12,81	7,18	9,50	8,88
1982 NOV	8,68	7,25	12,81	7,20	9,31	8,71
1982 DEC	8,58	6,45	12,81	7,13	10,69	8,65
1983 JAN	8,59	5,85	12,50	6,52	11,44	8,51
1983 FEB	8,50	5,70	12,69	6,77	11,44	8,49
1983 MAR	9,17	5,35	12,06	6,73	10,81	8,61
1983 APR	8,60	5,30	12,25	6,60	10,13	8,26
1983 MAY	8,98	5,40	12,63	6,27	10,38	8,48
1983 JUN	9,51	5,70	12,81	6,47	9,94	8,80
1983 JUL	9,85	5,95	12,13	6,61	10,31	9,02
1983 AUG	10,14	6,27	12,44	6,72	10,13	9,26
1983 SEP	9,46	6,30	12,63	6,92	9,56	8,88
1983 OCT	9,41	6,17	12,43	6,80	9,50	8,79
1983 NOV	9,58	6,45	12,38	6,41	9,50	8,86
1983 DEC	9,73	6,50	12,38	6,58	9,69	8,99
1984 JAN	9,59	6,35	12,38	6,41	9,66	8,87
1984 FEB	9,88	6,05	12,63	6,58	9,31	9,00

INTEREST RATES ON DOMESTIC INSTRUMENTS EMPLOYED IN CALCULATIONS
OF SDR INTEREST RATES OF DIFFERENT MATURITIES

(IN PERCENT PER ANNUM)

LAST WED.	UNITED STATES (1)	GERMANY (2)	FRANCE (3)	JAPAN (4)	UNITED KINGDOM (5)	COMBINED MARKET RATE (6)
<u>ONE-YEAR MATURITY</u>						
1982 OCT	9,29	7,37	13,05	7,88	7,15	8,93
1982 NOV	9,12	7,37	13,12	7,67	8,76	8,98
1982 DEC	8,80	6,57	13,05	7,09	10,11	8,74
1983 JAN	8,85	5,71	12,74	7,16	10,57	8,64
1983 FEB	8,73	5,98	12,99	7,03	10,01	8,57
1983 MAR	9,32	5,35	12,29	6,90	10,15	8,66
1983 APR	8,79	5,50	12,93	6,81	8,98	8,36
1983 MAY	9,21	5,66	13,12	6,77	9,49	8,66
1983 JUN	9,76	6,46	12,42	6,68	10,14	9,07
1983 JUL	10,22	6,54	12,42	6,70	10,72	9,39
1983 AUG	10,59	6,92	12,86	6,82	10,69	9,71
1983 SEP	9,93	7,00	12,99	6,68	9,65	9,24
1983 OCT	9,86	6,76	12,74	6,66	9,68	9,14
1983 NOV	9,98	6,86	12,74	6,53	9,68	9,20
1983 DEC	10,11	6,98	12,93	6,36	9,69	9,28
1984 JAN	9,87	6,68	12,86	6,31	9,56	9,09
1984 FEB	10,21	6,26	12,99	6,20	9,41	9,19
<u>FIVE-YEAR MATURITY</u>						
1982 OCT	10,76	8,05	15,65	8,89	9,77	10,45
1982 NOV	10,20	8,13	15,51	8,66	10,29	10,17
1982 DEC	10,19	7,70	15,33	7,92	11,05	10,05
1983 JAN	10,23	7,58	14,53	8,05	11,47	10,03
1983 FEB	10,00	7,43	14,84	7,95	11,30	9,89
1983 MAR	10,25	7,18	14,49	7,89	11,50	9,92
1983 APR	9,92	7,30	14,12	8,05	11,00	9,72
1983 MAY	10,29	7,66	14,41	8,11	11,16	10,02
1983 JUN	10,76	8,02	14,34	8,09	11,20	10,31
1983 JUL	11,32	8,14	14,13	8,15	11,63	10,65
1983 AUG	11,79	8,39	13,81	8,04	11,81	10,93
1983 SEP	11,24	8,25	13,89	7,81	11,02	10,48
1983 OCT	11,40	8,04	13,95	7,69	10,99	10,52
1983 NOV	11,36	8,16	13,48	7,44	10,80	10,42
1983 DEC	11,56	8,20	13,67	7,28	10,69	10,52
1984 JAN	11,31	8,13	13,34	7,25	10,83	10,36
1984 FEB	11,75	7,81	13,38	7,10	10,58	10,50

EUROCURRENCY OFFERED RATES USED IN THE CALCULATION
OF COMBINED RATES FOR NEW BORROWING

(IN PERCENT PER ANNUM)

	UNITED STATES (1)	GERMANY (2)	FRANCE (3)	JAPAN (4)	UNITED KINGDOM (5)	COMBINED MARKET RATE (6)
<u>THREE-MONTH MATURITY</u>						
1982 OCT	10.06	7.13	20.25	7.06	10.00	10.20
1982 NOV	9.69	7.13	19.00	7.13	9.13	9.77
1982 DEC	9.44	6.19	26.00	7.06	11.25	10.40
1983 JAN	9.19	5.63	19.25	6.75	11.88	9.51
1983 FEB	9.06	5.50	22.75	6.75	11.88	9.77
1983 MAR	9.63	5.06	12.25	6.50	11.38	8.83
1983 APR	9.13	5.06	13.00	6.25	10.63	8.55
1983 MAY	9.31	5.13	13.38	6.38	10.75	8.73
1983 JUN	9.88	5.25	14.50	6.63	10.13	9.10
1983 JUL	10.19	5.19	13.63	6.63	10.25	9.20
1983 AUG	10.38	5.69	15.25	6.75	10.19	9.54
1983 SEP	9.56	5.75	14.38	6.81	9.63	8.99
1983 OCT	9.69	5.88	13.25	6.50	9.75	8.94
1983 NOV	9.88	6.25	13.13	6.94	9.69	9.14
1983 DEC	10.13	6.19	13.75	6.50	9.81	9.26
1984 JAN	9.88	6.00	13.31	6.44	9.81	9.06
1984 FEB	10.19	5.94	17.50	6.63	9.56	9.56
<u>SIX-MONTH MATURITY</u>						
1982 OCT	10.31	7.13	20.00	7.06	9.88	10.28
1982 NOV	9.94	7.06	20.38	7.06	9.38	10.04
1982 DEC	9.69	6.19	24.00	7.00	11.19	10.30
1983 JAN	9.44	5.63	19.25	6.69	11.75	9.61
1983 FEB	9.25	5.63	21.25	6.63	11.75	9.70
1983 MAR	9.81	5.25	13.63	6.50	11.25	9.07
1983 APR	9.25	5.19	14.75	6.31	10.50	8.80
1983 MAY	9.44	5.31	15.88	6.44	10.81	9.06
1983 JUN	10.13	5.63	17.00	6.63	10.25	9.53
1983 JUL	10.69	5.63	15.31	6.69	10.63	9.72
1983 AUG	10.75	6.06	16.88	6.75	10.50	9.97
1983 SEP	9.75	6.00	16.06	6.81	9.53	9.27
1983 OCT	9.81	6.00	14.75	6.50	10.00	9.18
1983 NOV	10.06	6.25	14.13	6.81	9.88	9.32
1983 DEC	10.31	6.38	14.31	6.50	10.06	9.46
1984 JAN	10.00	6.19	14.06	6.44	10.00	9.24
1984 FEB	10.44	6.06	17.00	6.63	9.63	9.68

NOTE: THE DATA PERTAINS TO THE LAST WEDNESDAY OF THE MONTH.

Reference Formulas for Interest Rates on SDR-Denominated Assets

This mathematical annex describes a number of reference formulas which can be employed to calculate the interest return on SDR-denominated assets, the conditions under which some of these formulas become identical to each other, and the differences between them.

1. The principal formulas that could be used to construct an interest rate on an SDR-denominated asset from a given set of individual interest rates corresponding to the currencies in the SDR valuation basket are:

a. Combined market rate, r^a

$$r^a = \sum_{j=1}^5 e_j c_j r_j \quad (1)$$

where e_j , c_j , r_j denote respectively, for the j th currency, the exchange rate in SDRs per currency, the currency units in the SDR valuation basket, and the interest rate. The combined market rate is the interest return on separate investments of the fixed currency components of the valuation basket, valued at prevailing exchange rates.

Variants of the formula of equation (1) could be constructed by changing the exchange rate definition as in equation (2) below, or by calculating the interest rate on a discount-yield basis, as in equation (3) below, and converting the result to investment-yield basis:

b. Combined market rate, forward-rate weighted, r^b

$$r^b = \frac{\sum_{j=1}^5 f_j c_j r_j}{\sum_{j=1}^5 c_j} \quad (2)$$

where f_j is the forward exchange rate, at the maturity of separate investments of the fixed currency components of the valuation basket, in SDRs per currency.

c. Combined market rate, discount-yield approach, r^c

$$r^c = \frac{1}{\sum_{j=1}^5 \frac{e_j c_j}{(1 + r_j)}} - 1 \quad (3)$$

In equation (3), the expression $\sum_{j=1}^5 \frac{e_j c_j}{(1 + r_j)}$ is the SDR value of a composite investment that would mature into the exact SDR valuation basket at the end of the investment period.

2. As an alternative to the combined market rate formula of equation (1), calculations could also be made that derive the interest return on the currency basket on the basis of a single vehicle currency for investment, e.g., the U.S. dollar. The interest rate for different currencies (r_j in the above formulas), or in SDR terms, are set equal to the U.S. dollar interest rate less the forward premium of the j th currency or the SDR versus the U.S. dollar. The following two formulas have been used, the first by the staff, and the second by a U.S. commercial bank:

d. Covered U.S. dollar investment, r^d

$$r^d = \sum_{j=1}^5 e_j c_j (r_{\$} - p_j) \quad (4)$$

where $r_{\$}$ is the U.S. dollar interest rate and p_j is the forward premium of the currency against the U.S. dollar. It may be noted that in a perfectly arbitrated market, $r_j \cong r_{\$} - p_j$, and equation (4) is the same as equation (1). 1/

e. Covered U.S. dollar versus SDR investment formula, r^e

$$r^e = \frac{(1 + r_{\$}) f_{\$}}{e_{\$}} - 1 \quad (5)$$

where $r_{\$}$, $f_{\$}$, $e_{\$}$ denote for the U.S. dollar, respectively, the interest rate, and the forward and spot exchange rates in SDRs per U.S. dollar. 2/ In this formula, the return on a one-dollar investment is adjusted by the forward premium against the SDR to derive an SDR interest rate. Equation (5) may also be rewritten in a similar fashion as equation (4), as follows:

$$r^e = r_{\$} - p_{\text{SDR}} \quad (5')$$

where p_{SDR} is the forward premium of the SDR against the U.S. dollar. 3/

1/ Equation (4) approximates the local currency return of a U.S. dollar investment through the term $(r_{\$} - p_j)$, which could be replaced by the exact formulation $(r_{\$} - p_j - r_j p_j)$, i.e.:

$$r^d = \sum_{j=1}^5 e_j c_j (r_{\$} - p_j - r_j p_j).$$

2/ For maturities different from one year, the interest rate and forward rate data are assumed to be at (or converted to) annual rates.

3/ Equation (5'), like equation (4), is an approximation whose exact version is $r^e = (r_{\$} - p_{\text{SDR}})/(1 + p_{\text{SDR}})$. See footnote 1.

3. Of the formulas described above, those of equations (1) and (4) become identical, as noted earlier, when interest differentials reflect only forward premiums or discounts. Under the same condition of perfect interest arbitrage, the formulas in equations (2), (3), and (5) also become identical to each other. To show this, we can rewrite equation (2) as

$$r^b = f_{\$} \sum y_j c_j r_j \quad (6)$$

for y_j = forward exchange rate of the j th currency in U.S. dollars per currency, given that by definition $f_j = f_{\$} y_j$. From equation (5) on the other hand,

$$r^e = f_{\$} \left[\frac{(1 + r_{\$})}{e_{\$}} - \frac{1}{f_{\$}} \right] \quad (7)$$

To prove that $r^b = r^e$, or that equation (2) = equation (5), it is sufficient to show, under conditions of interest rate parity, that

$$\sum y_j c_j r_j = \frac{1 + r_{\$}}{e_{\$}} - \frac{1}{f_{\$}} \quad . \quad \text{Furthermore,}$$

$$\frac{1 + r_{\$}}{e_{\$}} - \frac{1}{f_{\$}} = (1 + r_{\$}) \sum x_c - \sum y_c \quad (8)$$

follows from the fact that

$$\frac{1}{e_{\$}} = \sum x_c \text{ and } \frac{1}{f_{\$}} = \sum y_c, \text{ by definition of the spot and forward}$$

valuation baskets, for x_j = spot exchange rate of the j th currency in U.S. dollars per currency. The interest rate parity condition is

$$1 + r_{\$} = (1 + r_j) \frac{y_j}{x_j} \quad (9)$$

and substituting equation (9) in equation (8), we have

$$\frac{1 + r_j}{e_{\$}} - \frac{1}{f_{\$}} = \sum (1 + r) y_c - \sum y_c = \sum y_{cr} \quad (10)$$

Thus, $r^b = r^e$ and the formulas represented by equations (2) and (5) are in fact identical under conditions of interest rate parity.

The formula represented by equation (3) can also be shown to be equal to equation (5) under interest rate parity, i.e., $r^c = r^e$.

From equations (3) and (9),

$$r^c = \frac{1 + r_{\$}}{\sum \frac{e c y}{x}} - 1$$

and given that $e_j = e_{\$} x_j$ and $\frac{1}{f_{\$}} = \sum y_c$,

$$\begin{aligned} r^c &= \frac{1 + r_{\$}}{e_{\$} \sum y_c} - 1 \\ &= \frac{(1 + r_{\$}) f_{\$}}{e_{\$}} - 1 = r^e \end{aligned} \quad (11)$$

4. When interest rates in different currencies are combined, the implicit weighting structure of the different currencies can be expressed as w in the general formulation:

$$r_{SDR} = \sum w r \quad (12)$$

The two types of formulas represented by equations (1) and (2) are generally not identical because the former's weighting structure is that of spot exchange rates while the latter makes use of forward rates, as can readily be seen from these formulas' definitions. The weights $w_j = e_j c_j$ in equation (1) differ from $w_j = f_j c_j$ in equation (2), although both sets of weights sum to unity, i.e., $\sum e c = \sum f c = 1$. If currencies with relatively high interest rates tend to be at a forward

discount against other currencies, even if interest arbitrage were imperfect, the forward-rate weighted reference formula of equation (2) would always produce a lower combined interest rate. This is because the lower weight for the high interest rate currencies is not fully offset by the increased weight for the low interest rate currencies in the weighted average, compared with the result of equation (1). Mathematically, the difference D between the two formulas is:

$$D = r^a - r^b = \sum (e - f) cr \quad (13)$$

If initially all five interest rates were equal, $D = 0$, and if any one interest rate r_j were to increase relative to the others, and forward exchange rates were to move at least in the direction of eliminating covered interest differentials, D would become positive. To show this, let D' be the difference when $r_j > r_i$ and $r_i = \bar{r}$ for the other four currencies.

$$D' = (w_j^a - w_j^b) r_j + \sum_{i \neq j} (w_i^a - w_i^b) r_i \quad (14)$$

By definition,

$$\begin{aligned} w_j^a - w_j^b &= \frac{x_j c_j}{\sum x_c} - \frac{y_j c_j}{\sum y_c} \\ &= \frac{x_j c_j}{\sum_{i \neq j} x_c + x_j c_j} - \frac{y_j c_j}{\sum_{i \neq j} y_c + y_j c_j} > 0 \end{aligned} \quad (15)$$

if $x_j > y_j$, as would be the case if forward premiums move to eliminate covered interest differentials.

Furthermore,

$$\begin{aligned} r_i \sum_{i \neq j} (w_i^a - w_i^b) &= r_i [(1 - w_j^a) - (1 - w_j^b)] \\ &= r_i (w_j^b - w_j^a) \end{aligned}$$

because $\sum w^a = \sum w^b = 1$. Therefore,

$$\begin{aligned} D' &= (w_j^a - w_j^b) r_j + (w_j^b - w_j^a) r_i \\ &= (w_j^a - w_j^b) r_j - (w_j^a - w_j^b) r_i \\ &= (w_j^a - w_j^b)(r_j - r_i) > 0 \end{aligned} \tag{16}$$

5. The formulas described above serve as reference points for the actual setting of interest rates on various SDR-denominated assets. In the private market, which attempts to replicate the official SDR for valuation and interest payment purposes through the basket mechanism, there is a concern to maintain the value of the asset and the interest return on it in terms of the SDR. Regardless of the particular reference formula used, interest rates and/or forward exchange rates on the various currencies in the basket are derived from the eurocurrency market. ^{1/} The valuation of principal is based on spot exchange rates at the beginning of the investment period. Interest return is understood to be valued by some banks on the same basis, while some banks are known to prefer forward exchange rates in calculating the interest rate, along the lines of equation (5). The adjustment of interest

^{1/} It may be noted that for most of Fund-related assets, including the official SDR, interest rates are based on instruments traded in domestic money markets.

return through the use of the forward valuation of the SDR would, in general, yield a lower calculated interest rate, as indicated in para. 4 above, reflecting mainly the market phenomenon of high interest currencies carrying a forward discount, thus providing a lower implicit weight to these currencies. In practice, interest rates in the private market are lower than those calculated using the reference formulas reflecting, perhaps, transactions costs and/or profit margins incorporated in the deposit rates used in the calculation.

Yields on Alternative SDR-Denominated Assets 1/

	January	February
Combined market interest rates <u>2/</u>		
Based on domestic rates		
3-month maturity (Rule T-1)	8.62	8.72
6-month maturity	8.88	9.00
12-month maturity	9.13	9.19
5-year maturity	10.38	10.50
Based on euro-currency rates		
3-month maturity	8.97	9.48
6-month maturity	9.14	9.57
12-month maturity	9.48	9.90
Average commercial bank deposit rates <u>3/</u>		
1-month deposits	8.61	9.14
3-month deposits	8.89	9.31
6-month deposits	9.08	9.44
12-month deposits	9.36	9.75
Bonds quoted on the Luxembourg Stock Exchange <u>4/</u>		
Average current yield	9.85	9.98
Average yield to maturity	11.91	11.72

Source: DM/84/21 (3/14/84).

1/ Rates pertain to last Wednesday of the month.

2/ As of January 1, 1981, combined market rates (according to the Rule T-1) are calculated by multiplying the yields or rates of each of the respective instrument by the number of units of the corresponding currency listed in Rule 0-1 and the value in terms of the SDR of a unit of that currency as determined by the Fund under Rule 0-2(a) and (b). Domestic rates are those used to determine interest rates on the SDR or on borrowings by the Fund. Euro-currency rates are midpoint midmorning rates in London, and for sterling, in Paris.

3/ Average of rates quoted by selected commercial banks.

4/ Maturity dates for these issues range from 1984 to 1989.