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SM/85/320

December 2, 1985

To: Members of the Executive Board

From: The Secretary

Subject: SDR Valuation Basket--Trial Calculations and Rounding Procedures

Attached for consideration by the Executive Directors is a paper on the SDR valuation basket--trial calculations and rounding procedures, which is scheduled for Executive Board consideration on Monday, December 16, 1985.

Mr. Roncesvalles (ext. 7807) or Mr. Kawakami (ext. 7812) is available to answer technical or factual questions relating to this paper prior to the Board discussion.

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INTERNATIONAL MONETARY FUND

SDR Valuation Basket--Trial Calculations and Rounding Procedures

Prepared by the Treasurer's Department

Approved by W. O. Habermeier

December 2, 1985

I. Introduction

In accordance with the Executive Board Decision on the method of valuation of the SDR, it will be necessary to determine on December 31, 1985, the amounts of the five currencies in the SDR valuation and interest rate baskets, effective January 1, 1986. 1/ Paragraphs 3b and 4 of the Decision require respectively that (i) the currency amounts correspond to the given set of agreed weights for the revised basket when applied to the average exchange rates over the reference period of three months preceding the coming into effect of the revised basket and (ii) the new basket will have the same transactions value for the SDR as the existing basket on the last working day before the new basket comes into effect on January 1, 1986. 2/

In the past, the currency amounts in the SDR basket have been rounded to two significant digits. With only five currencies in the basket, it cannot however be assured that the amounts of currencies in the new basket would continue to round to two significant digits and preserve the agreed percentage shares of currencies and the equality of the SDR exchange rate on the transition day with that of the new basket. This paper (i) discusses the rounding procedures in determining the currency amounts for a new SDR basket in the light of the guidelines established in 1980; and (ii) presents trial calculations based on these procedures. As discussed in SM/85/163, the revision of the SDR basket could possibly result in a discrete change in the interest rates on the SDR and other SDR-denominated assets; this paper also provides further information on the effects of the likely change in these interest rates that arise from the changeover to the new valuation basket.

1/ Decision No. 6631-(80/145) G/S, adopted September 17, 1980, is reproduced in Appendix I.

2/ The new percentage weights to be used for the basket effective January 1, 1986 are: U.S. dollar, 42 percent; Deutsche mark, 19 percent; Japanese yen, 15 percent; French franc, 12 percent; and pound sterling, 12 percent (see SM/85/163, 6/7/85 and EBM/85/102, 7/1/85).

II. Rounding Procedures and Trial Calculations

1. 1980 guidelines

As already mentioned, the past practice with respect to the determination of currency amounts in the SDR valuation basket has been to aim at rounding the units of currency in the new basket to two significant digits. The guidelines that were endorsed by the Executive Board in 1980 for the staff to follow in calculating the currency amounts on December 31, 1980 read as follows: 1/

"(1) Under all circumstances, the currency units will be determined in a manner which would ensure that the value of the SDR calculated on December 31, 1980 on the basis of the new basket will be the same as that actually prevailing on that day.

(2) The currency amounts calculated for the new basket will be expressed in two significant digits provided that the percentage deviation over the agreed weight for each currency in the value of the SDR resulting from the application of the average exchange rate for October-December 1980 is the minimum on average and will not exceed one-half percentage point for any currency.

(3) If a solution cannot be obtained by the application of the principle set forth in (2) above, the significant digits to which currency amounts will be expressed may exceed two for one or more currencies but not exceed four for any currency provided that the shares of component currencies over the averaging period (October-December 1980), when appropriately rounded, are the same as the percentage weights set forth in paragraph 2 of the Executive Board's Decision No. 6631-(80/145) G/S, adopted September 17, 1980.

(4) If more than one solution is found, the solution that has the smallest average deviation will be employed."

1/ "SDR Valuation Basket - Calculation of the Currency Amounts" (SM/80/206, Sup. 5, 12/22/80). New guidelines were endorsed in 1980 because the size of the basket was reduced from 16 currencies to five. With the larger size of basket, there was a large number of alternative baskets with currency units expressed to two significant digits, namely, 65,536 or 2 raised to the power of 16 and which could incorporate the agreed percentage weights and the condition of equality of the transactions value of the SDR on the transition day. A basket of five currencies greatly reduced the number of alternative baskets (to 32 (2^5)) with currency components that could be rounded to two digits while also possibly meeting the two conditions of maintaining the transactions value on the transition day and the agreed weights.

2. Rounding procedures

The 1980 guidelines provided for a margin around the agreed percentage shares, i.e., plus or minus half of a percentage point, so as to increase the number of potential alternative baskets and, hence, the probability that an SDR basket would be found that not only met the requirements in the Decision on the valuation of the SDR but also contained currency amounts expressed to no more than two digits each. Apart from its effect on the rounding of the currency amounts, this tolerance limit, it was felt, would help avoid the impression of undue precision in the calculations--especially as the agreed currency weights had themselves been rounded to a considerable extent--and would also help to simplify subsequent calculations of the value of the SDR which would itself facilitate public understanding of the SDR. It was also pointed out that the initial currency weights, irrespective of the degree of precision with which they are applied over the averaging period, cannot be preserved over time because exchange rate fluctuations change the relative shares of the component currencies in the basket. 1/ It could not, therefore, be concluded that maintaining the agreed currency weights over the averaging period would better preserve the balance of currencies over time, as reflected in the shares of currencies in the basket, than an approach which placed greater emphasis on simplifying the calculation of the SDR basket and permitting a tolerance limit which restricted the extent of deviation from the agreed weights over the averaging period. These considerations continue to apply, and it is proposed that the same tolerance limit from the agreed weights be permitted on this occasion of determining the currency amounts for the new SDR basket.

Because the trial calculations conducted in 1980 showed that even with the half-percentage point tolerance limit around the agreed percentage weights for the individual currencies, the likelihood of finding a basket with currency amounts with two significant digits was not very high, an iterative search procedure was agreed upon, whereby, in the absence of simpler solutions, a larger number of significant digits were to be progressively accepted. When the actual determination of the present basket was made on December 31, 1980, the iterative search produced a basket in which each of the currency units was expressed to two significant digits. (A description of the formulas and rounding procedures used in 1980 are reproduced in Appendix II.) It is also proposed to follow the same type of iterative search on this occasion.

3. Description and results of trial calculations employing the 1980 guidelines

The staff has conducted updated trial calculations following the 1980 guidelines. The trial calculations were run using three-month averaging periods ended in October and through mid-November 1985.

1/ See "Review of the Valuation of the SDR" (SM/85/163), pp. 17-19 and p. 21.

In addition, a calculation was made using October 1 through November 20 as the base reference period, a period which covers more than half of the three-month reference period through December 31, 1985 that will actually be used to determine the amount of currency units in the new SDR basket. As can be seen from Table 1, none of these calculations produced a solution in two digits for all the five currencies in the basket. The solutions obtained were baskets in which one currency was expressed to three digits while the other four were rounded to two significant digits. For example, in the trial calculation for the period ended November 20, the solution found was a basket in which the amount for the Japanese yen was rounded to three digits and those for the other four currency amounts were rounded to two digits.

As indicated earlier, the 1980 calculation procedures involve an *iterative computational method*. The unrounded currency units are calculated by first applying the average exchange rates to the agreed percentage weights. 1/ The unrounded results are then truncated at two significant digits, and a range of several units above and below the truncated components is determined for each currency by the one half percentage point tolerance limit. The range for each of the currency amounts produce a number of possible baskets that are then tested to see if they meet the requirements of the Board Decision. The constraints that have been applied in making these rounded calculations are (i) the basket must have an SDR valuation that is equal, when expressed to six significant digits, to that of the value of the SDR on the transition date and (ii) the implied percentage share of each currency on the basis of the exchange rates over the averaging reference period should deviate by less than 0.5 percentage point from the agreed weights for the currencies in the basket. For example, in the trial calculation for the period ended November 15, the constraints as regards the deviation from the agreed weights could result in currency amounts that range (at two significant digits) within 0.43-0.44 for the U.S. dollar, 0.52-0.56 for the Deutsche mark, 33-36 for the Japanese yen, 0.98-1.10 for the French franc, and 0.084-0.094 for the pound sterling. 2/ In the event that more than one solution is found, the basket that is selected, as in

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1/ The formula for the unrounded units is:

$$C_i = (W_i/BEX_i)(\$/SDR) \div \sum_{i=1}^{5} (W_i/BEX_i) \cdot TEX_i$$

where C_i is the units of currency i, W_i is the weight of currency i, BEX_i and TEX_i are respectively the base period average and transition date exchange rates, and \$/SDR is the transition date U.S. dollar value of the SDR (see Appendix II).

2/ It may be noted that the currency amounts that preserve the agreed weights differ by varying percentage amounts from their initial unrounded values. The differences are smallest for the U.S. dollar (1.2 percent) and largest for the French franc and the pound sterling (4.2 percent) reflecting the ratio between the tolerance limit ($\pm$ 0.5 percent) to the agreed shares.

Table 1. Trial Calculation of Amounts of Currency Units in the Revised SDR Valuation Basket 1/

Currencies (1)	Base period average exchange rates (In US$ per unit) (2)	Transition date exchange rates 2/ (In US$ per unit) (3)	Currency units: Unrounded units (4)	Currency units: Rounded units (5)	U.S. dollar equivalents (col.3 x col.5) (6)	Percentage change in currency amounts from those in the present basket (7)
I. Calculations Under the 1980 Guidelines 3/						
1. Using a three-month base period ended October 31						
U.S. dollar	1.0	1.0	0.435569	0.44	0.44000	-18.5
Deutsche mark	0.363009	0.382175	0.542805	0.55	0.21020	19.6
Japanese yen	0.00436224	0.00472478	35.6606	35.	0.16537	2.9
French franc	0.118952	0.125313	1.046207	1.03	0.12907	39.2
Pound sterling	1.39191	1.44330	0.0894080	0.088	0.12701	23.9
Total (U.S. dollar value of SDR on transition date)					1.07165	
2. Using a three-month base period ended November 15						
U.S. dollar	1.0	1.0	0.439270	0.44	0.44000	-18.5
Deutsche mark	0.367477	0.382351	0.540762	0.551	0.21068	19.8
Japanese yen	0.00446592	0.00490316	35.1288	36.	0.17651	5.9
French franc	0.120457	0.125392	1.04192	1.0	0.12539	35.1
Pound sterling	1.401202	1.4248	0.0895701	0.087	0.12396	22.5
Total (U.S. dollar value of SDR on transition date)					1.07654	
3. Using October 1-November 20 as base period						
U.S. dollar	1.0	1.0	0.448674	0.45	0.45000	-16.7
Deutsche mark	0.380068	0.384645	0.534040	0.54	0.20771	17.4
Japanese yen	0.00473578	0.00492005	33.8361	34.4	0.16925	1.2
French franc	0.124655	0.126244	1.028378	1.0	0.12624	35.1
Pound sterling	1.425086	1.4375	0.0899541	0.088	0.12650	23.9
Total (U.S. dollar value of SDR on transition date)					1.07970	
II. Calculations Under Uniform-Digits Approach						
4. Using October 1-November 20 as base period						
U.S. dollar	1.0	1.0	0.448674	0.444	0.44400	-17.8
Deutsche mark	0.380068	0.384645	0.534040	0.532	0.20463	15.7
Japanese yen	0.00473578	0.00492005	33.8361	34.4	0.16925	1.2
French franc	0.124655	0.126244	1.028378	1.04	0.13129	40.5
Pound sterling	1.425086	1.4375	0.0899541	0.0908	0.13053	27.9
Total (U.S. dollar value of SDR on transition date)					1.07970	

1/ The rounded currency amounts of the existing basket and its initial weights are shown below together with the agreed initial weights of the new basket:

	Existing basket: Currency units	Existing basket: Initial weight	New basket: Initial weight
U.S. dollar	0.54	0.42	0.42
Deutsche mark	0.46	0.19	0.19
Japanese yen	34.	0.13	0.15
French franc	0.74	0.13	0.12
Pound sterling	0.071	0.13	0.12

2/ Rates on the last day of the base period.
3/ See Appendix II for a description of the rounding procedures established in 1980.

1980, is the one with the least average (root-mean-squared) deviation from the unrounded set of currency components. If no solution is found at two significant digits, the units for one or more of the currencies are extended iteratively to three or more significant digits until a solution is found.

The following Table 2 illustrates the actual search procedure for solutions conducted for the period ended November 15, which was continued beyond the point (round 2) when the solution shown in Table 1 had been found:

Table 2. Illustrative Search Procedure for a Revised Basket Under the 1980 Guidelines (Calculations Conducted on November 15, 1985)

Round	Number of significant digits	Total number of significant digits	Actual computer search time	Solutions meeting the rounding requirements
1	2 for all currencies	10	0.1 sec.	0
2	2 for 4 currencies, 3 for 1 currency	11	1 sec.	1
3	2 for 3 currencies, 3 for 2 currencies	12	11 secs.	25
4	2 for 2 currencies, 3 for 3 currencies	13	1:23	280
5	2 for 1 currency, 3 for 4 currencies	14	5:34	1,000 (est.)
6	3 for all currencies	15	6:17	3,000 (est.)

Using the guidelines endorsed in 1980, none of the trial calculations conducted for different periods produced a basket with each of the currency units expressed to two significant digits and there is relatively little likelihood that such a basket will be found for the period ended December 31. There is, however, a high probability of finding solutions on the basis of the 1980 guidelines that would express most of the five currencies in the basket to two digits and the remaining one or two currency amounts to three digits. As can also be seen from Table 2, it is highly likely that solutions for three digits for all five currencies could be obtained if the 1980 guidelines were followed again this year but modified to accept only baskets with currency amounts expressed uniformly in the same number of significant digits. This solution (shown also in Table 1) was suggested by an Executive Director at EBM/85/102 (7/1/85) and is discussed below.

4. Uniform number of significant digits for all currency amounts

In the absence of a solution in which all the currencies would be expressed to two significant digits, the 1980 procedures allow for a combination in the number of digits for the currency amounts in the SDR basket. This procedure minimizes the overall number of significant digits. The choice of combination in the number of digits is not made arbitrarily, because in successive rounds of the iterative search process (see Table 2), the selection criterion that minimizes the average deviation from the agreed shares governs the choice from two or more baskets that are found to be within the tolerance limit of deviation from the agreed shares and are equal to the SDR value on the transition date. The change in the established procedures implied by a uniform significant digits approach would be that rounds two to five indicated in Table 2 above would be by-passed in the iterative search process and only three-significant-digit baskets would be tested, shown as round 6, if no basket were found that contained currency amounts uniformly expressed to two significant digits. 1/

The results of the different procedures are primarily a matter of presentation. Nonetheless, the difference between a basket with the currency amounts expressed to two significant digits for most and three significant digits for one or two currencies, and another basket with the currency amounts expressed uniformly in three significant digits could also be regarded as reflecting a particular choice in the trade-off between the degree of rounding for the currency units of the basket and the strict adherence to the agreed weights.

Table 3 shows the effect of the extent of different rounding procedures in terms of precise deviations from the agreed weights. This table shows the difference between the solution achieved under

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1/ With the established tolerance limit of one half of one percentage point, there is not likely to be a need to consider baskets with currency units expressed to more than three significant digits, as can be seen from the illustrative search described above. If the currency amounts were expressed uniformly in two or three significant digits, it would also not be necessary to narrow the tolerance limit of deviation around the agreed weights because the minimum root-mean-squared deviation criterion effectively accomplishes a narrowing of the tolerance limit, thus maximizing the adherence of the new basket to the agreed percentage shares for the currencies in it.

the 1980 guidelines and that for a basket with the currency amounts expressed uniformly in three significant digits. As can be seen, the average deviation from the agreed weights is smaller the greater the total number of significant digits (the more precise the currency amounts) in which the currency amounts of the basket are expressed. However, the final results under the two approaches do not show any clear systematic pattern. The calculations under the 1980 guidelines are closer to the unrounded amount for the U.S. dollar but they deviate more widely for most of the other currencies as compared with the currency amounts that were calculated on the basis of a uniform (significant) digits approach. This result might be coincidental and depends on the pattern of exchange rates at the date of calculation. More importantly, the results of the two types of calculations shown in Table 3 are all well within the tolerance limit established by the 1980 guidelines, and in themselves they do not indicate whether the guidelines should be kept unchanged or modified. Furthermore, irrespective of the number of significant digits used to express the new currency amounts, the staff would propose to continue the procedure of selecting the basket with the smallest overall deviation from the agreed weights (using the root-mean-squared definition of overall deviation) if more than one basket met the Decision's requirements for a given level or combination of rounding of the currency units.

Table 3. Differences Between Alternative Revised Baskets and the Initial Unrounded Currency Amounts: Trial Calculation Using October 1-November 20 as Base Period

Currencies	Unrounded units (In currency units) (1)	Trial baskets: Under 1980 guidelines (2)	Trial baskets: Uniform-digits approach, at three significant digits (3)	Memo: Maximum percentage deviation, without regard to sign, from Col. (1) under the established tolerance limit (4)
		Percentage difference from amounts in Col. 1		
U.S. dollar	0.448674	+0.3	-1.0	1.2
Deutsche mark	0.534040	+1.1	-0.4	2.6
Japanese yen	33.8361	+1.7	+1.7	3.3
French franc	1.028378	-2.8	+1.1	4.2
Pound sterling	0.0899541	-2.2	+0.9	4.2

From the point of view of simplicity in the presentation of the SDR to the market and in making SDR calculations (including those for the SDR interest rate) as well as furthering public understanding of the SDR, it would seem advantageous to minimize the absolute total number of digits to be used in presenting the currency amounts in the new basket, i.e., to maintain unchanged the 1980 guidelines as the basis for determining the currency amounts in the new SDR basket. This would also maintain continuity with past procedures, which are known to both official and private holders of SDRs. It may be noted in this regard that rounding to three significant digits could result in the presentation of some of the currency amounts in the new basket (e.g., the pound sterling) in five decimal places which could increase the risk of error in transmission and in making calculations. An increase in the number of digits would tend to make the SDR more unwieldy and the market might, when making its calculations of the SDR, tend to drop some of the digits, thereby widening the difference between the treatment of the official and private SDR.

Taking into account these considerations, the staff believes there is advantage in maintaining unchanged the 1980 procedures and that they could be applied in calculating the amount of each currency unit in the new SDR basket.

5. Effects of the revised basket on the Fund's interest rates on SDR-denominated assets

The currency amounts in the SDR interest rate basket are identical to those in the SDR valuation basket. As previously discussed in SM/85/163, pp. 22-27, the revision of the SDR basket could bring about a discrete change in the Fund's SDR interest rate and the Fund's borrowing rates under the Enlarged Access Policy, which are calculated in a similar manner.

According to the hypothetical revised valuation basket calculated for the period ended November 20 under the 1980 guidelines, the SDR interest rate determined on a trial basis on November 22 for the week of November 25-December 1 was 7.71 percent, or six basis points higher than the actual 7.65 percent SDR interest rate calculated under the existing SDR basket (see Table 4).

These calculations indicate that the size of the potential discrete change in the SDR interest rate is likely to be significantly lower than that indicated in SM/85/163. An increase in the SDR interest rate of the order of magnitude of six basis points as mentioned above would have had no perceptible impact on the Fund's income position 1/ and it would not seem necessary to make any compensating adjustments to

1/ The rate of remuneration would have been 7.17 percent instead of 7.11 percent per annum for the week ended December 1, 1985.

Table 4. Shifts in Combined Market Interest Rates on SDR-Denominated Assets Based on Hypothetical Revision of the Valuation Basket

	U.S. dollar (1)	Deutsche mark (2)	French franc (3)	Japanese yen (4)	Pound sterling (5)	Combined market interest rate: Present basket (6)	Combined market interest rate: Hypothetical revised basket (7)	Combined market interest rate: Diff. col.(8)-col.(6) (8)
Currency amounts								
Present basket	0.54	0.46	0.74	34	0.071			
Revised basket 1/	0.45	0.54	1.0	34.4	0.088			
Interest rates on Fund-related assets								
SDR: 2/								
Three-month maturity	7.46	4.8867	8.8715	8.17	11.4589	7.65	7.71	0.06
Fund borrowing: 3/								
Domestic instruments								
Six-month maturity	7.69	4.85	8.8750	7.8900	11.4688	7.72	7.76	0.04
One-year maturity	7.87	4.82	9.2517	7.4190	11.0100	7.72	7.74	0.02
Five-year maturity	9.22	6.45	10.9400	6.5210	10.6600	8.63	8.63	--
Eurocurrency instruments								
Three-month maturity	8.1250	4.7500	9.2500	7.8125	11.5625	7.97	7.90	-0.07
Six-month maturity	8.1250	4.8125	10.0000	7.4688	11.5000	7.97	7.97	--

1/ Calculated as of November 20, 1985.
2/ Calculated as of November 22, 1985.
3/ Calculated as of November 20, 1985.

counteract a change of this order, for example, by changing the relationship (presently 100 percent) between the SDR interest rate and the combined market rate.

Changes in the various interest rates on Fund borrowing tend to be smaller than the change in the SDR interest rate and they are likely to be within the rounding margins called for in their calculation. It may be recalled that the combined market calculations for determining these interest rates are rounded upwards, to the nearest 1/16 of a point for domestic instruments and to the next 1/8 of a point for eurocurrency instruments. The shifts in the unrounded combined market interest rates on SDR-denominated assets, based on the hypothetical basket revision of November 20, are also shown in Table 4.

III. Summary and Conclusions

1. This paper discusses the procedures to be followed in calculating the amounts of the five currencies in the SDR valuation basket that will come into effect on January 1, 1986. The amount of each currency to be included in the basket will be calculated on December 31, 1985, for lapse of time decision by the Executive board on that day. In view of the very short time available on December 31, 1985, it is necessary that the Executive Board endorse beforehand the procedures for calculating the new currency amounts.

2. The basic requirement of the calculations is that the new basket will have the same transactions value for the SDR as under the existing basket on December 31, 1985. It is also desirable to minimize in the calculations any deviation from the agreed weights for each of the five currencies in the basket based on average exchange rates in October-December 1985. The currency amounts are used in all calculations involving the SDR--both official and private. It is therefore desirable that the new SDR be presented in as uncomplicated a manner as possible to further the public understanding of the SDR and not to inhibit its use.

3. Apart from maintaining equality in the value of the SDR under the old and new baskets on the transition day, the 1980 guidelines provided for a limited deviation, not to exceed one half of one percent for each currency, in the currency amount from its agreed weight while aiming to come as close as possible to the practice of expressing currency amount in two significant digits. The guidelines also stipulate that for a given degree of rounding that produces more than one basket that met the requirements of the Decision on the SDR valuation, the basket selected must be that which had the minimum deviation of the currency amounts from their agreed weights.

4. The 1980 guidelines have been used to make trial calculations of the currency amounts in the new basket. These calculations indicate that it is not probable that a basket with currencies expressed to only two significant digits can be found that reflects the new weights,

within the agreed constraint, while meeting equality for the transactions value for the SDR on the transition day. However, it is highly likely that a basket can be found with three or four currency amounts expressed to two digits and one or two currency amounts expressed to three significant digits. Such a basket would minimize the absolute number of digits used in expressing the currency amounts.

5. At EBM/85/102, an Executive Director suggested that the guidelines followed in 1980 be modified so that the new basket would contain currency units expressed uniformly in either two, three, or if need be, four significant digits. Taking into account this suggested modification of the 1980 guidelines, the staff has made trial calculations of the currency amounts for the new basket which shows that it is likely, under this modification, that the currency amounts would be expressed uniformly to three significant digits.

6. It has been suggested that the uniform significant digits approach might result in greater adherence to the agreed percentage currency weights for the revised SDR basket. This could arise because the total number of signficant digits is likely to be greater than under the 1980 guidelines and because more precise currency amounts are used in the calculation. However, as can be seen from the trial calculations presented in Table 1, the procedure could not ensure greater adherence for every currency to its agreed weight in the new basket, though it might achieve a smaller deviation on average. The outcome is, however, somewhat uncertain because it would depend on the pattern of exchange rates at the date of calculation of the new currency amounts and the working of the minimization technique applied to the overall deviation of the basket from the agreed currency weights.

7. The difference between the 1980 procedure and the suggested modified procedure is largely presentational in intent. In the judgment of the staff the differences betwen the two procedures are not large. There would seem to be some advantage in minimizing the number of digits used in presenting the currency amounts in the new basket and also in maintaining continuity of past procedures. Against this, there is the possibility of achieving greater adherence to the agreed currency weights for some currencies. On balance, and as explained in paragraph 4 of Section II, the staff believe that there is advantage in maintaining the 1980 procedures in calculating the currency amounts for the new basket. As indicated earlier, it is highly desirable for the Executive Board to agree on the procedure to be followed before the final calculations are made at the end of this year.

8. The discrete change in the SDR interest rate basket that will result from the change in the currency amounts in the valuation basket is likely, on present indications, to be minor though the direction of change cannot be predicted. It is unlikely to have any perceptible impact on the Fund's income positon or on the Fund's borrowing costs, including the rate of remuneration.

Special Drawing Right--Method of Valuation

1. Effective January 1, 1981, the value of one special drawing right shall be the sum of the values of specified amounts of the currencies listed in 2. below, the amounts of these currencies to be determined on December 31, 1980 in a manner that will ensure that, at the average exchange rates for the three-month period ending on that date, the shares of the currencies in the value of the special drawing right correspond to the weights specified for each currency in 2. below.

2. On the basis of changes in members' exports of goods and services and in official balances of members' currencies held by other members since the previous review of the method of valuation of the SDR conducted in March 1978, that the currencies and weights referred to in 1. above shall be as follows:

Currency	Weight (In percent)
U.S. dollar	42
Deutsche mark	19
French franc	13
Japanese yen	13
Pound sterling	13

3. The list of the currencies that determine the value of the special drawing right, and the amounts of these currencies, shall be revised with effect on January 1, 1986 and on the first day of each subsequent period of five years in accordance with the following principles, unless the Fund decides otherwise in connection with a revision:

a. The currencies determining the value of the special drawing right shall be the currencies of the five members whose exports of goods and services during the five-year period ending 12 months before the effective date of the revision had the largest value, provided that a currency shall not replace another currency included in the list at the time of the determination unless the value of the exports of goods and services of the issuer of the former currency during the relevant period exceeds that of the issuer of the latter currency by at least one percent.

b. The amounts of the five currencies referred to in a. above shall be determined on the last working day preceding the effective date of the relevant revision in a manner that will ensure that, at the average exchange rates for the three-month period ending on that date, the shares of these currencies in the value of the special drawing right correspond to percentage weights for these currencies, which shall be established for each currency in accordance with c. below.

c. The percentage weights shall reflect the value of the balances of that currency held at the end of each year by the monetary authorities of other members and the value of the exports of goods and services of the issuer of the currency over the relevant five-year period referred to in a. above, in a manner that would maintain broadly the relative significance of the factors that underlie the percentage weights in paragraph 2 above. The percentage weights shall be rounded to the nearest one percent or as may be convenient.

4. The determination of the amounts of the currencies in accordance with 1. and 3. above shall be made in a manner that will ensure that the value of the special drawing right in terms of currencies on the last working day preceding the five-year period for which the determination is made will be the same under the valuation in effect before and after revision.

Decision No. 6631-(80/145) G/S
September 17, 1980

Formulas for the Calculation and Rounding of the Currency Components in the SDR Valuation Basket 1/

The calculation of the amounts of each currency in the SDR valuation basket is presented algebraically below.

Let W_i be the weight of currency i, expressed as a proportion;

BEX_i be the base period average exchange rate for currency i, expressed as U.S. dollars per unit of currency i;

TEX_i be the exchange rate for currency i on the transition date, the last business day of the base period, expressed as U.S. dollars per unit of currency i; and

\$/SDR be the value of the SDR in U.S. dollars on the transition date, calculated under the then Rule O-1.

Step A: The components in the basket are determined as:

$$C_i = (W_i/BEX_i) \cdot \frac{\$/SDR}{\sum_{i=1}^{5} (W_i/BEX_i) \cdot TEX_i}$$

where C_i is the units of currency i.

Step B: In rounding the results under Step A, the rounded currency amounts RCC_i will be determined in a manner that would ensure that the value of the SDR on the transition date on the basis of the new basket will be the same as that actually prevailing on that day. For each of the baskets that meet the test, the root mean square of the deviations of the rounded currency components (RCC_i) from their previously calculated values, i.e.,

$$\sqrt{\frac{\sum_{i=1}^{5} \left(\frac{RCC_i - C_i}{C_i}\right)^2}{5}}$$

is calculated.

1/ See "SDR Valuation Basket - Calculation of the Currency Amounts," SM/80/206, Supplement 3 (12/15/80) and Supplement 5 (12/22/80).

Step C: The currency amounts of the new basket will be expressed to two significant digits, provided that the percentage deviation over the agreed weight for each currency in the value of the SDR resulting from the application of the average exchange rates for the relevant three-month period ending on the transition date is the minimum on average and does not exceed one-half percentage point for any currency.

Step D: If no solution is found under Step C, the significant digits to which currency amounts will be expressed may exceed two for one or more currencies but not exceed four for any currency provided that the shares of component currencies over the three-month averaging period, when appropriately rounded, are the same as the agreed percentage weights. The basket that meets the test of equality with the transition value of the SDR in U.S. dollars, expressed to six significant figures, and with the smallest root mean squared deviation is selected.