December 20, 1982 - 82/233

Background Notes for the
Statement by Mr. Polak at the
Committee of the Whole on Review of Quotas
Meeting 82/18
December 21, 1982

These technical notes may be found helpful as background material for the policy observations I intend to make at the meeting of the Committee on December 21. They deal, successively, with four questions:

1. Is there a difference that is of relevance to the present quota discussion between Method 3 and Method 2A?

2. What is the importance of the concept of country-specific coefficients of adjustment and of the "uniformity" of such coefficients?

3. What is the relationship between the two essential parameters of this exercise: the adjustment coefficient and the equi-proportional increase?

4. In what manner do quota shares of country groups vary with increases in the adjustment coefficient?

I.

Most of the calculations that we have discussed in the last few months have been prepared by two methods, which have become known as Method 3 and Method 2A. This section will show that these two methods amount to the same, within the range of calculations that we have considered (and indeed well beyond that range) and subject to a trivial qualification (on which more below). In their most general form (e.g., in Table 2 of Document 13, column (4) for Method 3 and column (5) for Method 2A), both start out by adding to each member's quota Q an equiproportional component, raising all quotas in that first step as follows:

Method 3	Method 2A
From Q to (1+a)Q	From Q to (1+b)Q

Here a and b are coefficients that need not be equal.

Both methods then take the balance of the total quota increase available and distribute it again to all members (subject to the qualification to be dealt with later). Method 3 distributes this amount in proportion to calculated quotas C, so that the new quota under that method becomes (1+a)Q + cC. Method 2A distributes the amount available in proportion to

each member's excess of its calculated quota over its present quota, which is C-Q. The general formula for the new quota N under the two methods thus shows up as follows (using two additional coefficients c and d):

Method 3	Method 2A
$N = (1+a)Q + cC$	$N = (1+b)Q + d(C-Q)$

Coefficients a and c in Method 3, and b and d in Method 2A, must of course be jointly chosen in such a way that the sum of the new quotas adds up to the desired amount, e.g., SDR 90 billion.

So far it can be said that the new quotas under the two methods have been derived by different methods. But it will also be seen at once that the two methods can be expressed in fully comparable terms:

Method 3	Method 2A
$N = (1+a)Q + cC$	$N = (1+b-d)Q + dC$

These expressions show that any set of new quotas calculated by Method 3 can also be derived by means of Method 2A or vice versa. What is needed for the outcome to be the same is that:

$$d = c$$

$$(b-d) = a, \text{ or } b = a+d = a+c$$

Now for the qualification. In its presentation of Method 2A, the staff has throughout used only positive excesses of C over Q. This was a matter of choice; it was not required to avoid the reduction in any member's quota. As long as the method contains a substantial equiproportional component, the particular constellation of values for C and Q would have produced quota increases for all members, even if the formula had been adhered to throughout the range of the membership. The effect of the replacement by zero of negative values for (C-Q) amounted to guaranteeing each member a proportionate increase of cQ. The practical importance of this constraint turns out to be trivial, given the actual constellation of the numbers in this quota exercise. The constraint applies to only 14 members in columns (5) and (6). 1/ Even for the country that is helped most by the constraint, the Lao People's Democratic Republic, the difference is small: its quota increase in column (5) is 23.7 per cent, as against an increase of 17.5 per cent that it would have received without the constraint. The cost of the constraint amounts to only SDR 20 million in column (5) and SDR 13 million in column (6). This amount is covered by

1/ All examples in this note refer to a Fund of SDR 90 billion.

reducing the quotas of all members that do not benefit from the constraint, by .020 per cent (one fiftieth of 1 per cent) in column (5) and by .015 per cent in column (6).

Even the very minor differences would vanish if Method 2A were implemented without the constraint used,--a constraint, incidentally, for which no compelling reason has been put forward.

The conclusion is thus justified that, given the constellation of actual and calculated quotas and the order of magnitude of overall quota increases now under consideration, there is no difference of any consequence between Methods 3 and 2A 1/, and the trivial difference that does exist could be eliminated without any member being significantly affected. 2/

It also follows of course, that the quota figures derived under one heading oculd be replicated, for each member, by a calculation under the other heading. There are no precise duplicates in the material before us, but there are two sets of near-duplicates. For each pair, one calculation is presented as coming from Method 3 and the near-matching one from Method 2A. The calculations in column (4) and (6) of Table 2 in Document 13 have nearly the same adjustment coefficient (16 and 15) and not very different minimum increases (26 per cent and 32 per cent). Not surprisingly, the results in terms of group shares are practically the same, within 0.1 percentage point;

1/ The same proposition holds with respect to Method 4. That method has been described in terms of quota shares, not absolute amounts, of present or calculated quotas. However, since quota shares are by definition proportional to the corresponding absolute quota figures, any instructions to the computer can as readily be expressed in terms of one set of numbers as in terms of the other.

2/ On pages 5 to 7 of its paper, the staff insists on certain remaining differences between the two methods. Thus it states that Method 3 does, and Method 2A does not, provide a quota increase to each member. This is not borne out by the country tables. It also mentions that the maximum adjustment coefficient for Method 2A would be 45 per cent, as against 32 per cent for Method 3. There is no column headed Method 2A in this or any other staff paper (i.e. the Board is not considering any such column) where the adjustment coefficient exceeds 23 per cent. Both of these statements relate to a "Method 2A" that is different from that used in all the calculations presented under that label in this and earlier papers, viz. one in which there is no equiproportional element. In all calculations of the 2A type discussed in the Eighth Review (in contrast to the Fifth and Sixth Reviews) 50 per cent or more of the total quota increase was distributed in proportion to present quotas and only the remainder on the basis of the excess of calculated over present quotas. A third difference is seen in the fact that under Method 3 the rate of adjustment is the same for all members, while under Method 2A these rates differ, "but normally fall within a relatively narrow range." This is merely another way of saying that all calculations shown under Method 2A are subject to a certain constraint (See Section II below).

and if one runs down columns (4) and (6) in the Annex Tables one will similarly find the results to be very close for every country. Essentially the same comment applies to the two calculations--one asked for by Mr. Malhotra and one by Mr. Erb--shown side by side in columns (2) and (3) of the Supplement. Both have very low adjustment coefficients (8 and 11) and virtually the same minimum increase (37 per cent and 36 per cent). Again, the differences in results are very small.

II.

The distinction that the staff makes between calculations with a uniform adjustment coefficient and those where this coefficient differs from country to country is the same as that between calculations without and calculations with a constraint. The application of a constraint inevitably involves a second round of calculations. In all cases under consideration, this second round has consisted of a small percentage reduction of the quotas of all "contributors."

These two steps fully describe the process. No additional insight is gained by taking the end result and deriving from it a country-specific adjustment coefficient that would have had to be used to do the two steps in one. A particular oddity of the new concept introduced by the staff is that the individual adjustment coefficient goes to $\pm$ infinity at the very point where it loses significance, viz. where a country's share in calculated quotas equals its share in actual quotas. 1/

It has been recognized earlier that the two-step procedure may, for a few countries, produce a share in new quotas that does not lie between the two shares that entered into the first calculation (so called "overshooting"). In most calculations the differences involved have been of negligible importance.

III.

It has been observed in I that coefficients a and c in the formula for Method 3 have to be chosen in such a way that the sum of the new quotas adds up to the desired amount. It follows from the same proposition that there is a link between the size of the adjustment coefficient (AC) and the equiproportional increase (EI). For a Fund of SDR 90 billion, this link can be expressed as follows:

$$1.48\ AC + EI = .48$$

1/ The formula for the implied adjustment coefficient (a_i) (not given in the staff paper) in terms of the initial value of a used in the calculation, the cost of restraint, expressed as a fraction of the new quotas of all other members (d), and the member's ration of its calculated quota share to its present quota share (R_i), is as follows:

$$a_i = (1-d)\ a - \frac{d}{R_i - 1}$$

This goes to infinity as R_i approaches 1.

The figure of .48 comes from the fact that SDR 90 billion is 48 per cent larger than the present Fund of SDR 61 billion. For the much discussed 50 per cent increase, the relationship would be even simpler:

$$1.50\ AC + EI = .50$$

These equations highlight the proposition that for every size of the Fund, there is a simple trade-off between the adjustment coefficient and the minimum increase.

The link described holds precisely for calculations not subject to any constraint (see Table). The material before us also contains some cases where the weighted sum of the two parameters is somewhat in excess of .48. These are the cases that involved the need to introduce a certain constraint in order to keep the total to SDR 90 billion and in which, therefore, the new quota figures are not precisely in accordance with the simple formula. These cases also suggest that although the dominant relationship between the adjustment coefficient and the equiproportional increase applies a trade-off between the two, there is some room for solutions that involve both a higher adjustment coefficient and a higher equiproportional increase.

IV

When the 11 cases submitted by the staff in Documents 10, 13 and 13, Supplement 1 1/ are arranged in order of their adjustment coefficients (see Table), there is an initial tendency for the shares of groups of countries to move in one direction as the adjustment coefficient increases. This has been well recognized before. But what has drawn little attention so far is that the relationship is far from linear. The bulk of the increase of the share of the industrial countries as a group, as compared with their present share--countries as a group--occurs in conjunction with the first 15 points or so of the adjustment coefficient. Beyond that point, the curve flattens out; and the movement is reversed as one moves from Case J to Case K.

1/ Excluding the two nonlinear cases.

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Case (1)	Adjustment Coefficient (2)	Equiprop. Increase** (3)	1.48x(2)+(3) (4)	Quota Shares: Industrial Countries (5)	Quota Shares: Major Oil Exporters (6)	Quota Shares: Non-Oil LDCs (7)	Sources: Doc. (8)	Sources: Column (9)
Present				61.3	10.9	27.8		
A	.08	.36 (.37)	.48	61.7	11.2	27.1	(b)	(2)
B	.11	.36 (.36)	.52*	61.9	11.3	26.8	(b)	(3)
C	.15	.32 (.32)	.54*	62.1	11.4	26.5	(a)	(6)
D	.16	.24 (.26)	.48	62.2	11.4	26.4	(a)	(4)
E	.18	.28 (.28)	.55*	62.2	11.5	26.2	(b)	(4)
F	.20	.18 (.21)	.48	62.2	11.6	26.1	(c)	(3)
G	.23	.24 (.24)	.58*	62.4	11.7	25.9	(a)	(5)
H	.25	.11 (.14)	.48	62.5	11.7	25.6	(c)	(4)
I	.32	.25 (.25)	.72*	62.6	11.9	25.5	(a)	(3)
J	.32	0 (.05)	.48	63.0	12.0	25.0	(a)	(2)
K	.50	.25 (.25)	.99*	62.5	12.3	25.2	(a)	(7)

* Constrained; B, C, E and G very little

** The figures between brackets indicate the increase in the quota of Lao PDR, which is the member with the lowest ratio between calculated and present shares. These figures are the same as the ones in the first line of Table 3, Document 10.

Sources:

(a) Document 13, Table 2
(b) Document 13, Suppl. 1, Table 1
(c) Document 10, Table 3

Note:

- All cases refer to a Fund of SDR 90 bln
- Figures in columns (2) and (3) rounded