Note 4. Convergence Over Time of Actual Quotas Toward Calculated Quotas

30.   This note provides statistical data on the movement over time of actual quotas in relation to calculated quotas. In general, two types of comparisons between actual and calculated quotas have been made. One is based on "normalized" calculated quotas, i.e., comparisons based on actual quotas and calculated quotas, where the latter has been scaled down (or normalized) so that their total equals that of actual quotas. The second comparison is that between the absolute levels of actual and calculated quotas, which would capture the extent to which the total or average of actual quotas has tended to lag behind calculated quotas.

31.   Table 4.1 shows the average deviations of calculated quotas from agreed quotas at the conclusion of the last seven quota reviews. The upper panel of Part 1 of the table shows the deviations on the basis of calculated quotas for each review that have been scaled or "normalized" to sum to the total of the quotas actually agreed to in each respective quota review. These deviations between actual and calculated quotas peaked at the end of the Seventh Review, reflecting the preponderant equiproportional element in most of the quota reviews up to that time.

32.   Under the Eighth Review, the weight of calculated quotas in the distribution of quota increases was relatively large, and, as a result, the average discrepancy between calculated quotas and agreed quotas, on a normalized basis, fell to 53 percent. Under the Ninth Review, the average discrepancy widened somewhat, to 59 percent, when the equiproportional element was set at 60 percent, not far below the historical norm of having equiproportional increases equal to 70 percent of the total quota increase. The normalized deviation for industrial countries was kept relatively low as a result of ad hoc re-arrangements that equalized the quota shares of Japan and Germany, and of France, and the United Kingdom. The average deviation between actual and calculated quotas for all members widened under the Tenth Review with the absence of a quota increase in that review. Under the Eleventh Review, the average deviation between calculated and actual quotas was reduced to about the level observed at the end of the Eighth Review, partly as a result of a significant adjustment of the quota shares of industrial countries.

33.   The non-normalized data show a similar pattern of divergence over time, but they also show that the absolute size of the divergence of calculated from actual (or agreed) quotas has remained substantial since the time of the Seventh Review.

34.   The table also shows that about a fourth of the total membership (in terms of the number of countries) tended to have excesses or positive deviations of calculated over actual quota shares. Furthermore, the quota share or voting power of such members that would gain quota share, as actual quotas were adjusted toward calculated quotas, was generally less than

the voting power of the members that would tend to lose quota share. This situation largely explains the tendency of the membership to agree on a relatively large equiproportional element in quota increases, which limited the changes in quota shares.

35.   At each general quota review, the reduction of the discrepancy between shares in actual and calculated quotas may be measured by the "adjustment coefficient." For an individual member, the adjustment coefficient measures the extent of reduction of the initial gap between actual quota share and calculated quota share. For the membership as a whole, the adjustment coefficient is defined as the average reduction in the differences between members' shares in calculated and actual quotas.[15] Although the adjustment coefficient was devised in 1982/83 at the time of the Eighth Review, an ex post calculation of the historical adjustment coefficients indicates that this coefficient has tended to be significantly higher in recent quota reviews in comparison with earlier reviews.

36.   Because the adjustment coefficient is a "flow" or rate-of-change concept, it should also be viewed in relation to the extent of (cumulative) convergence between actual and calculated quota shares over time. For the latter concept, a convergence index has been calculated and shown in the attached table. The convergence index is defined as 100 percent minus the aggregate of positive (or negative) deviations between calculated and proposed (actual) shares. The convergence index measures the extent to which the relative distributions of actual and calculated quotas have become aligned over time, even as the distribution of calculated quotas was subject to change in between general quota reviews. As can be seen in the table, the convergence index was relatively high at the end of the Fifth and Ninth Reviews (almost 90 percent), and somewhat lower at around 85 percent at the end of the other quota reviews. It would appear that the amount of "work" needed to maintain a convergence index of 85–90 percent has, in recent quota reviews, required a palpable

---

[15] The specific formula for calculating the adjustment coefficient is:

$$\frac{\left[\Sigma(S_p^i)^2\right]^{1/2} - \left[\Sigma(S_c^i - S_n^i)^2\right]^{1/2}}{\left[\Sigma(S_c^i - S_p^i)^2\right]^{1/2}} \times 100$$

where S_c = calculated quota share, S_p = "present" or then-existing quota share and S_n = new quota share. This measure compares (a) the average (root-mean-square) deviation of shares in new quotas from shares in calculated quotas with (b) the average (root-mean-square) deviation of shares in then-existing quotas from shares in calculated quotas.

For an individual member i, the adjustment coefficient is:

$$\frac{S_n^i - S_p^i}{S_c^i - S_p^i} \times 100$$

adjustment of relative shares in quotas, and that an even greater amount of selectivity in quota increases would seem to be needed to raise the convergence index closer to 100 percent.

Table 4.1. Deviations of Calculated Quotas from Quotas Agreed
Under Past Quota Reviews
(in percent, except as indicated)

	Fifth Review	Sixth Review	Seventh Review	Eigth Review	Ninth Review	Tenth Review	Eleventh Review
1. Average (root-mean-squared error)							
Normalized 1/							
All members	33.2	60.3	77.6	52.6	59.0	64.6	54.1
Industrial countries	22.3	29.5	32.7	27.0	26.8	57.6	44.0
Major oil exporting countries	23.8	45.0	89.3	66.9	69.2	62.9	43.3
Non-oil developing countries	36.2	66.9	82.7	54.5	62.1	65.9	56.3
Non-normalized 2/							
All members	31.3	75.6	133.8	140.5	163.8	221.6	153.7
Industrial countries	27.9	66.4	99.4	160.6	167.5	325.2	237.4
Major oil exporting countries	23.5	46.3	204.2	266.1	283.7	309.8	137.0
Non-oil developing countries	32.8	80.4	129.4	114.0	145.4	188.1	136.6
2. Total of positive (negative) deviations between proposed and calculated quota shares							
All members	10.8	14.7	16.8	14.4	10.1	14.6	14.4
No. of members with positive deviations	18	22	31	33	34	36	39
Quota shares of members with positive deviations	58.3	56.3	42.0	39.9	58.4	43.1	40.8
No. of members with negative deviations	94	102	102	110	118	140	144
Quota share of members with negative deviations	41.7	43.6	61.3	60.1	41.6	56.9	59.2

Table 4.1. (concluded). Deviations of Calculated Quotas from Quotas Agreed
Under Past Quota Reviews
(in percent, except as indicated)

	-Fifth Review	Sixth Review	Seventh Review	Eigth Review	Ninth Review	Tenth Review	Eleventh Review
3. Adjustment coeficient, 3/							
All members	11.5	5.4	1.7	19.3	28.0	0.0	14.4
4. Convergence index, 4/	89.2	85.3	83.2	85.6	89.9	85.4	85.6
All members							

1/ The figures shown are based on comparisons between quotas proposed as a result of the Review indicated
and quotas calculated in connection with the same review, after applying a scale factor to the calculated
quotas (normalizing) so that they aggregate to the same size Fund as agreed under the Review.
2/ The average comparisons shown are based on quotas calculated for the given Review, without the
adjustment described in Footnote 1. These figures also indicate the extent to which quotas in general have
lagged over time behind the calculated quotas.
3/ The specific formula for the adjustment coefficient is:

$$\frac{\{SQRT[SUM((CQ-PQ)sq2)]\}- \{SQRT[SUM((CQ-PropQ)sq2)]\}}{\{SQRT[SUM((CQ-PQ)sq2)]\}} \times 100$$

where CQ is the calculated quota share, PQ is the present quota share and PropQ is the proposed quota share.
4/ The convergence index is defined as 100 percent minus the total of positive deviations, between proposed
and calculated quota shares.