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February 28, 1994

To: Members of the Committee of the Whole
 on Review of Quotas

From: The Secretary

Subject: The Working of the Quota Formulas

There is attached for consideration by the Committee of the Whole a paper on the working of the quota formulas in connection with the Tenth General Review of Quotas. Conclusions appear on pages 49-52.

This paper, together with the paper presenting preliminary quota calculations (EB/CQuota/94/1, 2/25/94), will be taken up at a meeting of the Committee tentatively scheduled for Friday, March 18, 1994.

Mr. Roncesvalles (ext. 37800) or Mr. Tavlas (ext. 37493) is available to answer technical or factual questions relating to this paper.

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INTERNATIONAL MONETARY FUND

The Working of the Quota Formulas

Prepared by the Treasurer's Department

(In consultation with the Research Department)

Approved by David Williams

February 28, 1994

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I. Introduction

In its Report to the Board of Governors at the conclusion of the Ninth General Review of Quotas in June 1990, the Executive Board noted that it would "further examine the working of the quota formulas in the context of the preparatory work for the next review of quotas, so as to ensure that they would take adequate account of all relevant developments bearing on members' quotas." In this connection it may be noted that the Executive Board agreed to maintain unchanged the then existing set of five quota formulas for making quota calculations for the Ninth General Review but noted in its report to the Interim Committee in March 1989 that agreement on the formulas did not preclude changes in future quota reviews. This paper accordingly discusses (i) the role of the quota formulas for making calculations that might reasonably indicate the relative economic positions of Fund members; (ii) the relevant developments that have a bearing on members' quotas and how they may be reflected in the formulas; (iii) the statistical properties of the formulas used for making calculations under the Eighth and Ninth Reviews of 1983 and 1990, respectively; and (iv) the suggestions that have been made as regards possible changes in the quota formulas.

The paper is organized as follows. Section II reviews the role and use of formulas in making quota calculations, including the derivation of the original Bretton Woods quota formula. Section III discusses the modifications that were made to the Bretton Woods formula in 1963/64 and in 1983, and reviews other changes to the formulas that were proposed but not accepted in successive quota reviews. Section IV provides an analysis of the working of the quota formulas in the context of the Tenth General Review of Quotas in light of recent economic developments and the calculations made using updated data through 1990, as well as the suggestions made by Executive Directors in previous quota reviews for certain changes in the quota formulas. The analysis in Section IV is therefore based on the preliminary quota calculations made for the Tenth Review. ^{1/} Section V provides a summary and conclusions. Appendix I presents a history and an analysis of the specification of the quota formulas; Appendix II describes the statistical methods and procedures for alternative formulas that include new variables; and Appendix III presents illustrative alternative quota calculations for all members.

II. The Role and Use of Quota Formulas

The Articles of Agreement provide for a general review and possible adjustment of quotas every five years but they do not indicate how Fund quotas should be determined. The Executive Board has neither formally adopted nor endorsed any particular method for determining quotas or quota increases. However, the Fund has developed and applied quantitative criteria with the aim of setting Fund quotas in a reasonably equitable fashion. In practice, calculations that have been made on the basis of the quota formulas have been used to derive a single set of "calculated quotas,"

^{1/} See "Tenth General Review of Quotas--Preliminary Quota Calculations," EB/CQuota/94/1 (2/25/94).

which have served as a measure of the relative economic size of members. Such calculated quotas have been used primarily for two purposes: (1) to help determine the initial quotas of new members; and (2) as a basis for determining increases in quotas for Fund members.

With regard to the determination of the initial quotas of new members, the calculated quota serves as a guide to the setting of an actual quota for a new member that would fit reasonably well into the existing structure of Fund quotas and that is in the same range as the quotas of existing members considered by the Fund to be broadly comparable in economic size and characteristics. 1/ The formulas employ data for the prospective member that are consistent with those used in the calculations made for existing members in connection with the quotas in effect during the time of the membership process. It may nevertheless be noted that for the purpose of determining initial quotas of new members, the Fund has been reluctant to apply automatically the results of quota calculations based solely on the formulas. As discussed in 1973, this reluctance reflects a desire by the Executive Board to have the ability to exercise its discretion in determining actual initial quotas, as well as a belief that no single quota formula or set of formulas can reflect all the considerations that appropriately bear on members' quotas and members' individual positions in the Fund. 2/

As regards the use of formulas in connection with general reviews of quotas, formulas have played a significant role in the determination of quota increases only since 1963--following the revision of the original Bretton Woods formula and the development of a number of alternative formulas derived from the original Bretton Woods formula (see below). The quota formulas were used to measure the extent to which calculated quotas exceeded actual quotas in the Fifth through Seventh Reviews, and this measure of divergence between actual and calculated quotas formed the basis for selective increases agreed in those reviews. In connection with the Eighth Review in 1981/83 and in the Ninth Review in 1990/92, the quota formulas played a major role in determining selective increases in quotas in that the shares of members in the total of calculated quotas served as the distribution key for allocating the selective component of the overall quota increase.

The accession to the Fund membership by the countries that comprise the former Soviet Union (FSU) has established the Fund as a global institution and this has implications for the role of quota formulas. Given that universal membership in the Fund is virtually complete, the primary need in

1/ It will be recalled that Article II, Section 2 prescribes that terms for membership "...shall be based on principles consistent with those applied to other countries that are already members." The quota calculations made to help determine the initial quota for a new member are an important application of these principles.

2/ See "A Review of Fund Policies on Quotas," SM/73/274 (12/10/73).

the future for using quota formulas will be to provide a basis for allocating quota increases, and it would seem appropriate that the calculated quotas would continue to provide a measure of relative economic size of members in the light of ongoing changes in the world economy. The issues that arise are therefore those pertaining to whether the formulas continue to provide an adequate indicator of relative economic size and whether they reflect those developments that have a direct bearing on the distribution of quotas. In this connection, several Executive Directors have raised the issue of whether the formulas continue to reasonably reflect the relative economic size of developing countries particularly given the view of some Directors that there seems to be a downward bias embedded in the quota formulas as reflected in the declining calculated quota shares of many developing countries.

1. Relationship between formulas and the functions of quotas

In earlier discussions in the Executive Board, apart from the emphasis given to the use of quota calculations based on formulas as a composite measure of the relative economic size of members, it has frequently been pointed out that the distribution of calculated quotas and the variables underlying these calculations should also reflect the multiple functions that quotas perform, which are: (i) they determine the contribution of members to Fund resources; (ii) they have a bearing, which has increased in recent years, on members' access to the Fund's resources; (iii) they form the basis of members' voting power; and (iv) allocations of SDRs are distributed according to quotas. As these four functions are neither necessarily mutually consistent nor exclusive, it is difficult not only to identify a particular set of economic criteria that should enter into the determination of members' quotas but also to combine these criteria in a manner that would reflect a reasonable balance with respect to the four specific functions of quotas, in addition to being a measure of the relative economic size of members. In practice, the inherent conflict of meeting all such objectives has essentially been resolved in the context of recent general reviews of quotas by apportioning a part of the overall increase in quotas in the form of an equiproportional increase and another part in the form of selective increases based on the formula-driven quota calculations.

2. The Bretton Woods formula

In contrast to the present five-formula system, the original Bretton Woods formula was a single-equation formula whose results purported to provide a comprehensive measure of the relative size of a country's economy that took into account important differences in the economic structures of countries. Such differences included: the greater variability of some countries' trade than those of others; the relative openness of members' economies; the differing ability of members to contribute to the financing of the Fund's operations; and members' differing need to draw on Fund resources. The Bretton Woods formula was applied in 1944 to help derive the initial quotas for 45 countries by providing a statistical base to the process, but it was recognized that the calculations were only one of the

elements of that process. 1/ Moreover, the determination of the relevant economic criteria and the assignment to them of weights in the Bretton Woods formula were not the only factors considered in the derivation of initial quotas, which reflected preconceived notions of the relative economic size of countries and which emerged from a process of negotiation and compromise among the conference participants. 2/ The Bretton Woods formula nonetheless continues to play an important role in the determination of calculated quotas, with its present-day version being the applicable formula for about half the membership.

The Bretton Woods formula contained the following variables:

(i) national income as a measure of a country's economic size and an indicator of its ability to contribute to Fund resources; (ii) reserves as a measure of a member's capacity to finance Fund operations but with a relatively small weight because such holdings were considered to be subject to strong fluctuations and because of the inverse relationship between a member's holdings of reserves and a need to use the Fund's resources; (iii) merchandise imports as an important indicator of a member's possible need to draw on the Fund; (iv) variability of exports with a considerable weight since it was "one of the main purposes of the Fund ... to absorb shocks due to the variability of exports;" 3/ and (v) a multiplicative factor, represented by the sum of unity and the ratio of exports to national income, which was applied to the other components in the formula, in order to provide higher quotas to export-oriented countries.

As indicated in the next section, the Bretton Woods formula worked reasonably well except insofar as the definition of variability of exports became unrepresentative of what it purported to measure, and concerns were also expressed as regards perverse results arising from its nonlinear specification with respect to national income, since in extreme cases a country with a higher national income than another country could have a lower calculated quota even if the other variables were the same for the two countries. These aspects of the Bretton Woods formula are discussed further below.

1/ See "The Quinquennial Review of Quotas," Supplement 1, EBS/50/173 (12/6/50), p. 13.

2/ These negotiations and compromises were in large part driven by limitations imposed by a number of prior constraints, assumptions, or objectives, in particular those relating to the relative size of the four largest countries. See Appendix I.

3/ EBS/50/173, Supplement 1 (12/6/50), p. 14. This component was defined as the difference between the highest and lowest annual exports in a five-year period.

III. Modifications of the Bretton Woods Formula

The structure of the quota formulas and the Fund's method of calculating quotas have been critically examined on a number of occasions--in particular during the quota discussions in connection with the Fourth, Fifth, Sixth, Eighth, and Ninth Reviews of Quotas. Such examination has centered on the formulas in general, on their various components, and on the method of quota calculations.

1. Revision of the Bretton Woods formula (CF Decision and Fourth Review)

In 1963 the Bretton Woods formula was revised and a number of alternative formulas were derived from the original Bretton Woods formula. These changes to the formula structure were first used in association with the Fourth Quinquennial Review in 1964/65. Two important considerations were taken into account in making these changes. First, an aim of the changes in the quota formulas was to increase the quotas of the smaller primary producing countries, i.e., those countries with quotas that were less than \$60 million at the time. Second, it was considered appropriate that "the structure of calculated quotas for most of the other countries flowing from any modification of the Bretton Woods formula should bear a reasonable relationship to the present structure of such quotas." 1/

The revision of the original Bretton Woods formula included changes in the definition or coverage of several variables and reductions in the coefficients of all the variables. 2/ The version of the original Bretton Woods formula with coefficients equal to half of the original formula is referred to as the "Bretton Woods formula (reduced)."

1/ The changes in the quota formulas took place in conjunction with adoption of the Fund's Decision on Compensatory Financing of Export Fluctuations (CFF) (Decision No. 1477-63/8, adopted February 27, 1963). The Fund recognized that some quota adjustments might be required or desirable, particularly for countries with relatively smaller quotas (those less than \$60 million) and the Decision stated that the Fund was willing to give sympathetic consideration to requests for adjustment of quotas in the light of fluctuations in export proceeds and other relevant criteria. The results of the derivative formulas were used to quantify the proposed quota increases for 29 developing countries. SM/63/36 (4/8/63), p. 1.

2/ The original coefficients of the Bretton Woods formula were reduced by one half so as to yield a total of calculated quotas for the Fund membership that was more consistent with their estimated needs for conditional liquidity and the actual size of the Fund in 1963. The reduction in the coefficients was uniform and by itself did not affect the distribution of calculated quotas.

The original concept of variability was modified because, as the difference between the minimum and maximum of exports over a five-year period, it mainly reflected the upward trend of exports rather than its fluctuation. Variability was also revised to bring it into line with the definition employed in connection with the Compensatory Financing Facility; that is, the new definition employed in the Bretton Woods (reduced) formula was one standard deviation around a centered five-year moving average calculated over the latest 13-year period for which data were available.

With regard to external trade, improvements in the reporting of invisibles and private transfers led to the development and use of parallel calculations with the Bretton Woods formula applied to both merchandise trade data and current account data. Calculations based on merchandise trade flows were referred to as Set I calculations (and the set of trade, national income, reserves, and variability data underlying these calculations were called Set I data). A second set of calculations was made using identical coefficients as in the Bretton Woods formula, but applying the coefficients to current receipts, current payments, and the variability of current receipts in place of exports, imports, and the variability of exports. Calculations based on these Set II data came to be known as Set II calculations.

2. Derivative formulas

Along with the revision of the Bretton Woods formula in 1963, the staff developed derivative quota formulas that used essentially the same variables as the original Bretton Woods formula. The derivative formulas were developed because it was recognized that the quotas of the smaller primary producing countries could not justifiably be increased using the calculations based on the revised Bretton Woods formula alone. Accordingly, a set of four derivative formulas was selected to supplement the calculations resulting from the Bretton Woods formula (reduced). ^{1/} In general, these derivative formulas did not contain a coefficient for a member's external reserves, which were seen at that time as an uncertain indication of the external strength of smaller primary-product exporting countries. More importantly, the new formulas had smaller coefficients or weights for national income and larger coefficients for trade and variability of exports than those in the Bretton Woods (reduced) formula. The retention of the Bretton Woods formula (reduced) avoided adverse effects on the quotas of the larger industrial and developing countries, while the increased weights for trade and variability in the derivative formulas tended to increase the calculated quotas of the smaller developing countries. Furthermore, the multiplicative factor (i.e., one plus the ratio of exports to national income) remained in two of the derivative formulas

^{1/} In fact, 15 new quota formulas were developed, of which four were chosen for purposes of determining a calculated quota range for each country. These four formulas are those referred to as Schemes III, IV, M4, and M7.

(Schemes III and IV), but was eliminated in the other two (Schemes M4 and M7), thereby making these M4 and M7 formulas linear. The main outcome of these changes was to introduce into the system a dual structure of quota formulas which reflected the different economic structures of Fund members; the main effect of the new formulas was to increase the calculated quotas of the smaller countries, especially those subject to highly unstable factors that affected their external sectors, while the continued use of the Bretton Woods formula (reduced) tended to capture the economic characteristics of the larger countries. This dual structure of quota formulas has been subsequently maintained.

3. Changes proposed during the Fifth and Sixth Reviews

The working of the quota formulas was assessed during the Fifth and Sixth Reviews, although no changes to the formulas were accepted. During the discussions in connection with the Fifth General Review in 1969/70, questions were raised about the appropriateness of the quota formulas in calculating quotas for the developing countries and a Director expressed the view that a quota formula should be designed "that had a set of assumptions relevant to the developing areas." 1/ In connection with the appropriateness of the formulas for the developing countries, an alternative method for calculating quotas was proposed that involved the use of increments of the variables in the quota formulas. 2/ It was felt that the then-existing formulas, and the manner in which they were used to calculate quotas, imparted a bias against the developing countries, and that this bias could be removed if quotas were calculated on the basis of changes in members' relative economic positions, as reflected in increments in the variables used in the formulas, applied to existing actual quotas.

Also during the Fifth Review, the following changes in the quota formulas were proposed: (i) use of an average of national income over a number of years, rather than only a single year's national income, in order to decrease the possibility of using a particularly low or high national income figure; (ii) as a means of overcoming the difficulties associated with the effects of large changes in exchange rates on national income in some countries, it was suggested that national income should be converted to a common basis by some appropriate purchasing power index; (iii) suggestions were made to take into account the large debt repayments of developing countries; 3/ and (iv) with regard to international trade, the suggestion was put forward that the periods for which these variables are included in the formulas--five years for exports and imports and 13 years for the computation of variability--might be extended.

1/ IS/63/1 (5/24/63), p. 4.

2/ R.H. Arriazu, "Incremental Approach to Quota Calculations," EBD/69/165 (10/16/69).

3/ EBM/69/97 (10/20/69).

At the time of the Sixth Review in 1974/75, the issue of whether the "formulas [included] a bias against the position of developing countries" 1/ continued to be discussed. Regression analysis was used by the staff to approximate the then existing quotas while examining the effects on the distribution of quotas of using variables which purported to measure poverty. Measures of poverty that were examined included population and per capita income. 2/ The incremental approach was revisited in the Sixth Review, and calculations were made on the basis of the changes of the variables used since the previous review, rather than on the basis of the aggregate variables normally used in making quota calculations. The use of the incremental approach was found to result in substantial changes in the relative positions of members. 3/ In particular, the approach tended to lower the calculated quotas of potential creditor countries while increasing the calculated quotas of potential debtor members. It was therefore concluded that the incremental approach should not be followed since "the Fund's liquidity could be unfavorably affected from both sides, and this could lead to increased reliance on borrowing to finance Fund transactions." 4/ The Seventh Review in 1978/79 did not include a major review of the quota formulas; however, at its conclusion, the Executive Board agreed to "review the customary method of calculating quotas after the Seventh General Review of Quotas has been completed." 5/

4. Revision of the formulas in connection with the Eighth Review

After considerable discussion by the Executive Board in 1981-82, further changes were made to the quota formulas at the time of the Eighth Review. 6/ These changes improved the quality of the data used in calculating quotas, reduced the impact of the variability component which had tended to exaggerate the effects of commodity-price shocks, while not disturbing the distribution of calculated quotas, and simplified considerably the procedure used to calculate quotas. In these respects, the changes made to the quota formulas were wide ranging, although it was recognized that the main impact of the changes in the quota formulas would only be felt in subsequent quota reviews. 7/

The modifications to the method of calculating quotas may be summarized as follows: (a) GDP replaced national income in the formulas, mainly because GDP was viewed as a more comprehensive and readily available measure

1/ Committee of the Whole Meeting 74/1 (4/15/74), p. 8.

2/ See "Statistical Formulas Explaining Fund Quotas," SM/73/275, Correction 1 (12/10/73), p. 4.

3/ See "A Note on the Incremental Approach to Quota Calculations," EB/CQuota/74/1 (4/11/74), p. 9.

4/ Ibid, p. 13.

5/ SM/78/248, Revision 4 (10/26/78), p. 4.

6/ See "Ninth General Review of Quotas - Issues Arising in Connection with the Eighth General Review of Quotas," EB/CQuota/87/4 (12/21/87).

7/ Ibid, pp. 3-4.

of national output than national income; (b) the measure of reserves was broadened to include holdings of SDRs, ECUs, and reserve positions in the Fund, and such holdings were calculated as a 12-month average rather than an end-of-period total (to reduce the volatility of the series); (c) a simplification of the procedure used to calculate quotas was attained by effectively reducing the number of formulas from ten to five through exclusive use of the so-called Set II data that included all the elements of the current account; 1/ and (d) the coefficient of variability was reduced by 20 percent in the four derivative quota formulas (the coefficient for variability in the Bretton Woods formula remained unchanged), so as to moderate the impact of the very sharp increases in prices of some actively traded commodities in 1973 (e.g., copper and phosphates) and, above all, the increases in prices of petroleum products in 1973 and 1974 and again in 1979, that had resulted in unduly large increases in the contribution of variability in individual calculated quotas. 2/

The main consequence of reducing or eliminating the variability coefficient, *ceteris paribus*, was to increase the share in calculated quotas of the industrial countries as a group, mainly at the expense of the share in calculated quotas of the major oil exporters. However, a number of smaller non-oil developing countries were also affected, especially those relying heavily on one or two primary commodities (e.g., copper, coffee or phosphates) for their exports. Reducing substantially the coefficient of the existing measure of variability would have implied relatively large shifts in the distribution of calculated quotas, and consequently, it was decided to limit the reduction of the coefficient of variability and to make a compensating adjustment by introducing reserves in the four derivative quota formulas that did not then contain such a variable. 3/ The addition of reserves with a modest weight of about 4-5 percent in these formulas was also considered desirable because it made the quota formulas more homogeneous in structure in the sense that all five formulas would contain the same set of variables. The revised Bretton Woods formula and the four

1/ The changes with respect to the GDP and reserves variables and the elimination of the use of merchandise trade data did not introduce any significant change in the distribution of calculated quotas, in the sense that no individual members were materially disadvantaged as a result. It was found that--when using the five-formula method with GDP and the redefined series for reserves--calculated quotas of 35 members exceeded by more than 5 percent their calculated quotas under the then-existing method; correspondingly, the calculated quotas of 14 members fell short by more than 5 percent. See "Eighth General Review of Quotas--Quota Calculations," SM/81/151 (7/2/81), p. 17.

2/ The relative contribution of variability to calculated quotas increased from 12 percent in the Sixth Review to about 22 percent in the calculations made for the Seventh Review; it declined to about 17 percent in the preliminary calculations made for the Eighth Review.

3/ See "Variability Coefficient in the Quota Formulas--Further Considerations," EB/CQuota/82/7 (5/6/82), p. 19.

derivative formulas, as used in the Eighth and Ninth Quota Reviews, are given in Appendix I.

5. Changes proposed during the Eighth and Ninth Reviews

The main suggestions that were made in 1983 and in 1987-88 in connection with the Eighth and Ninth Reviews, but were not accepted, were motivated by concerns that the existing variables in the quota formulas might not adequately represent the factors considered relevant for determining quotas or members' relative economic size. These concerns reflected similar concerns as were made in the Fifth and Sixth Reviews, as discussed above. The following summarizes the main proposals made during the Eighth and Ninth Reviews.

Needs-based variables

The issue of including a specific needs-based variable in the formulas has had a long history in quota discussions, particularly in light of the view put forth by some Directors that the formulas contained a bias against developing countries. During the Eighth Review the issue re-emerged when it was suggested that a needs-based variable, as measured for example by the reciprocal of per capita income, be included in the formulas. The rationale underlying the proposal was that countries that have a relatively low per capita income tend to have a greater need for balance of payments support and, therefore, for Fund assistance. However, other Directors were not in favor of including such a variable in the quota formulas; a needs-based variable was, in their view, appropriate for long-term development finance, but not for determining a nation's need for balance of payment finance in the context of a Fund-supported adjustment program. In addition, it was pointed out that the Fund had arranged for other ways of supporting its poorer members, for example through the Trust Fund and the establishment of successive interest subsidy accounts. 1/ However, the issue of including a needs-based variable continued to be discussed in the course of the Ninth Review, and several papers examined the statistical effects of including such a variable in the formulas. 2/ Agreement on whether such a variable should be included could not be reached and it was decided to defer further consideration until the Tenth Review. 3/

Financial variables

During the Ninth Review and also during the discussions of the Committee on Membership of Switzerland, it was suggested that some

1/ See EBM/81/30 (2/27/81).

2/ A comprehensive review and analysis of the issues is contained in "Ninth General Review of Quotas--Further Considerations of Variables in the Quota Formulas," EB/CQuota/87/3 (12/7/87).

3/ "Report to the Interim Committee on the Ninth General Review of Quotas," March 24, 1989.

consideration be given to include a financial variable in the quota formulas--for example, the currency composition of reserve holdings--in view of the unique role of reserve currencies in the Fund and the international monetary system. Work by the staff found that the overall impact of including a financial variable in the quota formulas tended to increase the share of the group of industrial countries in the total of calculated quotas and thus reduce the share of the developing countries taken as a group. ^{1/} The matter was left unresolved, however, and it was also agreed by the Executive Board that it would revisit the issue in preparation for the Tenth Review.

Other related issues pertaining to the quota formulas also resurfaced in discussions during the Eighth and Ninth Reviews but were left for subsequent consideration. These issues included: (i) further simplification of quota calculations with the aim of developing a two-equation or a one-equation approach; (ii) use of an average (i.e., over several years) GDP variable as well as of a purchasing-power adjusted measure of GDP; (iii) the inclusion of a capital account variable in the formulas; and (iv) use of the market valuation of gold reserves.

IV. The Tenth Review: Issues for Consideration

As noted above, the major issues arising from the Ninth Review as well as from previous quota reviews as regards the quota formulas pertain mainly to: whether the share in the calculated quotas of the developing countries adequately reflect their relative importance in the world economy; whether the financial importance of members is adequately accounted for in the quota formulas; whether the quota calculations should be simplified by reducing the number of formulas; and whether existing definitions of variables need to be changed and other variables (e.g., those measuring the capital account) need to be added. Without resolving these issues, the Executive Board concluded its review of the quota formulas for use in the Ninth Review with most Directors noting that the then-existing formulas represented a reasonable compromise, continued to provide a relatively good basis for deriving the calculated quotas of members, and were generally working in the manner intended. ^{2/} In line with the Executive Board's intention to further examine the quota formulas in the context of the preparatory work for the Tenth Review, this section discusses the issues pertaining to the quota formulas in the context of the Tenth General Review of Quotas.

1. Criteria for assessing the quota formulas

Consideration of the working of the quota formulas and any possible changes in quota formulas has been undertaken by the Executive Board in the past in the light of certain general considerations and criteria as regards

^{1/} See EB/CQuota/87/3 (12/7/87).

^{2/} Committee of the Whole Meeting 88/11 (11/18/88), p. 21.

the working of the quota formulas. These criteria may be summarized as follows:

(a) Quota calculations purport to be a comprehensive measure of relative economic size, and calculations based on formulas that employ such variables as GDP and external trade in goods and services have been made with an implicit recognition that the composite index of relative economic size has assigned approximately equal weights to GDP and external trade.

(b) The quota formulas should reflect both creditor and debtor characteristics of members, i.e., they should represent a balance in the weighting of variables that indicate the potential supply of Fund resources and potential demand for such resources. While such a balance is difficult to quantify with precision, this criterion was considered in the discussions during the Fifth Review and was used when the Executive Board agreed in 1983 on a reduction in the coefficient of variability in the quota formulas. In 1988, the staff concluded that the then existing set of quota formulas met this criterion of having a rough balance between the weights of factors that affect the supply of and demand for Fund resources. ^{1/} It would seem reasonable to maintain such a balance in the quota formulas in light of the stability in the weights of the traditional variables in the calculated quotas based on the existing set of formulas as applied to data through 1990 (see discussion below). These calculated quotas are presented and compared with actual quotas and with the Ninth Review calculated quotas in the paper "Tenth General Review of Quotas--Preliminary Quota Calculations."

(c) The distribution of calculated quotas should not result in undue fluctuations from one quota review to the next, unless warranted by changes in underlying economic fundamentals. Such a criterion does not require that the shares of individual countries or groups of countries in calculated quotas be stable over time, and indeed such shares have exhibited significant changes over time (see Table 1). Shares in calculated quotas should, however, reflect changes in the underlying economic variables in a manner that would tend to offset the impact of possibly temporary shifts in the measure of countries' relative economic size. This particular criterion is met by the existing formulas because some of the variables that enter into them are negatively correlated with each other (e.g., reserves and current payments), and, more importantly, the multiformula approach using the method of the higher of the Bretton Woods (reduced) formula and an average of two of the derivative variants of the Bretton Woods formula, results in a relatively more stable value for the calculated quota as a composite measure than that of its component variables (see Appendix I for simulations of the partial elasticities of calculated quotas with respect to each of the traditional variables that enter into the quota formulas).

^{1/} See "Ninth General Review of Quotas--Review of Technical Note on Some Issues Related to Criteria for Determining Fund Quotas," EB/CQuota/88/9 (10/28/88), p. 9.

Table 1. Evolution of Actual and Calculated Quota Shares 1/

(In percent)

	1955	1959 Increase	Fourth Review (1965)	Fifth Review (1970)	Sixth Review (1976)	Seventh Review (1978)	Eighth Review (1983)	Ninth Review (1990)	Tenth Review 3/
1. Industrial countries									
Then-existing or "present" quota share	76.0	73.8	72.5	70.5	69.6	62.8	61.3	62.3	60.6
Calculated quota share			76.9	77.7	77.3	68.0	66.6	65.9	70.7
Memo: Number of participating countries			22	22	22	22	22	22	24
2. Developing countries									
Then-existing or "present" quota share	24.0	26.2	27.5	29.5	30.4	37.2	38.7	37.7	39.4
Calculated quota share			23.1	22.3	22.7	32.0	33.4	34.1	29.3
Memo: Number of participating countries			80	91	105	113	123	130	152
Major oil-exporting countries									
Then-existing or "present" quota share	1.9	2.0	4.3	4.8	5.0	9.5	10.9	10.8	10.4
Calculated quota share			4.6	4.4	5.5	14.0	14.2	14.3	8.7
Memo: Number of participating countries			10	10	12	12	12	12	12
Non-oil developing countries									
Then-existing or "present" quota share	22.1	24.2	23.2	24.7	25.4	27.7	27.8	26.8	29.0
Calculated quota share			18.6	18.0	17.2	18.0	19.2	19.8	20.5
Memo: Number of participating countries			70	81	93	101	111	118	140
Of which:									
Non-oil developing countries that participated in the Fifth Review 2/									
Then-existing or "present" quota share	--	--	--	24.7	23.8	23.7	23.4	22.0	21.2
Calculated quota share	--	--	--	18.0	16.1	15.7	16.5	16.6	15.3

1/ Figures shown in the table are for members participating in the quota reviews.

2/ The shares shown are for a group of 81 countries and are calculated to exclude the impact of additions to the membership since the Fifth Review. This group excludes China (which did not participate in quota reviews until the Eighth, but which received an ad hoc increase in 1980 on the basis of quota calculations under the Sixth Review as well as a "catch-up" increase under the Seventh Review). The actual quota shares as shown in this table reflect the impact of the ad hoc increase for Saudi Arabia in 1981.

3/ Based on preliminary data and the set of quota formulas used for the Eighth and Ninth Reviews. The number of participating countries counts the former Yugoslavia as one country, the former Soviet Union as 15 countries, and the former Czechoslovakia as two countries.

Moreover, suggestions to change the definition of the variables entering into the quota formulas, such as using average data for reserves or GDP, have reflected the emphasis given in the past to this aspect of stability in the working of the quota formulas.

(d) The quota formulas should reflect relevant developments in the world economy, as noted by the Executive Board at the conclusion of the Ninth Review. This criterion can be taken to mean that certain changes in the world economy and in the international monetary system that have taken place affect the role and operation of the Fund, and these developments may thereby have a relevant bearing on the relative size of members' quotas. These notable changes include the predominance of (managed) floating exchange rates, ^{1/} the increasing openness of many economies, the growing integration and globalization of capital markets, and the long-run adverse shift in the terms of trade for some commodity-producing countries, as well as the differences in the availability and cost of borrowed reserves for member countries.

Some of the recent changes in the world economy and the international monetary system can be expected to be captured in the updating of the data that represent the traditional variables entering into the quota formulas. For example, the increased openness of some economies would likely raise their calculated quotas relative to those of other members with similar GDPs but whose external trade had grown more slowly, while the drop in commodity prices in the latter half of the 1980s, such as petroleum and beverage prices, would tend to reduce the relative share in calculated quotas of primary-product exporting countries. Other changes not captured in the quota formulas could nonetheless also have a bearing on the distribution of Fund quotas; for example, quotas are seen by many members as an inadequate indicator of the relative size of members' needs for unconditional liquidity that can be met in the international capital markets by some members but not by others.

In view of the issues that have arisen in past quota reviews, and the relevant developments bearing on members' quotas, the above-mentioned criteria may be used to assess the various suggestions regarding possible modifications of the quota formulas.

2. Evolution of quota shares of groups of countries

As regards the issue raised by Directors representing the developing countries as to whether the relative economic importance of their countries is reflected in the quota calculations, it is instructive to review the historical evolution of the quota shares of individual countries and of

^{1/} Although most countries continue to peg their exchange rates, about two-thirds to three-fourths of world trade takes place at floating rates. See M. Goldstein, The Exchange Rate System: Lessons of the Past and Options for the Future. IMF Occasional Paper No. 30, 1984.

groups of countries (see Table 1). It may be noted that the extent of changes in the distribution of quotas has reflected not only the balance between equiproportional and selective quota increases in past quota reviews but also the impact of additions to the Fund's membership. Moreover, the size of the equiproportional element in past quota reviews has tended to slow down the adjustment of actual quota shares of members toward their corresponding calculated quota shares as the latter shifted over time. Nevertheless, to the extent that some adjustment of the quota structure is effected at each quota review and has become widespread since the Eighth Review with the use of the calculated quotas as a distribution key for selective increases, the difference between the actual quota share of each country (or group of countries) from its calculated quota share has tended to narrow over time, as can be seen in the summary evolution of members' quota shares given in Table 1.

The distribution of quotas has shifted over time from the industrial countries as a group toward the developing countries, whose aggregate share in total quotas has risen from 24.0 percent in 1955 to 39.4 percent at present. The combined share of the non-oil developing countries in quotas has tended to rise steadily from 22.1 percent in 1955 to 29.0 percent at present. This overall increase represents both the impact of developing countries joining the Fund and the policies that were aimed at increasing their quotas, such as the small quota policy of 1955 and the adjustment of quotas in connection with the Compensatory Financing Decision of 1963. Furthermore, as noted above, the equiproportional element in successive quota reviews has tended to mitigate the size of any decline in the relative share of individual non-oil developing countries under the quota reviews.

As noted earlier, however, concerns have been expressed by Directors representing the developing countries as to whether the existing quota formulas provide an adequate measure of their relative economic size and/or their potential need for Fund resources. ^{1/} In particular, as can be seen in Table 1, if the aggregate share of the non-oil developing countries is calculated to exclude the impact of additions to the Fund's membership since the Fifth Review, the share of this group of (81) countries has declined steadily over time, from 24.7 percent just before the Fifth Review to 21.2 percent at present. This decline reflects mainly the secular downward adjustment for this group of countries of their actual quota shares toward their calculated quota shares, which have themselves declined.

^{1/} These concerns also arise from the relatively small size of these member countries, whose relative voting power falls faster than their share in quotas because of the continuing fall in the relative importance of the (fixed) basic votes whenever quotas are increased (see "Ninth General Review of Quotas - The Share of the Developing Countries in the Fund," EB/CQuota/88/7, 8/9/88).

The downward trend in the calculated quota share of the non-oil developing countries can be traced to a secular fall in these countries' shares in world GDP and trade, as shown in Table 2 which presents the evolution since the Fifth Review of the shares of this group of 81 countries in the variables that enter the quota formulas. (In calculating these shares, the table also assumes that total Fund membership was unchanged since the Fifth Review.) The share in calculated quotas of this group of countries fell from 18.0 percent in the Fifth Review to 15.3 percent in the Tenth Review, and this decline occurs despite a rising trend in these countries' reserves. It will be recalled that the quota formulas assign only a modest weight to reserves. The decline in the shares in world GDP of the non-oil developing countries is particularly striking, and the role of GDP in the calculated quotas of these countries is discussed further below.

In contrast, the share of the group of major oil-exporting countries in total actual quotas has generally increased over time (Table 1), especially as a result of the doubling of their combined quota share under the Sixth General Review of 1976. However, the share of this group of countries has declined since the Eighth Review, reflecting the recent additions to the Fund membership; their aggregate calculated quota share has also fallen, from 14.3 percent under the Ninth Review to 8.7 percent under the Tenth Review, on the basis of the customary quota formulas. For the group of industrial countries, their aggregate share in actual quotas has tended to decline progressively from 72.5 percent just before the Fourth General Review in 1964 to 60.6 percent at present, while their calculated quota share fell from 76.9 percent in 1964 to 65.9 percent under the Ninth Review. The rise in the calculated quota share of the industrial countries to 70.7 percent on the basis of the preliminary calculations for the Tenth Review essentially mirrors the above-mentioned fall in the calculated quota shares of the major oil-exporting countries. Reflecting principally the addition of new members, the share of the non-oil developing countries in the total of calculated quotas rises by 0.7 percentage point to 20.5 percent. It would seem reasonable to expect that if the existing quota formulas were maintained unchanged under the Tenth Review, the aggregate actual quota share of the developing countries could fall, while that of the industrial countries could rise, and the extent of the adjustment in shares could be expected to depend directly on the relative size of the selective element of the quota increase.

3. Weights of the variables in the quota formulas

In considering the weighting structure or the relative importance of different variables in the quota formulas, it is worthwhile to examine the evolution of these variables since the last quota review and how this evolution has affected the distribution of calculated quotas. Table 3 summarizes the performance of the major country groups since the Ninth

Table 2. Non-oil Developing Countries that Participated in the Fifth Review:
Shares in Variables Used in the Quota Calculations 1/ 2/

(In percent)

Variable	Fifth Review	Sixth Review	Seventh Review	Eighth Review	Ninth Review	Tenth Review
GDP <u>3/</u>	13.7	12.1	14.5	15.8	13.2	11.9
Current receipts	14.7	13.3	12.7	12.9	14.9	13.7
Current payments	17.3	16.0	15.4	15.5	17.1	14.5
Reserves	15.3	15.5	16.0	18.4	18.6	18.1
Variability of current receipts	22.8	24.6	14.8	15.8	16.2	20.6
Memo: <i>Calculated quotas</i>	18.0	16.1	15.7	16.5	16.6	15.3

1/ For all reviews, shares are with respect to the total membership that participated in the Fifth Review.

2/ Exports and imports data were also used in the quota calculations prior to the Eighth Review but are not presented here.

3/ Prior to the Eighth Review, shares are of national income rather than GDP.

Table 3. Rates of Growth of Variables Used in Quota Calculations ^{1/}

(Average annual compound growth rates, in percent)

	Gross domestic product (1)	Reserves (2)	Current receipts (3)	Current payments (4)	Variability of current receipts (5)	Memo: Calculated quotas ^{2/} (6)
1. <u>Tenth Review (1985-90)</u>						
Industrial countries	6.9	10.8	6.8	6.9	7.9	6.8
Major oil exporters	3.1	-13.0	-10.0	-8.6	0.5	-3.9
Non-oil developing countries	2.1	5.4	2.1	0.9	10.9	3.2
All members	5.7	7.1	4.6	4.5	6.6	4.8
2. <u>Ninth Review (1980-85)</u>						
Industrial countries	8.4	5.2	9.2	9.2	9.7	9.3
Major oil exporters	7.9	-5.1	5.7	10.8	11.4	9.5
Non-oil developing countries	4.1	6.5	12.0	11.3	11.1	9.0
All members	7.3	3.5	9.4	9.8	10.5	9.2
3. <u>Eighth Review (1976-80)</u>						
Industrial countries	11.0	13.3	15.3	15.8	11.3	17.9
Major oil exporters	15.0	11.6	20.6	24.4	12.0	20.3
Non-oil developing countries	14.1	17.0	16.7	16.8	13.6	21.0
All members	11.8	13.5	16.1	16.7	11.9	18.8

^{1/} Growth rates for current transactions and variability of current receipts are based on comparisons of five-year and 13-year periods, respectively, ending in 1976, 1980, 1985, and 1990 for the Seventh, Eighth, Ninth, and Tenth Reviews, respectively; growth rates for reserves are based on comparisons of average monthly data for 1976, 1980, 1985, and 1990.

^{2/} Using the customary quota formulas.

Review in terms of each of the variables. 1/ The basis for comparison is the data ended 1985 as used in the Ninth Review quota calculations and the (preliminary) data ended 1990 (where the data for current transactions and for variability of current receipts are based on five-year and 13-year periods, respectively). For comparative purposes, the table also shows the evolution of the variables in past quota review periods. The general slowing down in growth rates of economic variables since the Eighth Review reflects in large part the deceleration in global inflation over the 1980s.

The following points may be noted as regards the Tenth Review data: (i) the industrial countries as a group have recorded the strongest growth in (nominal) GDP, reserves, and current transactions, and the second highest growth in variability of current receipts; and (ii) the oil-exporting countries registered significant declines in reserves and current transactions, and the lowest increase in the variability of current receipts. To a large extent, the shifts in calculated quota shares reported in Tables 1 and 2 are accounted for by these divergent trends in the underlying economic variables.

The average contribution of each variable to the calculated quotas of the major country groups for the Tenth Review is reported in Table 4. 2/ The corresponding information for the Ninth Review is presented in Table 5. As previously noted, the relative importance of each variable in the calculated quotas has remained reasonably stable between the Ninth and Tenth Reviews for the membership as a whole as well as for the major country groups. GDP and current account transactions account for about 80 percent of the total of calculated quotas, whereas variability contributes slightly less than 16 percent and reserves about 4 percent. The distribution of the relative significance of individual variables as between different groups of members has remained wide, in that industrial countries tend to rely more on GDP as the main contributor of their aggregate calculated quotas while the calculated quotas of the developing countries tend to depend relatively more on indicators of balance of payments need, i.e., on the variability of current receipts and on current payments.

1/ The Ninth Review data shares shown in Table 3 are based on figures for all current members, including those members joining after the completion of the Ninth Review.

2/ The use of five quota formulas to determine calculated quotas means that the calculated quotas of individual members are, ex post, determined by different formulas. The average contribution of each variable across member countries therefore reflects the average importance of each variable across the five formulas. In this respect, the contribution of current receipts reflects both its direct contribution as well as its indirect contribution through the multiplicative factor. The combined contribution of current receipts and payments is a more comprehensive measure of the influence in the quota formulas of variables representing the external sector of members' economies.

Table 4. Relative Importance of Variables in Calculated Quotas
Under the Tenth Review 1/

(In percent, except as indicated)

	Number of members (1)	Percentage contributions of variables in calculated quotas				
		GDP (2)	Reserves (3)	Current receipts (4)	Current payments (5)	Vari- ability (6)
1. All members	161	38.6	4.2	2.3	39.8	15.1
Those on the Bretton Woods formula	72	46.7	4.2	0.0	41.5	7.5
Those on other formulas	89	10.9	4.3	9.9	34.1	40.7
2. Industrial countries	24	44.1	4.2	1.2	42.1	8.4
Those on the Bretton Woods formula	21	46.5	4.1	0.0	42.4	7.0
Those on other formulas	3	13.1	5.4	16.3	38.8	26.3
3. Major oil exporting countries	12	16.5	2.5	6.0	22.5	52.6
Those on the Bretton Woods formula	1	73.6	0.2	0.0	11.0	15.3
Those on other formulas	11	6.8	2.9	7.0	24.4	58.8
4. Non-oil developing countries	125	28.9	5.1	4.5	39.3	22.3
Those on the Bretton Woods formula	50	45.2	5.3	0.0	39.7	9.7
Those on other formulas	75	12.8	4.8	8.9	38.8	34.7

1/ Based on data ended 1990. The contribution of an economic variable to a calculated quota is calculated as the product of the variable and its coefficient(s) in the applicable formula(s) expressed as a percentage of the calculated quota; the contribution of the multiplicative factor in the case of nonlinear formulas was distributed proportionately among the variables entering into these formulas. The figures shown for various groups of members are summations of the individual contributions to members' calculated quotas expressed as a percentage of total quotas for the subgroups of countries indicated.

Table 5. Relative Importance of Variables in Calculated Quotas
under the Ninth Review 1/

(In percent, except as indicated)

	Number of members (1)	Percentage contributions of variables in calculated quotas				
		GDP (2)	Reserves (3)	Current receipts (4)	Current payments (5)	Vari- ability (6)
1. All members	150	35.8	3.9	2.7	41.5	15.9
Those on the Bretton Woods formula	76	45.8	3.8	--	43.2	7.1
Those on other formulas	74	9.9	4.3	9.8	37.1	38.9
2. Industrial countries	20	43.4	3.4	0.8	43.8	8.5
Those on the Bretton Woods formula	15	47.6	3.4	--	42.4	6.7
Those on other formulas	5	13.9	4.0	6.8	53.6	21.7
3. Major oil exporting countries	12	7.4	4.8	9.2	27.2	51.4
Those on the Bretton Woods formula	--	--	--	--	--	--
Those on other formulas	12	7.4	4.8	9.2	27.2	51.4
4. Non-oil developing countries	118	31.2	5.0	4.3	44.5	15.0
Those on the Bretton Woods formula	61	38.8	5.6	--	46.8	8.8
Those on other formulas	57	10.4	3.3	16.1	38.3	31.9

1/ This table is reproduced from EB/CQuota/88/9 (10/28/88), "Ninth General Review of Quotas - Review of a Technical Note on Some Issues Relating to Criteria for Determining Fund Quotas," Table 1, p. 5 and is based on data ended 1985. See footnote 1 of Table 4 for an explanation of how figures are calculated.

On average, GDP accounts for approximately 44 percent of the Tenth Review calculated quotas of the industrial countries as a group (compared with 43 percent for the Ninth Review), and 17 percent for the major oil-exporting countries (7 percent for the Ninth Review). The contribution of the external sector, represented by current receipts and current payments, accounts for about 45 percent of industrial countries' and non-oil developing countries' Tenth Review calculated quotas, and for slightly less than 30 percent of the calculated quotas of the major oil-exporting countries. These contributions are little changed from the corresponding figures under the Ninth Review (and also in comparison with past quota reviews) except for the major oil exporters where current account transactions accounted for nearly 40 percent of Ninth Review calculated quotas. The contribution of variability of current receipts to calculated quotas for the Tenth Review ranges widely, from 8.4 percent for the industrial countries to 52.6 percent for the major oil-exporting countries. Between the Ninth and Tenth Review periods, the relative importance of variables in the quota formulas has therefore shown little change for the industrial countries. For the major oil-exporting countries, there has been a significant shift in the contributions of individual variables in large part because the sharp drops in their current receipts and current payments have correspondingly raised the average contribution of GDP to their calculated quotas. Reflecting in large part the fluctuation of commodity prices over the latter half of the 1980s, the contribution of variability has risen for the non-oil developing countries.

The foregoing review of the weights of the customary variables in the quota formulas does not evidence any major or pronounced shifts in the relative importance of these variables in the overall structure of calculated quotas that might imply the need for changes in the coefficients of variables in the quota formulas. This suggests that any improvements to the working of the quota formulas would likely be found in terms of changes in the definition of certain variables, inclusion of new variables to take into account recent developments that may have a bearing on members' quotas including the issue of exchange rate valuation, or in simplifying the quota formula methodology and elimination of perverse results, such as those attributable to the nonlinear element in three of the five existing formulas. These modifications are analyzed below.

4. Changes in the definitions of variables

a. GDP

Three main issues have arisen in the past with regard to the use and role of GDP in the quota formulas. First, suggestions have been made to use an average of GDP over several years, rather than GDP for one year, which is now the practice, in order to deal with the problems associated with cyclical influences on GDP and to avoid the use of a possibly unrepresentative single year near the cyclical peak or trough of economic activity in any given country. Difficulties have also arisen with respect to the conversion of GDP to a common unit of account for those years when

market exchange rates or changes in them did not reflect or move in line with relative prices or relative inflation rates. ^{1/} On these grounds, it may be useful to consider taking an average value of GDP over some relevant period in order to mitigate the impact of over- or undervaluation in a single year's exchange rate that was used to convert the GDP data to an SDR basis. Second, in order to deal with problems associated with exchange-rate conversion, it has also been suggested that a measure of purchasing power-adjusted GDP, rather than GDP converted at market exchange rates, be used in the quota calculations. Third, and related to the preceding issue, it has been argued that since the GDP variable currently used is defined in nominal terms, the quota formulas do not take adequate account of the growth rate of real GDP, and thereby understate the calculated quota shares of the low income countries that have been growing faster than the average.

The problems involved in the conversion of nominal GDP data into a common unit of account, at least over the shorter term, and comparisons based on such data are illustrated in Table 6, which shows GDP growth rates of member countries in real and nominal (SDR) terms. Columns (1)-(4) show real GDP growth rates for Fund members for consecutive five-year periods, covering the period from 1970 to 1990. For example, the average real growth rate between 1985 and 1990 for all members was 3.3 percent, with industrial countries and the major oil-exporting countries growing at a slower pace than the non-oil developing countries (Col. (4)). This pattern of real growth rates over 1985-90 is not reflected in the data on nominal growth rates of GDP in SDR terms (shown in Col. (8)). In nominal terms the group of industrial countries experienced a higher-than-average growth rate, significantly above that of the developing countries.

The differences in the performance of GDP in real and nominal terms of different countries can be attributed to changes in real effective exchange rates, as indicated in Cols. (9)-(12) of Table 6. Real effective exchange rates for the non-oil developing countries fell sharply in the second half of the 1980s, whereas for the industrial countries real effective exchange rates appreciated on average. ^{2/} Thus, over the 1985-90 period nominal exchange rate movements have not reflected differentials in domestic and external inflation rates and have therefore resulted in significant changes in real exchange rates. In particular, real exchange rates appear to have fallen sharply between 1985 and 1990 for many developing countries and as a result, the nominal GDP variable used in the

^{1/} In 1963, an averaging of national income over a five-year period was put forward as a partial solution to the problems associated with discrete or abrupt changes in par values under the pegged rate system. There was no agreement at that time to change the practice of using a single-year GDP figure because the development of derivative formulas had the effect of reducing the importance of national income and raising that of external trade in the calculated quotas.

^{2/} Within this group, those of Germany and Japan appreciated while the real effective exchange rates of most other industrial countries declined.

Table 6. Rates of Growth of Real GDP, 1970-90 1/

(In percent at annual average rate)

	Growth rates											
	Real GDP				Nominal GDP in SDRs				Memo: Implicit change in real effective exchange rate 2/			
	1970-75 (1)	1975-80 (2)	1980-85 (3)	1985-90 (4)	1970-75 (5)	1975-80 (6)	1980-85 (7)	1985-90 (8)	1970-75 (9)	1975-80 (10)	1980-85 (11)	1985-90 (12)
All members	3.5	3.8	2.3	3.3	12.3	11.8	7.7	5.7	0.6	0.1	0.1	-0.9
Industrial countries	2.9	3.3	2.3	3.2	11.3	11.0	8.4	6.9	0.3	-0.2	0.8	0.3
Developing countries	5.8	5.0	2.4	3.6	17.3	14.3	5.5	2.3	2.8	1.2	-2.0	-4.3
Of which:												
Major oil exporting	7.4	4.9	-0.5	2.5	36.5	15.0	7.9	3.1	17.8	1.9	3.1	-2.6
Non-oil developing	3.3	5.0	5.5	4.1	12.5	14.1	4.8	2.1	0.9	1.0	-5.6	-5.0

1/ Data for real GDP are from International Financial Statistics. Data for nominal GDP are those used in Quota Reviews. For 1975-80, 1980-85, and 1985-90, GDP data in SDR terms were compiled in connection with the Eighth, Ninth, and Tenth Quota Reviews. For 1970-75, the GDP growth rates in nominal terms are estimated based on national income data for 1972 and 1976 used in the Sixth and Seventh General Quota Reviews.

2/ Derived as growth in nominal GDP in SDR terms minus the growth in real GDP minus an imputed estimate of the average inflation rate in SDR terms.

quota formulas for these countries does not fully reflect their real growth rates over this period. Over the longer term, the observed overshooting of real exchange rates tends to disappear. While Col. (9) to Col. (12) of Table 6, taken together, indicate that substantial changes in real exchange rates have indeed occurred over the 1970-90 period, it would seem that these changes are not persistent, and tend to fluctuate over time. For example, while real exchange rates for developing countries are recorded as falling by about 6 percent over the 1980s, the cumulative change in real exchange rates for this group in the previous decade of the 1970s was an appreciation of about 4 percent.

With regard to the averaging of GDP, some Directors in the past have also suggested using a five-year average of GDP so as to parallel the sample period for other data used in making quota calculations (in particular, the data for trade in goods and services which are averaged over a five-year period). An averaging procedure would tend to smooth the difference in the rate of change of GDP between one quota calculation period and another, but it could also result in the measurement of members' relative economic positions that would be less current than would otherwise be the case and could thereby result in some slowdown in the adjustment of members' quotas to their most recent relative economic positions. Table 7 summarizes the illustrative calculations on the basis of averaging GDP over five- and three-year periods. On balance, the changes in the shares of calculated quotas using an average of GDP over five- and three-year periods are rather small. The share of the industrial countries in calculated quotas falls slightly using the five-year averaging procedures. This outcome reflects the fact that the growth of nominal GDP is higher in industrial countries than in the developing countries. As shown in Table 8, if a 5 percent deviation from the shares in the customary calculations were considered to be within a normal tolerable range, there would be 20 members, accounting for 6.5 percent of total present quotas, whose calculated quota shares could move outside that range if a five-year averaging period were used. A three-year averaging period would confine these significant changes to 13 members with a present quota share of 3.4 percent.

Another method of avoiding temporary or aberrant fluctuations in GDP, or for dealing with problems associated with the use of exchange rates that might not adequately reflect the relationship between external and domestic prices, involves converting GDP into SDRs using an appropriate purchasing

Table 7. Summary Statistics of Alternative Quota Calculations

(In percent)

	Distribution of percentage shares			Average percentage deviation from shares in customary quota calculations ^{1/}
	Industrial countries	Developing countries	Oil exporters	
I. <u>Present calculated quotas</u>	70.7	29.3	8.7	--
Memo: <u>Present actual quotas</u>	60.6	39.4	10.4	117.3
II. <u>Alternative quota calculations</u>				
1. GDP based on five-year averaging period	70.4	29.6	8.7	4.6
2. GDP based on three-year averaging period	70.6	29.4	8.7	2.7
3. GDP based on PPP	66.0	34.0	8.4	21.9
4. GDP based on real effective exchange rates				
(a) 1980 base	68.8	31.2	8.2	6.5
(b) 1985 base	70.6	29.4	8.1	4.4
5. Gold valued at market prices	71.0	29.0	8.7	1.5
6. Variability redefined as mean absolute deviation	71.0	29.0	8.5	6.4
7. Variability based on a three-year moving average of receipts	72.7	27.3	7.2	6.4
8. Reduction of variability coefficient by 20 percent	71.7	28.3	8.0	3.3

^{1/} Calculated as the unweighted average of absolute percentage deviations.

Table 8. Frequency Distribution of Percentage Changes
in Calculated Quota Share Arising from Changes
in GDP Data and in the Valuation of Gold

Percentage changes in calculated quota shares	Number of members	Present quota shares of members
A. Resulting from the use of GDP data from a 5 year sample period		
Greater than +10 percent	7	0.6
+5 to +10 percent	6	0.1
0 to +5 percent	59	15.1
-5 to 0 percent	82	78.3
-10 to -5 percent	4	4.6
Below -10 percent	3	1.2
B. Resulting from the use of GDP data from a 3 year sample period		
Greater than +10 percent	4	0.4
+5 to +10 percent	4	0.4
0 to +5 percent	64	25.3
-5 to 0 percent	84	71.4
-10 to -5 percent	2	1.4
Below -10 percent	3	1.2
C. Resulting from the use of PPP GDP data		
Greater than +10 percent	54	22.7
+5 to +10 percent	15	5.6
0 to +5 percent	39	8.0
-5 to 0 percent	37	27.5
-10 to -5 percent	8	24.9
Below -10 percent	8	11.3
D. Resulting from the use of real effective exchange rate based GDP		
(a) 1980 base		
Greater than +10 percent	18	12.3
+5 to +10 percent	10	3.5
+0 to +5 percent	32	25.8
-5 to 0 percent	93	47.7
-10 to -5 percent	3	9.7
Below -10 percent	4	1.0
(b) 1985 base		
Greater than +10 percent	16	24.6
+5 to +10 percent	7	5.8
+0 to +5 percent	33	11.5
-5 to 0 percent	91	34.5
-10 to -5 percent	9	18.3
Below -10 percent	5	5.3
E. Resulting from the valuation of gold at market prices		
Greater than +10 percent	1	0.1
+5 to +10 percent	2	1.8
+0 to +5 percent	21	44.9
-5 to 0 percent	136	53.1
-10 to -5 percent	1	0.1
Below -10 percent	--	--

power parity (PPP) index. It has been suggested by several Directors that the use of PPP relationships would produce figures for national income or GDP that were less biased against the developing countries. 1/

There are, however, several data problems associated with the use of PPP indices, including in particular those that arise in a multilateral context. 2/ First, the coverage of countries in the available data base (the International Comparison Program, or ICP) is not comprehensive, with entire regions having been excluded in some instances. The latest ICP survey for 1990 includes only 30 countries, and extrapolations of past ICP data for about 60 countries have been made, in many cases from data collected from 1975 or 1980. For the nonparticipating countries (more than 80 Fund members, including China 3/ and the FSU countries), the estimation procedures that have been used to determine their PPPs are generally rudimentary, and the estimates based on those procedures may be subject to

1/ See EBD/69/165 (10/16/69). A recent study that argues on a priori grounds that such a bias exists with the use of market exchange rates has attempted to measure the effect of the bias, using available PPP figures. This work concluded that any such bias in the results of the quota formulas has not materially affected actual quotas because the Fund has set the actual quotas of developing countries relatively high in comparison with their calculated quotas (see L. Officer, "Are International Monetary Fund Quotas Unfavorable to Less-developed Countries? A Normative Historical Analysis," Journal of International Money and Finance, Vol. 10, 1991, pp. 193-213).

2/ See "Economic Criteria Entering Quota Calculations," SM/81/44 (2/13/81), p. 8. More recently, the staff has assembled PPP indices for use in the WEO exercises. See A.M. Gulde and M. Schulze-Ghattas, "Purchasing Power Parity Based Weights for the World Economic Outlook," in Staff Studies for the World Economic Outlook, IMF, December 1993, pp. 106-123. See also N. Wagner, "A Review of Data and Methodological Issues for Estimating Purchasing Power Parity-Adjusted GDP," (forthcoming as IMF Working Paper). The latter paper provides a description of the methodology and available data on PPPs used for the purposes of statistical aggregation in the WEO papers.

3/ The PPP weight for China is based on an estimate produced by Jeffrey Taylor. See J.R. Taylor, "Dollar GNP Estimates for China," CIR Staff Paper, No. 59, Center for International Research, U.S. Bureau of the Census, March 1991. Taylor's PPP estimate differs from those based on the ICP in two substantial respects: first, it is based on published data, rather than ICP-style price survey data; and second, his methodology approaches estimation from the production side rather than using final expenditure flows. Such differences in methodology may produce figures which are not strictly comparable. For example, for 1991, Taylor's method resulted in a PPP-adjusted estimate of China's GDP of \$1.4 trillion compared with estimates of \$3.4 trillion using ICP-type data and \$379 billion when converted at the official exchange rate.

substantial errors. ^{1/} Second, because of the infrequency of the ICP surveys, the PPP data for the ICP-participant countries are generally extrapolated to the year of interest using constant-price national income data; this introduces inconsistencies with benchmark ICP figures that use current-price indices. It may be noted that these particular data difficulties with respect to the use of PPP-adjusted GDPs in the quota formulas do not seem to be as severe in connection with the use of PPPs in other areas where lesser precision might be acceptable, such as for statistical averages or aggregation. The use of PPP-indices has recently become more widespread for obtaining weighted averages of world or regional growth rates in the WEO exercises, or in the use of PPPs to make approximate bilateral comparisons of standards of living in different countries.

Apart from data deficiencies, a number of methodological issues also need to be considered with respect to the use of PPP-converted GDP. For example, large shifts in the share of overall world GDP from the industrial countries toward the developing countries occur when GDP is measured using PPPs because the price structure in developing countries differs significantly from the average international price structure currently used in the available PPP computations. ^{2/} Alternative weighting schemes, in addition to the currently-used quantity weights, could be considered for the purpose of developing average international prices. In addition, alternative, and in some cases significantly different, PPP indices could be derived from the production side rather than the presently available indices that are derived from the expenditure side of the national income accounts. Since the use of PPP-adjusted GDPs has major implications for the structure of calculated quotas, it is important that there would be general agreement regarding the choice of methodology underlying the construction of PPP indices before their application for operational matters such as making quota calculations.

In order to assess the impact of PPP-converted GDP on the distribution of calculated quotas, results using PPP-adjusted GDP are also reported in Table 7. As noted above, the use of purchasing-power adjusted GDP in the quota formulas results in substantial shifts in the distribution of calculated quotas, with the share of the developing countries in calculated

^{1/} These errors arise, in part, from the specification of the regression equations which are derived from the set of ICP countries that are not necessarily representative of the non-ICP countries and include insufficient explanatory variables to capture diverse economic structures. See Sultan Ahmad, "Regression Estimates of Per Capita GDP Based on Purchasing Power Parities," World Bank Policy Research Working Papers, August 1992.

^{2/} Since the quantity-weighted average international prices are dominated by the expenditure patterns of the higher-income industrial countries, the derived PPP indices are generally less representative of developing countries' price structures. By construction, this approach to the PPP methodology results in a tendency to overestimate the developing countries' PPP-based GDPs.

quotas rising by 4.7 percentage points, while the share of the industrial countries falls correspondingly. The increases in calculated quota shares are predominantly among the non-oil developing countries. There would be 85 members whose calculated quota shares could move outside a 5 percent deviation from the shares in the customary calculations, and these members account for 64.5 percent of total present quotas (Table 8).

A further method of dealing with the problems associated with the use of nominal exchange rates converted into a common unit of account would be to use a measure of GDP that adjusts for changes in real effective exchange rates. In order to illustrate such a measure of GDP for use in the quota formulas, the following procedure was implemented: (a) for each Fund member, its Eighth or Ninth Review nominal GDP, denominated in SDRs, was used as a base to which its real GDP growth from 1980 or 1985 to 1990 was applied; 1/ (b) the resulting figures were adjusted by the average inflation rate for 1980-90 or 1985-90 for the five countries whose currencies comprise the SDR. 2/

The results of using this measure of GDP adjusted for real effective exchange rates are reported in Table 7. As shown in the table, if 1985 was used as a base year, the share of calculated quotas of the industrial countries declines from 70.7 percent to 70.6 percent. The share of the developing countries rises from 29.3 percent to 29.4 percent, with the share of non-oil developing countries increasing by 0.7 percentage point. As shown in Table 8, if a 5 percent deviation from the shares in the customary calculations was considered to be within a tolerable range, then there would be 37 members, accounting for 54.0 percent of total present quotas, whose calculated quota shares were outside that range. If 1980 was used as a base year the share of calculated quotas of the industrial countries declines by 1.9 percentage points to 68.8 percent (Table 7). The share of the developing countries rises to 31.2 percent, with the share of non-oil developing countries increasing by 2.4 percentage points. If a 5 percent deviation from the shares of the customary calculations was considered to be within a tolerable range, there would be 35 members, accounting for 26.5 percent of total quotas, whose calculated quota shares were outside that range (Table 8).

It would seem that the appropriateness of using the above measure of exchange-rate-adjusted GDP depends importantly on the appropriateness of the base year used. To the extent that exchange rates were misaligned in the

1/ Real GDP data for 1980, 1985, and 1990 were not available for all members. For three members, the growth in real GNP was used; for three other members, the growth in real net material product was used; and for one member, the growth rate in real national income was used. For 46 countries, staff estimates were made by using 1990 GDP converted at market exchange rates, i.e., the measure of GDP customarily used in the quota calculations.

2/ The approach used effectively assumes that real effective exchange rates are equal to those prevailing during the base year.

base year, the resulting measure of adjusted GDP would favor those with overvalued currencies at that time. In this connection, the U.S. dollar was relatively appreciated in 1985, and, for example, if the United States were excluded from the calculations using 1985 as a base year, the share in Tenth Review calculated quotas of the developing countries would increase by 2.5 percentage points while the share of the industrial countries other than the United States would correspondingly decline. The use of a 1980 base year would appear to be more somewhat in accord with longer-term fundamentals than the 1985 base year, particularly in view of the significant real depreciation of effective exchange rates of many developing countries through the 1980s. Thus, while the adjustment of GDP for real exchange rate changes avoids some of the problems associated with the current method of converting nominal GDP into a common SDR base, questions arise with respect to the choice of an appropriate base year.

b. Valuation of gold in members' reserves

The Executive Board agreed in 1979 that gold should be valued in the Fund at its former official price, equivalent to SDR 35 per fine ounce, for all Fund-related operational purposes. 1/ This is the price at which the Fund would bring into the General Resources Account the counterpart of any sale of gold as it is also the price at which gold is valued in the Fund's Accounts (Rule J-1(a)). The staff has not recommended that the current Fund practice of valuing gold at SDR 35 an ounce be changed for the purpose of making quota calculations. Any change in this direction should, if necessary, be discussed in a wider context of the valuation of gold in the Fund for operational purposes.

The issue of the valuation of gold nevertheless arises in relation to the calculation of quotas because, following the practice in the Eighth and Ninth General Reviews, gold and U.S. dollars deposited with the European Monetary Cooperation Fund (ECMF) have been excluded from the reserves of EMS countries in the Tenth Review data base, but the ECU counterparts of these deposits, of which the gold element reflects a market valuation, have been included in reserves. The staff has followed the practice of members of the EMS to include their holdings of ECU in reserves, as reported to the Fund, because the ECU holdings are liquid reserves and are directly usable for balance of payments financing, even though part of the ECU holdings represent a market related valuation of gold. 2/ In view of the usability of the ECU by the members of the EMS, it would seem reasonable to continue the customary practice of including all ECU holdings as reserves.

1/ See Executive Board discussion of "Treatment and Valuation of Gold for Fund Purposes," (SM/79/40, 2/7/79 and EBM/79/48 and EBM/79/49, 3/23/79).

2/ At the time of the Eighth Review, a suggestion was made that 20 percent of all non-EMS members' gold holdings be valued at market prices, as a means of paralleling the practice of EMS countries in depositing 20 percent of their gold holdings in exchange for ECU. This suggestion was not followed up by the Executive Board.

For illustrative purposes, it may be useful to show the implications of valuing all members' gold holdings on a consistent market-related basis. The implications for quota calculations of valuing the non-EMS members' gold holdings at market prices are presented in Table 7. Reflecting the fact that reserves are included in the quota formulas with only a relatively small weight, changing the valuation methodology has only a minor impact. The aggregate quota share of industrial countries, which hold the majority of gold reserves, rises slightly in comparison to the share under the customary calculations, to 71.0 percent while the share of developing countries falls correspondingly. Virtually all the shifts in individual quota shares are small (see Table 8) with only four members, with a present quota share of 2.0 percent, experiencing significant changes in calculated quotas. Very similar results were reported during the Ninth Review. ^{1/} At that time, the implications of achieving a consistent basis for valuing gold in members' reserves by the alternative approach of valuing all the gold holdings of EMS members at SDR 35 per fine ounce were also investigated. This approach was found to have only a negligible impact on the shares of individual members, with the calculated quota share of industrial countries falling by only 0.1 percentage point and the share of the developing countries rising correspondingly.

c. Variability of current receipts

Although variability is not a direct measure of relative economic size, its inclusion in the quota formulas is based on its significance as a measure of instability in a member's external sector, which has a bearing on the member's potential need to use the Fund's resources. As can be seen from Table 9, in the preliminary quota calculations made for the Tenth General Review, variability makes a substantial contribution to the calculated quotas of all members, of the order of 15 percent, and of approximately 31 percent to the calculated quotas of developing countries. However, the variability component in the calculated quotas of a few members, especially some major oil-exporting countries, is comparatively very high and contributes more than half of their calculated quotas. For such countries, the relatively large contribution of variability reflects the pervasive effects of changes in commodity prices on their economies.

As discussed above, variability is defined in terms of the deviation of the value of exports of goods and services from its normal trend-adjusted level. Over a sample period of 13 years, and using a five-year moving average, variability is calculated as one standard deviation of the data representing the five-year period. This method of measuring variability works well when annual changes in receipts are within a reasonable range. However, the measure can give distorted results in the event of discrete and large changes in data which do not represent cyclical fluctuations around the norm, such as occurred as a result of very sharp increases in oil prices in 1973/74 and in 1979. The customary method of calculating variability

^{1/} See EB/CQuota/87/3 (12/7/87) pp. 6-7.

Table 9. Average Contribution of Variability of Current Receipts
to Calculated Quotas for Selected Country Groups

(In percent)

	Seventh Review (1964-76)	Eighth Review (1968-80)	Ninth Review (1973-85)	Tenth Review (1978-90)
Industrial countries	10.5	7.7	8.6	8.4
Developing countries	38.8	26.8	30.5	31.3
Major oil exporters	63.7	42.7	51.7	52.6
Non-oil developing countries	20.1	15.5	15.2	22.3
All members	19.6	14.1	16.1	15.1

Note: The dates shown for each quota review indicate the sample period used to calculate variability.

tends to magnify the discontinuities arising from these changes in export prices because the absolute deviations from the measured trend are squared. In contrast to the discontinuities in primary product prices that occurred in the 1970s, a more cyclical pattern has become evident in recent years.

Calculations have been made to illustrate the effect on calculated quotas of suggestions made in past quota reviews as regards: (a) the use of the mean absolute, instead of the root mean squared, deviation from trend as a measure of variability; (b) a three-year moving average of receipts in lieu of a five-year moving average; and (c) a reduction in the weight of the coefficient for variability by 20 percent. The summary results are shown in Table 7 and the frequency distribution of changes from the results of the customary formulas are shown in Table 10. In almost all cases, modifications of the variability measure result in shifts in calculated quotas to the industrial countries as a group and generally tend to reduce the shares in calculated quotas of the major oil exporters.

It may be noted that despite the reduction by 20 percent in the variability coefficient that was agreed in connection with the Eighth General Review, the contribution of variability to calculated quotas made in connection with the Ninth and Tenth General Reviews has increased for all the main groups of countries. The increase in the contribution of variability to the calculated quotas of the group of major oil-exporting countries reflects the decline in their export receipts in the 1980s following the sharp price increase in 1979 (see Chart 1). The decline in export receipts has had adverse repercussions on the growth of GDP, imports, and reserves of this group of countries, which grew more slowly, or even fell, in comparison with the rest of the membership. Broadly, the variability factor has served to offset the effective loss in relative economic position of the group of major oil-exporting countries attributable to the deceleration or decline in their GDP, reserves, and external trade. In these circumstances, variability may be seen to have worked in the direction of stabilizing the distribution of calculated quotas, although it can be seen that the calculated quota shares of some primary-exporting countries would still fall quite sharply in the preliminary calculations made for the Tenth Review. On balance, the present measure of variability seems to be working in a relatively satisfactory manner, and the results of updated calculations do not seem to call for any modification in the variable or in the size of its coefficient in the quota formulas.

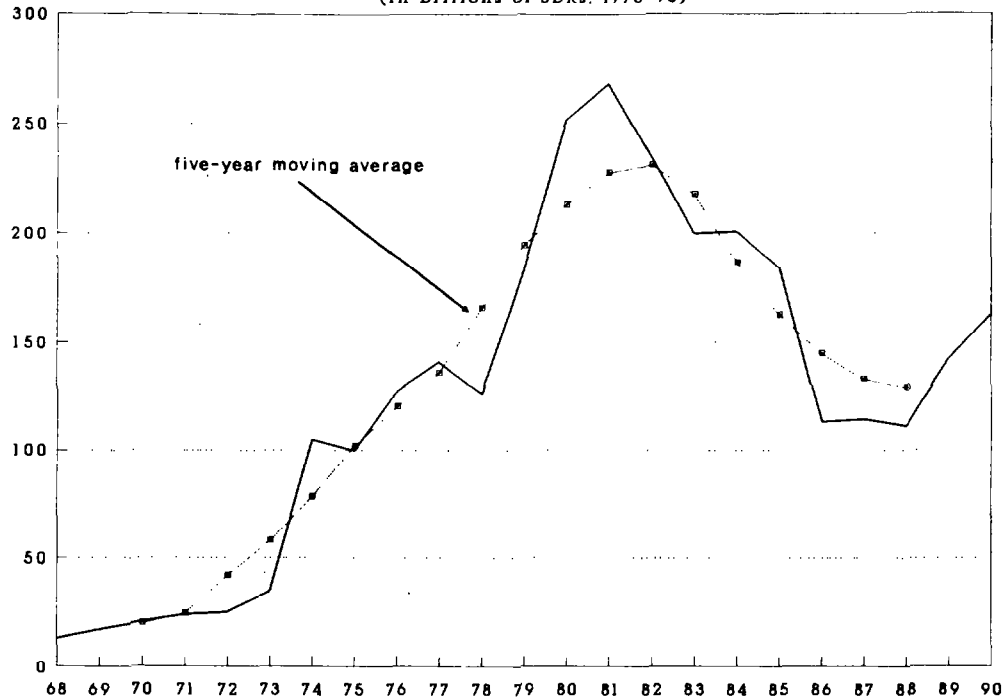
d. Other variables

While some questions have been raised in the past as regards the role of current account variables in the quota formulas, such as the relative weights of payments and receipts, or the use of the larger of payments and receipts, the suggestions for change in the quota formulas in these areas did not receive significant support in the Eighth and Ninth Reviews. As was noted in past discussions of these issues, these proposals either had only a

CHART 1

YEARLY CURRENT RECEIPTS FOR OIL-EXPORTING COUNTRIES

(In billions of SDRs; 1976-90)



DEVIATIONS OF CURRENT RECEIPTS FROM THEIR FIVE-YEAR MOVING AVERAGE FOR MAJOR-OIL EXPORTERS

(In billions of SDRs; 1970-88)

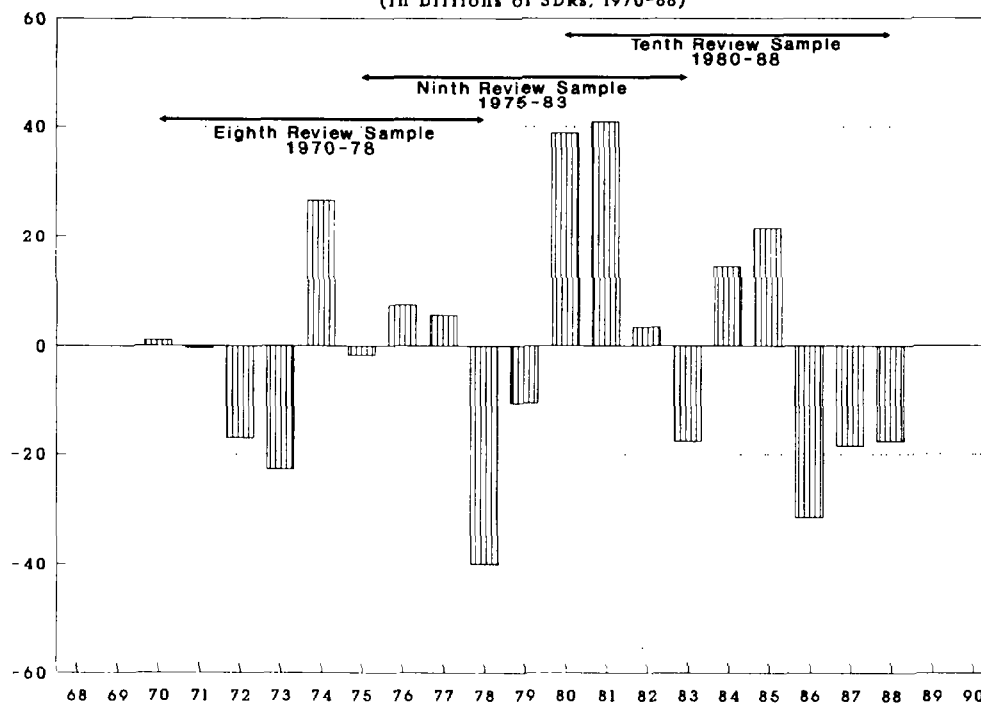


Table 10. Frequency Distribution of Percentage Changes in
Calculated Quota Shares Arising from Modification
of Variability or Reduction in its Coefficient

Percentage changes in calculated quota shares	Number of members	Present quota shares of members
<hr/>		
A. Resulting from the use of variability redefined as <u>mean absolute deviation</u>		
Greater than +10 percent	9	3.0
+5 to +10 percent	17	14.0
0 to +5 percent	31	25.8
-5 to 0 percent	45	44.6
-10 to -5 percent	37	8.8
Below -10 percent	22	3.8
B. Resulting from three-year <u>moving average</u>		
Greater than +10 percent	2	0.1
+5 to +10 percent	20	10.4
0 to +5 percent	56	62.7
-5 to 0 percent	27	5.1
-10 to -5 percent	28	9.5
Below -10 percent	28	12.0
C. Resulting from reducing the variability coefficient by <u>20 percent</u>		
Greater than +10 percent	--	--
+5 to +10 percent	--	--
0 to +5 percent	66	73.4
-5 to 0 percent	58	13.5
-10 to -5 percent	34	7.9
Below -10 percent	3	5.1
<hr/>		

marginal impact on quota calculations or were subject to intractable statistical problems. 1/

5. New variables

The Executive Directors requested in 1987-88 that consideration be given to the possibility of introducing new measures that would better indicate countries' need to borrow or their ability to contribute to Fund resources. The new variables suggested included "needs-based" variables, financial variables, and measures of capital account transactions. It should be noted in this connection that the inclusion of a new variable in the quota formulas necessarily reduces the importance of the existing variables, and certain technical issues arise with respect to the methods that might be used to determine the coefficient of any new variable or its specification (i.e., additive or multiplicative) in the quota formulas. These issues are not new but are briefly reviewed in Appendix II, which also presents the statistical formulas that have been estimated for the present exercise.

In order to assess the impact in the quota formulas of variables measuring external debt, financial strength, net capital flows, market access, and exchange rate variability, the following methodology was used. Equations were fitted to actual quotas and calculated quotas using the five customary variables (i.e., GDP, reserves, current receipts, current payments, and variability) plus the new variable. The statistical performance of these new variables were then evaluated on the basis of their significance in the equations and their impact on the goodness-of-fit of the equations. 2/

a. Needs-based variable

Several measures of this variable were proposed for inclusion into the quota formulas during the Ninth Review, including per capita GDP, the level of foreign debt, and the current account gap (defined as the difference between current payments and current receipts divided by current payments). The inclusion of such variables could result in some measure of redundancy with existing variables (e.g., GDP, current receipts and payments) without necessarily introducing new information while adding a problem of multicollinearity into the formulas. To the extent, however, that such variables provide better measures of members' needs for balance of payments financing than the existing variables, the new variables could substitute for, or supplement, existing measures. However, in past analyses undertaken

1/ See SM/81/44 (2/13/81) and EB/CQuota/87/3 (12/7/87).

2/ The statistical significance of a variable is indicated by its t-ratio, while a measure of the goodness-of-fit is the average percentage deviation of the results based on the inclusion of the new variable from customary quota calculations (i.e., those not including the new variable). See Appendix II.

by the staff on the possible use of a needs-based variable, it has been generally the case that such an index has a powerful and uneven impact on the distribution of calculated quotas.

A needs-based variable has conventionally been derived by expressing in per capita terms those variables which are themselves independent measures of economic size, such as GDP or trade. It is necessary, however, to use an appropriate scale factor in conjunction with such a needs-based variable, in order to avoid disproportionately large effects on the quota calculations for small countries or vice versa. ^{1/} Accordingly, in simulating the effect of incorporating a needs-based variable in the quota calculations, the staff has applied an index of per capita GDP, for illustrative purposes, as a multiplier on the results of the customary quota calculations to derive "per capita GDP-based" calculated quotas. ^{2/}

The per-capita-GDP index-based calculated quotas have been combined, in a weighted fashion, with the results of the quota calculations using preliminary Tenth Review data. This approach is illustrated in Table 11, Cols. (1)-(7), which includes a per capita income index. This table (Cols. 4-7) also shows the results of various simulations that reflect a range (50 percent to 95 percent) of weights that might be assigned to the customary quota calculations in the process of combining them with the calculations adjusted by per capita income. As can be seen from the table, a simple average of the results of the quota calculations adjusted by the per capita income and the customary calculated quotas would result in a substantial redistribution of quota shares (Col. (4)). The quota share for the industrial countries would decline to just over 40 percent while the share of the developing countries as a group would rise from 29.3 percent to almost 60 percent. As the weight given to the per-capita-income-adjusted calculations diminishes (Cols. (5)-(7)), the quota shares of industrial countries rises. However, it is only when the weight given to the per capita income calculations is 10 percent or less that the illustrative quota shares for the various subgroups of members take on values that are broadly within the ranges implied by the distribution of present calculated and existing quotas. Nonetheless, the differences for many individual countries (Appendix III, Table 24) are large in practically all the simulations presented in this paper.

The results of introducing a per capita income variable in the quota formulas reflect, in large part, the very wide range in the values of such a variable for the Fund's members, i.e., the very wide differences in per capita incomes among Fund members. Such wide differences are also characteristic of alternative needs-based variables, e.g., an index based on

^{1/} Applying GDP as a scale index to the reciprocal of per capita income is equivalent to introducing population as a variable into the quota formulas.

^{2/} See Appendix II for a description of the derivation and application of the poverty index.

Table 11. Summary of Illustrative Quota Calculations
Incorporating Per Capita GDP

(In percentage shares, except as indicated)

	Present calculated quotas (1)	Per capita GDP (Iraq = 1.0) ^{1/} (2)	Per capita GDP applied to calculated quotas (3)	Illustrative calculated quotas with given relative weights to cols. (1) and (3)				Memo: Present quotas (8)
				50/50 (4)	75/25 (5)	90/10 (6)	95/5 (7)	
Industrial countries	70.7	0.18	12.7	41.7	56.2	64.9	67.8	60.6
Developing countries	29.3	2.98	87.3	58.3	43.8	35.1	32.2	39.4
of which:								
Major oil exporters	8.7	1.99	17.3	13.0	10.9	9.6	9.1	10.4
Non-oil developing countries	20.5	3.42	70.1	45.3	32.9	25.5	23.0	29.0

^{1/} Figures shown are weighted averages for the subgroups listed. The index of per capita GDP uses Iraq as an effective mean so that the product of the per capita GDP index and present calculated quota shares sum to unity.

per capita imports or current payments, which have broadly similar effects when they are incorporated into the calculated quotas. The inclusion of a per capita income variable would therefore seem warranted only if a particular shift in the distribution of calculated quotas is desired. Alternatively, the calculated quota share of poorer member countries could be increased through an increase in the weights of current payments and variability in the formulas and a corresponding reduction in the weight of the GDP variable.

b. External debt

As noted, another measure of a needs-based variable that has been proposed in past reviews is an indication of a nation's external debt. ^{1/} In order to examine the impact of such a variable in the quota formulas, the staff used the World Bank's data on external debt of the developing countries. ^{2/} As shown in Table 16 of Appendix II, the debt variable has a positive and significant coefficient in the equation fitted to actual quotas but has a negative coefficient in the equation fitted to the customary calculated quotas. These statistical results suggest that actual quotas to some extent already reflect the relative debt levels of the developing countries. As shown in row (c) under the debt variable in Table 12, the assignment of a modest weight to the debt variable increases significantly the share in calculated quotas of the non-oil developing countries, with a corresponding reduction in the calculated share of the industrial countries.

c. Financial variables

With regard to the use of financial variables, it is important to recall that GDP is included in the customary quota formulas as a measure of the relative economic importance of members, and it is not surprising that relative national incomes are highly correlated with statistical indicators of the relative financial importance of member countries. For countries with an international financial center, the earnings or value added of the financial sector are likely to be relatively high. In addition, to the extent that a country's currency is used internationally, its exporters and importers tend to gain a comparative advantage over, and have less risk than, foreign competitors and customers, and its external sector would therefore tend to be larger than that of a country whose currency was not an international currency, assuming other factors equal. In principle, the inclusion of financial variables in the quota formulas should therefore complement rather than substitute for the GDP or current account variables.

^{1/} See, for example, "Some Issues Relating to Criteria for Determining IMF Quotas--A Technical Note," EB/CQuota/88/4 (3/9/88), p. 19.

^{2/} The data include public and publicly-guaranteed debt and private nonguaranteed debt. See World Debt Tables, 1991-92, The World Bank, 1993.

A number of statistical indicators of countries' relative financial importance were developed in connection with recent studies by the staff on the international use of currencies and on the occasion of the most recent review of the SDR valuation and interest baskets. ^{1/} These indicators include the currency composition of foreign exchange reserves held by monetary authorities, turnover in foreign exchange markets, the currency denomination of deposits in the eurocurrency markets and in new international bond issues, and the use of currencies in invoicing international trade and payments. Two main empirical problems have, however, been encountered in the use of financial variables in quota formulas. First, since GDP captures to some extent the relative financial and monetary importance of countries, a large element of the influence of financial variables is potentially redundant. Second, data pertaining to these indicators are available only with respect to a subset of the large industrial countries, and a partial approach runs the risk of introducing new distortions into the distribution of calculated quotas.

Despite these qualifications to the nature of the data, illustrative calculations incorporating a financial variable into the quota formulas are shown in Table 12 and in Appendix II, Tables 16, 18, and 19. The estimated coefficients of these variables are either insignificant (currency denomination of reserves, eurocurrency deposits, bond issues, and foreign exchange market turnover) or negative (currency invoicing of international trade). These simulations suggest that statistical considerations would argue against the use of a financial variable in the quota formulas because of the existence of multicollinearity between each of the financial variables and the existing variables in the formulas. ^{2/} The difficulties of estimating a precise coefficient for a new variable, in circumstances of multicollinearity with existing variables, could be dealt with to some extent if the financial variable--for example, in the form of currency denomination of foreign exchange reserves--were included in the quota formulas with only a very modest coefficient. The effect of fixing the contribution of the financial variables equal to that of approximately to the contribution of reserves in the customary quota formulas are reported in row (c) in Table 12. As can be seen, the inclusion of the financial variable reduces somewhat the share of calculated quotas of the developing countries while increasing the share of the industrial countries.

^{1/} See "Review of Method of the Valuation of the SDR," SM/90/141 (7/17/90) and G.S. Tavlas and Y. Ozeki, The Japanese Yen as an International Currency, IMF Occasional Paper, No. 90, January 1992.

^{2/} The main consequences of multicollinearity include a fall-off in the precision of estimation, and it becomes difficult to disentangle the relative influences of the explanatory variables. Also, the coefficient estimates become sensitive to particular sets of sample data and the addition or deletion of observations can produce dramatic shifts in the coefficients.

Table 12. Summary Statistics of Illustrative Quota Calculations
Including Capital Account or Financial Variables 1/

(In percent)

	Distribution of percentage shares				Average percent- age deviation from customary quota calculations (5)
	Industrial countries (1)	Developing countries (2)	Major oil exporters (3)	Non-oil developing countries (4)	
1. Currency denomination of official holdings of foreign exchange reserves					
(a)	70.7	29.3	8.9	20.4	5.5
(b)	68.2	31.8	10.9	20.9	45.3
(c)	71.7	28.3	8.5	19.8	4.1
2. Currency denomination of eurocurrency deposits					
(a)	70.7	29.3	8.9	20.4	5.5
(b)	68.3	31.7	10.9	20.8	45.1
(c)	71.7	28.3	8.5	19.8	5.3
3. Currency denomination of international bond issues					
(a)	70.7	29.3	8.9	20.4	5.5
(b)	67.6	32.4	10.9	21.5	44.1
(c)	71.8	28.2	8.5	19.7	9.2
4. Foreign exchange market turnover (applied to trade data)					
(a)	70.7	29.3	8.9	20.4	5.5
(b)	68.0	32.0	11.0	21.0	43.9
(c)	71.5	28.5	8.5	20.0	6.3
5. Currency invoicing of international trade					
(a)	70.7	29.3	8.9	20.4	5.6
(b)	68.1	31.9	10.8	21.1	45.1
(c)	71.8	28.2	8.4	19.8	2.7
6. Normal capital flows					
(a)	70.6	29.4	9.0	20.4	5.6
(b)	66.4	33.6	11.8	21.8	48.0
(c)	71.0	29.0	8.7	20.3	2.8
7. Real effective exchange rate variability <u>times</u> current receipts					
(a)	70.4	29.6	9.0	20.6	5.8
(b)	63.9	36.1	11.5	24.6	45.6
(c)	71.0	29.0	8.6	20.4	1.2
8. Financial market accessibility <u>times</u> current payments					
(a)	70.3	29.7	8.9	20.8	7.0
(b)	65.8	34.2	10.6	23.6	47.5
(c)	70.0	30.0	8.9	21.1	4.5
9. External Debt					
(a)	71.2	28.8	9.0	19.8	6.8
(b)	64.3	35.7	10.5	25.2	38.1
(c)	68.0	32.0	9.0	23.0	15.3
Memo: Benchmark regressions					
(a)	70.7	29.3	8.9	20.4	5.5
(b)	68.4	31.6	10.9	20.7	45.5
Present calculated quota	70.7	29.3	8.7	20.5	--
Present actual quota	60.6	39.4	10.4	29.0	117.3

1/ The (a) and (b) results are based on two types of single equation simulations using regression techniques to obtain coefficients for the variables indicated. The (a) results are based on minimizing deviations from the customary calculated quotas; the (b) results are derived by approximating present quotas as closely as possible (see Appendix II for the regression equation estimates and their statistical properties); the (c) results are based on the present five-formula method modified to provide a modest weight for a new variable. For illustrative purposes the weight given to a new variable is equal to about 5 percent, or equal to the weight of reserves in the benchmark regression fitted to the customary calculated quotas.

d. Capital account transactions

The increasing importance of capital transactions in the working of the international monetary system and the differentiated levels of access of members to international capital markets have a bearing on members' potential needs for Fund resources, and a number of Executive Directors have suggested including in the quota formulas a measure of capital flows, which would reflect absolute and relative creditor or debtor positions. A number of Directors have also noted that long-term capital movements might not always, or only with a considerable time lag, be adequately reflected in the pattern and level of current account transactions and that, under present circumstances, the level of reserves might not be a particularly good proxy for short-term capital flows.

Any inclusion of capital account transactions in the quota formulas should take into account changes that have taken place in recent years in the international financial system. The emphasis given to trade flows (rather than capital flows) in the original Bretton Woods formula was consistent with the restrictions on capital transactions and currency convertibility that were in place for most countries during much of the period of the Bretton Woods pegged exchange rate regime. The lifting of such restrictions by many countries, and the move to a managed floating exchange rate system have been accompanied by a surge of capital flows and an increase in the significance of capital account transactions in the balance of payments of member countries. The volatility of capital transactions also adds to the vulnerability of the external payments situation of many countries and, for those with floating exchange rates, contributes to the variability of their exchange rates. In light of these factors, a separate variable to reflect potential capital flows or a member's need for unconditional liquidity may be considered for inclusion in the quota formulas.

A reasonable approach to incorporating the concept of capital flows to use in quota formulas is a measure of "normal" net capital flows, since such a measure would correspond with a country's sustainable current account position. ^{1/} It may therefore seem worthwhile to consider whether a corresponding measure of a member's sustainable capital account position could be incorporated in the quota formulas. In this connection, however, it may be noted that measurement problems are

^{1/} For a discussion of these issues, see J. Frenkel and M. Goldstein, "A Guide to Target Zones," IMF Staff Papers, Vol. 33, December 1986, pp. 633-673, and "Approaches to Assessing the Consistency of Exchange Rates with Economic Fundamentals," (to be issued shortly). See also M. Goldstein, The Exchange Rate System: Lessons of the Past and Options for the Future, IMF Occasional Paper No. 30, July 1984, pp. 27-32.

inherent in devising a comprehensive measure of a nation's sustainable capital account position. ^{1/} As a rough approximation, it may be feasible to take an average of the capital account position over a number of years as a measure of the sustainable capital account, e.g., a five-year moving average of capital flows. Illustrative calculations along these lines of incorporating capital flows into the quota formulas are reported in Table 12 and Appendix II, Tables 16, 18, and 19. As can be seen, the coefficient of the capital account variable appears with a negative coefficient in the equations fitted to actual or calculated quotas. This result is not unexpected in view of the high collinearity between the capital flows variable and the current receipts and payments variables. The inclusion in the quota formulas of the capital flows variable with a relatively modest weight would tend to increase slightly the share in calculated quotas of the industrial countries and reduce the calculated quota share of the developing countries (as shown in line 6(c) in Table 12).

e. Access to private capital markets

As previously noted, one of the main functions of quotas is to determine a member's potential access to Fund resources. To reflect such a function of quotas, a variable representing members' ability to access the private capital markets, which is inversely related in practice with their use of Fund resources, could be considered for inclusion in the quota formulas. During the Eighth General Review, it was argued that proportionally larger quotas should be accorded the developing countries that did not have ready access to sources of international liquidity other than their own reserves and the Fund. In this connection, countries may be grouped into four categories according to their ability to access private capital markets. ^{2/} Group I countries are those industrial countries that have essentially unlimited ability to issue their own external liabilities and have consequently borrowed relatively limited amounts of foreign currencies. Group II countries are other industrial countries. Developing countries with general access to international financial markets are classified as Group III, and developing countries with limited access to international financial markets are classified as Group IV. An analysis of

^{1/} Adjusting the actual capital imbalance to exclude transitory or unsustainable elements requires an assessment of such factors as: whether the fiscal position is appropriate (in terms of both the level and composition of government spending, as well as the structure of taxes and borrowing used to finance the budget); whether increased investment associated with the external imbalance can be expected to provide a rate of return that exceeded the cost of borrowing (including externalities); and whether any increased consumption associated with the imbalance is temporary and desirable for purposes of intertemporal consumption smoothing.

^{2/} This classification has been used for analytical purposes in the WEO papers and in "The Rationale for, and Implications of, an SDR Allocation in Present Circumstances," SM/123/93 (6/9/93).

the possible use of this qualitative variable in the formulas, and a listing of the countries under each classification, are provided in Appendix II.

The results of using the access-to-capital-markets variable are reported in Table 12. Because the variable is qualitative in nature, it was employed in the quota formulas as an index in a multiplicative manner, i.e., it was applied to current payments separately. ^{1/} This multiplicative approach helps to avoid disproportionately large effects on the quotas for relatively small countries (see Appendix II). The approach also has the effect of relating the need for Fund resources (as reflected in the access-to-capital-markets variable) directly to the size of a country's current payments; if the variable has a positive and significant impact, then other things remaining equal, the larger a country's current payments the greater its need for Fund financing. The illustrative inclusion of the variable gives a measure of how the current payments variable could be given a larger weight in the determination of quotas for countries with low access to capital markets. As reported in Appendix II, Tables 16, 18, and 19 the variable has a positive correlation with actual quotas, i.e., the greater is the need for Fund resources, the higher is the actual quota. The positive coefficient found for this variable suggests that the structure of actual quotas has implicitly taken account of members' needs for liquidity, as proxied by the size of a country's current payments and its lack of access to private capital markets. In particular, countries that have relatively less access to financial markets have been provided with a higher weight (i.e., coefficient) with regard to their current payments than have countries with relatively more access to capital markets. As reported in Table 12, the inclusion of such a variable in the formulas increases slightly the share of calculated quotas of the non-oil developing countries, with a corresponding reduction in the share of the industrial countries.

f. Exchange rate variability

With the advent of a managed floating exchange rate system in 1973, international financial markets have been characterized by large movements in both nominal and real exchange rates, reflecting the fact that substantial nominal exchange rate variations have not closely tracked changes in domestic and external prices. Furthermore, the short-run variability of exchange rates--whether measured in real or nominal terms, in bilateral or effective terms--has been substantially higher in the post-1973 period than it was under the Bretton Woods system. While this aspect has a bearing on the working of the GDP variable in the quota formulas (see Section 4.a above), consideration could also be given to using exchange rate variability as a direct indicator of instability in members' balance of payments. It should be pointed out in this connection, however, that recent work on exchange rate determination calls attention to the role of unstable

^{1/} This approach is equivalent to allowing the coefficient on current payments in the quota formulas to vary inversely with the ability of member countries to obtain financing from the international capital markets.

macroeconomic policies in causing excessive movements in real exchange rates. Thus, while the use of exchange rate variability can serve as measure of members' needs for balance of payments financing that could be attributed to exogenous shifts in such factors as the terms of trade, such variability can also be the outcome of unstable macroeconomic policies. In this connection, overshooting models of exchange rate determination have shown that exchange rates can move by more than would be predicted based on changes in macro policies, because of sticky prices and wages in product and labor markets. Such overshooting may help to explain the data presented in Table 6 above. 1/

As noted above, the quota formula methodology was devised in 1944 under a system of pegged exchange rates and widespread restrictions on capital flows. Under the current system of managed floating, countries have the option of dealing with pressures on their external positions through reserve changes and/or exchange rate changes. While balance of payments flows have been included in the quota formula methodology through such measures as the current account and the variability of current receipts, exchange rate volatility has not been directly included in the formulas. 2/

In order to deal with the issue of the role of exchange rate volatility in the formulas, a variable representing such volatility has been calculated as the standard deviation of a nation's real effective exchange rate from a normal level, represented by a five-year moving average. 3/ As is the case with the access-to-markets variable, it is necessary to use an appropriate scale factor in conjunction with exchange-rate variability in order to avoid disproportionately large effects on the quota calculations for small countries or vice versa. Accordingly, real exchange rate variability was entered into the quota formulas as an index in a multiplicative manner, i.e., it was applied to current receipts separately. If the variable is positive in the quota formula, countries with relatively high real exchange rate variability would have a higher coefficient attached to current receipts for the purpose of determining the calculated quota. The results of using such a variable are reported in Table 12 and Appendix II, Tables 16, 18, and 19. As shown in Appendix II, Table 16, exchange rate volatility has a negative coefficient in the estimated equations, i.e., it enters the quota formula with an unexpected sign, since a negative coefficient implies a lower calculated quota for a

1/ The empirical literature is inconclusive with regard to the main determinants of exchange rate changes, though monetary and fiscal policies are found to be important influences. See R. MacDonald and M. Taylor, "Exchange Rate Economics, A Survey," IMF Staff Papers, March 1992, pp. 1-57.

2/ It should be noted that exchange rate misalignment (i.e., the deviation of the exchange rate from its equilibrium value) can occur independent of whether the exchange rate moves too much or too little.

3/ Such a definition parallels that used to measure the variability of current receipts. A sample period of 12 years (1979-90) was used. See Appendix II for further details.

country with higher exchange rate variability. The result suggests that countries that have experienced relatively higher real exchange rate volatility have a lower weight attached to current receipts than countries that have experienced lower exchange rate volatility. This result may reflect the correlation between exchange rate variability with other variables (particularly reserves) in the quota formulas. To the extent, however, that real exchange rate variability is determined by a country's mix of macroeconomic policies, the results suggest that the more stable these policies have been, the higher weight should be given to current receipts in the determination of actual quotas.

6. Simplification of the quota formulas

As indicated earlier, nonlinearities in some of the existing quota formulas and the working of the multiformula approach account in large part for the many cases of a perverse (i.e., negative) relationship between changes in calculated quotas of countries and growth rates of GDP. As can be seen in Appendix I, this perversity is more likely to exist the smaller and more open is a member's economy, and it applies to as many as 65 countries, including five industrial countries, eight major oil-exporting countries, and 52 non-oil developing countries. For a further group of 17 countries, the relationship between GDP and calculated quotas is positive but very small, so that for practical purposes the marginal impact of GDP on the calculated quota is effectively zero. These countries with perverse results or zero marginal weights for GDP collectively account for about 23 percent of total quotas. There are no a priori technical reasons why the relationship between GDP and calculated quotas for such a large number of countries should be negative, and the original motivation underlying the nonlinear form of the Bretton Woods formula of approximating a preconceived structure of actual quotas may no longer be valid. In the statistical work undertaken by the staff in 1973, it was concluded that formulas of the nonlinear type do not, on average, approximate more closely the actual quotas than do simple linear formulas. ^{1/} A linear version of the nonlinear formulas (Schemes III and IV) would correct the perverse effect with respect to the GDP variable. Linear formulas can be derived by using statistical techniques which minimize the deviations between the results of the original and linearized versions of the Bretton Woods (reduced) and the Schemes III and IV formulas.

In the context of such a revision of the quota formulas, it is also for consideration whether the current set of formulas could be simplified by reducing their number from five to two. In 1982, the Executive Directors felt that it was not practical to reduce the multiformula method to a single formula and still be in a position to capture in a reasonable fashion the differing economic characteristics of members. However, the staff undertook extensive statistical work at that time and again in 1987, which showed that the five-formula method could be reasonably

^{1/} See SM/73/275, p. 15.

approximated by two of the existing formulas, i.e., by using the Bretton Woods and M4 formulas. ^{1/} As already noted, a multiformula approach, as opposed to a single-formula method, underlines the desirability of setting the calculated quota in a manner that takes into account the differences in the economic structure of member countries.

The Bretton Woods-M4 combination is broadly representative of the existing five-formula method because of the preponderance of countries whose calculated quotas are based on the Bretton Woods formula and the fact that the coefficients of the major variables in the M4 formula are set within the range of the size of coefficients used in the four derivative formulas (see Appendix I). In the preliminary calculations for the Tenth Review, 73 (out of 160) countries had their calculated quotas determined by the Bretton Woods formula, including 20 (out of 24) industrial countries. The tendency of the industrial countries, with relatively high national incomes or GDP, in using the Bretton Woods formula is due to the "higher of the two" approach to the determination of a single calculated quota (see Section III above) and the fact that this formula has a relatively high weight for GDP and relatively low coefficients for current receipts and payments compared with the derivative formulas. The developing countries are more or less evenly divided as between those whose calculated quotas are based on the Bretton Woods formula and those based on the four derivative formulas, with the M4 formula being used in most of the calculated quotas based on the formulas. In these circumstances, a simplification could be considered using a two-equation system that would be representative of the results of the existing quota formulas while also avoiding the perverse effects of the nonlinear formulas. For purposes of continuity, and given the relatively large weight assigned to GDP in the Bretton Woods formula, there would seem to be a case for either retaining this formula or deriving a linear version of it. The other four derivative formulas could be represented by M4 or a linearized proxy of the results derived from the derivative formulas.

Table 13 reports the results of making quota calculations on the basis of such a simplified framework. Three alternative simplification schemes have been illustrated: (1) the use of only the Bretton Woods and the Scheme M4 quota formulas; (2) a linearized version of the Bretton Woods formula and the M4 formula; and (3) the linearized Bretton Woods formula and the linearized versions of the average of the derivative formulas yielding the lowest calculated quotas. The results show that the adoption of a linearized Bretton Woods formula in association with linear derivative formulas (options 2 and 3 above) would decrease the quota shares of the non-oil developing countries, while increasing the share of the oil-exporting developing countries. However, the changes are marginal, indicating that the linearized formulas produce results that are very close to the results of the nonlinear formulas. Furthermore, the linear formulas have the added advantage of not yielding the anomalous results derived from the nonlinear formulas. In the view of the staff, such a modification of the quota

^{1/} See EB/CQuota/87/3 (12/7/87), p. 27.

Table 13. Summary of Illustrative Quota Calculations
with Simplified Formulas

(In percent)

	Distribution of Percentage Shares			
	Industrial countries (1)	Developing countries (2)	Major oil exporters (3)	Non-oil developing countries (4)
1. Customary quota calculations	70.7	29.3	8.7	20.6
2. BW & M4 <u>1/</u>	70.0	30.0	9.2	20.8
3. BWL & M4 <u>2/</u>	70.2	29.8	9.3	20.5
4. BWL & ML <u>3/</u>	70.8	29.2	9.0	20.2

1/ The maximum of the Bretton Woods (BW) and M4 was used.

2/ The maximum of the linearized Bretton Woods formula (BWL) and M4 was used.

3/ The maximum of (i) the linearized Bretton Woods formulas (BWL) and (ii) the linearized average of the lowest among M4, M7, Scheme III, and Scheme IV formulas (ML) was used.

formulas should be given consideration by Executive Directors on the grounds of ensuring that the calculated quotas, as a measure of relative economic size, would shift over time in the same direction as its constituent variables, and this would therefore avoid the perverse effects that have been observed in the working of the nonlinear quota formulas.

V. Conclusions

The following general observations may be made with regard to the working of the quota formulas:

1. At the conclusion of the review of the quota formulas carried out in connection with the Ninth Review, most Directors considered the existing formulas as providing a reasonable compromise, and the quota formulas used for the Ninth Review were left unchanged. Executive Directors noted, however, that this did not preclude changes in the formulas in future quota reviews, and they agreed to examine the working of the formulas in preparation for the Tenth Review, so as to ensure that the formulas would take adequate account of all relevant developments bearing on members' quotas. During the Ninth Review, suggestions were made as regards possible changes to the formulas that might better reflect the creditor and debtor characteristics of members, i.e., changes to include "needs"-based variables as well as variables reflecting the relative financial importance of countries.

2. Consideration of possible changes in quota formulas has been a recurrent feature of most of the past reviews of quotas, though relatively few changes have been made in the structure of the quota formulas since 1963 when the present multiformula approach was introduced. However, Executive Directors have had a continuing concern that the quota formulas should work as intended. In the successive reviews of the working of the quota formulas, it has been generally accepted by the Executive Directors that: (a) quota calculations purport to be a reasonable comprehensive measure of the relative economic size of member countries; (b) quota formulas should reflect both creditor and debtor characteristics of members; (c) the distribution of calculated quotas should not result in undue fluctuations from one quota review to the next, unless warranted by changes in underlying economic fundamentals; and (d) the quota formulas should reflect relevant developments in the world economy as, for instance, was stressed by the Executive Board at the conclusion of the Ninth Review.

3. The evolution of the Fund into a global institution suggests that the primary need in the future for the use of quota formulas in making quota calculations will be in relation to allocating quota increases in the context of general review of quotas. As such, the working of the quota formulas will need to be assessed in light of ongoing changes in the world economy and the structural characteristics of Fund members. The issues that arise pertain to whether the formulas continue to function as an adequate indicator of relative economic size and whether they reflect economic and

financial developments that have a direct bearing on quotas and should, therefore, have a bearing on whether changes in the distribution of quotas would be warranted. In this connection, some Directors have expressed the view that there seems to be a downward bias in the quota formulas that is reflected in the declining calculated quota shares of many developing countries.

4. The actual quota shares of major groups of countries have shifted significantly in the past two general reviews of quotas toward the corresponding distribution of members' calculated quota shares. In this connection, the calculated quota share of the developing countries, particularly the non-oil developing countries, after excluding the impact of additions to the Fund membership, has exhibited a decline that may be attributable to a secular fall in these countries' shares in nominal world GDP, expressed in terms of a common unit of value (such as SDRs), and trade. On the basis of the existing quota formulas, the aggregate share of the developing countries in the total of calculated quotas would tend to fall, while the aggregate share of the industrial countries would tend to rise, and the extent of any adjustment in quota shares could be expected to depend directly on the relative size of the selective element of any quota increase, which in the past has been determined on the basis of members' shares in the total of calculated quotas.

5. This paper has examined various suggestions made by Directors in past quota reviews as regards the weights of the variables in the quota formulas, changes in the definition of variables in the quota formulas (particularly GDP and its conversion to a common SDR base), and the inclusion of new variables in the quota formulas. A review of the weights of the customary variables in the quota formulas does not provide evidence of any pronounced shifts in the relative importance of these variables in the overall structure of calculated quotas that would suggest that changes in their coefficients in the quota formulas would be warranted. This result suggests that if it were desired to change the working of the quota formulas in a particular direction, it would be necessary to change the definition of variables, or include new variables in the formulas. In addition, consideration could again be given to simplify the quota formula methodology. The new variables that have been examined in this paper include needs-based and financial variables, measures of the capital account, and exchange rate variability. It may be noted that the inclusion of a new variable necessarily reduces the importance of the existing variables in the quota formulas. The paper has also reviewed the issue of further simplification of the quota formulas.

6. The working of the GDP variable in the quota formulas could be improved. While the use of the PPP index to convert GDP into SDRs would seem desirable, as it would avoid the effects of using market exchange rates on the data, and which may be unrepresentative of a members' GDP level, the staff is of the view that data deficiencies inherent in the presently available PPP indices argue against such a change. There are

also a number of methodological issues that need to be considered regarding the calculation of PPP-adjusted GDP, which has the potential to cause substantial shifts in the distribution of calculated quotas. The averaging of GDP over several years, converted at market exchange rates, would go some way to smoothing the volatility of the data expressed in SDRs which can arise from using a single year's data, and the staff is of the view that the GDP variable in the formulas be averaged over the same five-year period used for averaging the data on the external current account used in the quota calculations. Nevertheless, the fact that substantial or prolonged swings in nominal exchange rates can mask members' real growth rates suggests that some modification of the formula methodology may also be called for to correct this anomaly. The use of GDP data adjusted for real effective exchange rates, despite problems associated with the choice of an appropriate base year, has been illustrated in the paper and may provide a useful means of reflecting members' real growth rates in the quota calculations.

7. Modifications of the variability measure generally result in shifts in calculated quotas toward the industrial countries as a group and tend to reduce the shares in calculated quotes of the major oil exporters. In light of the sharp decline in the relative economic position of the group of major oil-exporting countries since the mid-1980s, variability has served to moderate the decline in these countries' shares in calculated quotas. On balance, the present measure of variability seems to be working as intended and in a relatively satisfactory manner; the results of the updated calculations would not seem to call for any modification in this variable or in the size of its coefficient.

8. As indicated in previous reviews, the introduction of a poverty index in the quota formulas has a relatively uneven impact on calculated quotas, which reflects the nature of the poverty index itself as a measure of the level of economic development rather than of members' relative economic size. The introduction of a poverty index would of course reduce the shares of the relatively high income countries (industrial and developing countries) in the total of calculated quotas and increase the share of the relatively low income countries, and such a change could have implications for the long-run liquidity position of the Fund.

9. Variables representing both financial market accessibility and the external debt of developing countries would increase the share of the developing countries in the total of calculated quotas and reduce the share of the industrial countries. In view of the fact that both variables were found to have a positive relationship with the structure of actual quotas, it would seem that the distribution of actual quotas has implicitly taken these factors into account, and consequently there would seem little advantage of including these factors in the quota formulas.

10. The inclusion of financial variables, as well as variables representing normal net capital flows and exchange rate variability, do not have a significant impact on the structure or distribution of calculated quotas. Capital account and financial variables are highly correlated with other

variables in the present quota formulas, and there would not seem to be a strong case, on technical grounds, for including such variables in the quota formulas. The data on the variability of exchange rates are difficult to interpret and their use for the purpose of making quota calculations would seem to be limited, in large part because changes in exchange rates are more likely to be the outcome of domestic policy adjustments rather than a measure of changes in potential need for Fund financing.

11. This paper also re-examined the issue of simplification of the quota formulas. Nonlinearities in some of the existing quota formulas and the working of the multiformula approach are primarily responsible for the many cases of a negative relationship between changes in the calculated quotas of countries and the growth rates of their GDP. A linear version of the nonlinear formulas would help correct for this perversity. In addition, simplification of the quota formulas could be made by using a two-equation system, such as the combination of the Bretton Woods and M4 formulas, that would be representative of the results of the existing five-equation method of the quota formulas. The staff is of the view that the use of a linearized Bretton Woods formula in association with a linear formula (M4) that approximates the current four derivative formulas would be a useful simplification in the process of making quota calculations.

Specification of the Quota Formulas

This Appendix presents the various quota formulas that have been used during past quota reviews and in connection with the determination of initial quotas of new members. The principles and constraints under which the original Bretton Woods formula was derived are discussed briefly. An analysis is also presented of the sensitivity of calculated quotas to changes, at the margin, in each of the variables contained in the formulas, on the basis of the existing five formulas and using updated data through 1990.

1. The Original Bretton Woods Formula

The original Bretton Woods formula can be written in symbols as:

$$Q = (0.02Y + 0.05R + 0.10M + 0.10V)(1 + X/Y) \quad (1)$$

where

Q = Calculated quota
Y = National income
R = Gold and foreign exchange reserves
X = Average annual exports (five-year average)
M = Average annual imports (five-year average)
V = Maximum fluctuation in exports defined as the difference between the highest and the lowest value of exports during a five-year period.

The calculations made on the basis of this formula at the time of the Bretton Woods Conference employed national income for 1940, gold and dollar balances as of July 1, 1943, annual average imports of 1934-38, annual average exports of 1934-38, and the maximum fluctuation (i.e., difference between the highest and lowest) in exports recorded in 1934-38.

The specification of the original Bretton Woods formula involved a process of negotiation and compromise within the limitations imposed by the following preconceived constraints: (1) The Fund would ultimately have assets of about \$10 billion, out of which the Bretton Woods participants' quotas would be \$8 billion, leaving the balance of \$2 billion for new members; (2) The United States, which held the bulk of international liquidity, would supply a major part of the Fund's assets, and the major postwar demands on the Fund would be for gold or dollars; (3) The quota of the United States would be twice as large as the quota of the United Kingdom; (4) The combined quotas of the United Kingdom, its dominions and colonies should be equal to that of the United States, and the quotas of other large members should be reasonably related to those of the United States and the United Kingdom; (5) Countries which could pay the largest amounts of gold and convertible currencies to the Fund would not necessarily be those who would wish to make the largest use of its resources; (6) The countries with the four largest quotas should be (in

descending order of size): the United States, the United Kingdom, the U.S.S.R. and China. 1/

Given this set of initial conditions (i.e., the six constraints listed above), the Bretton Woods formula was essentially derived as a result of what the main countries perceived the resulting quota structure should be, rather than the other way around. 2/ The formula was described as one that "gave reasonable results for the major countries" and "it provided a satisfactory starting point for discussions concerning the quotas of other countries." 3/

2. Formulas for the Fourth through the Seventh General Reviews

At the time of the Fourth General Review, following the procedure adopted in connection with measuring the variability of export receipts for purposes of the Compensatory Financing Facility, the measure of variability of exports included in the Bretton Woods Formulas was redefined as:

$$V = \left[\frac{\sum_{t=3}^{11} (X_t - \bar{X}_t)^2}{9} \right]^{1/2}$$

where X_t = value of current receipts in year t

\bar{X}_t = five year moving average of exports, calculated over a thirteen year period.

In addition, the weights in the Bretton Woods formula were each reduced by 50 percent, thereby yielding a calculated set of quotas closer to the then existing quotas and a total size of the Fund more in line with the views of Directors on an appropriate size of the Fund. Furthermore, alternative calculations were made by substituting: (a) current payments (imports, payments for services, and private transfers) for imports; (b) current receipts (exports, receipts from services, and private transfers) for exports; and (c) variability of current receipts for variability of exports. Two sets of calculations, Set I calculations using exports, imports, etc., and Set II calculations using current receipts, current payments etc., were thus made.

1/ Constraints (1) through (5) are referred to in O. Altman, "Quotas in the International Monetary Fund," Staff Papers, Vol. 5, (1956-57), p. 136. Constraint (6) is referred to in J.K. Horsefield, The International Monetary Fund 1945 - 65, Vol. 1, p. 95 and in Raymond Mikesell, The Bretton Woods Debate: A Memoir, Essays in International Finance, Princeton University, 1994, forthcoming.

2/ EBS/50/173, Supplement 1 (12/6/50), p.12.

3/ Ibid, p. 13.

The Bretton Woods formulas (reduced), applied to the Set I and Set II data were:

Revised Bretton Woods

$$Q_1 = (0.01Y + 0.025R + 0.05M + 0.2276V) (1 + X/Y) \quad (2)$$

$$Q_1^* = (0.01Y + 0.025R + 0.05P + 0.2276VC) (1 + C/Y) \quad (3)$$

where,

Q_1 = Quota calculated with Set I data
 Q_1^* = Quota calculated with Set II data
 P = Current payments
 C = Current receipts
 V = Variability of exports
 VC = Variability of current receipts

Derivative formulas

A number of experimental versions of the revised Bretton Woods formula were also developed at the time of the Fourth General Review by reweighting and modifying the original Bretton Woods formula. Of these, four were found to give reasonable results and were used in subsequent quota calculations. The modifications to the revised Bretton woods formula that were introduced eliminated reserves, further decreased the coefficient of national income, and increased the coefficients of trade and the variability of exports. Furthermore, the multiplicative factor (i.e., one plus the ratio of exports to national income) was eliminated in two of the formulas, thereby making them linear. The resulting formulas were normalized by applying to each an adjustment factor that equated the sum of calculated quotas using each formula with the sum obtained using the Bretton Woods (reduced) formula.

The derivative formulas were as follows:

Set I formulas

$$\text{Scheme III: } Q_2 = (0.0065Y + 0.078M + 0.5065V) (1 + X/Y) \quad (4)$$

$$\text{Scheme IV: } Q_3 = (0.0045Y + 0.070M + 0.9622V) (1 + X/Y) \quad (5)$$

$$\text{Scheme M4: } Q_4 = (0.005Y + 0.044M + 0.044X + 1.044V) \quad (6)$$

$$\text{Scheme M7: } Q_5 = (0.0045Y + 0.039M + 0.039X + 1.304V) \quad (7)$$

Set II formulas

$$\text{Scheme III: } Q_2^* = (0.0065Y + 0.078P + 0.5065VC) (1 + C/Y) \quad (8)$$

$$\text{Scheme IV: } Q_3^* = (0.0045Y + 0.070P + 0.9622VC) (1 + C/Y) \quad (9)$$

$$\text{Scheme M4: } Q_4^* = (0.005Y + 0.044P + 0.044C + 1.044VC) \quad (10)$$

$$\text{Scheme M7: } Q_5^* = (0.0045Y + 0.039P + 0.039C + 1.304VC) \quad (11)$$

From the ten formulas, a calculated quota range was derived as follows: The two quota calculations made from the Set I and Set II Bretton Woods formulas (revised) were averaged and the average was used as one end of the calculated quota range. In addition, an average was made of the lowest two calculations, based on the four modified and reweighted Set I formulas, and the lowest two Set II versions of these formulas; the average of these four calculations was used as the other end of the calculated quota range. A single calculated quota was derived as the higher end of the calculated quota range.

3. Formulas for the Eighth and Ninth General Reviews

At the time of the Eighth General Review, the quota formulas were further revised. GDP replaced national income; the foreign reserves variable was included in all of the derivative formulas; and the measure of reserves was broadened to include SDRs and ECUs and redefined as a twelve-month average rather than a year-end level. Furthermore, the Set I calculations were dropped and the coefficient of variability was reduced by 20 percent in the four derivative Set II formulas. The formulas used in the Eighth and Ninth Reviews are identical except for the adjustment factors, which are applied to each of the derivative formulas so that the totals derived under each formula at the time of a quota review equal that derived under the Bretton Woods formula. The calculated quotas continued to be derived as the higher of the result of the Bretton Woods formula and the result obtained by averaging the two lowest results of the derivative formulas.

The current Bretton Woods (reduced) formula and the derivative formulas, together with their adjustment factors for the Eighth and Ninth Reviews, as well as for the preliminary Tenth Review calculations, are:

$$\text{Bretton Woods: } (0.01Y + 0.025R + 0.05P + 0.2276VC) \times (1 + C/Y)$$

Scheme III:

$$(0.0065Y + 0.0205125R + 0.078P + 0.4052VC) \times (1 + C/Y)$$

$$\begin{aligned} \text{Adjustment factor: } & 0.87556413 \text{ (Eighth General Review)} \\ & 0.84849814 \text{ (Ninth General Review)} \\ & 0.86367845 \text{ (Tenth General Review)} \end{aligned}$$

Scheme IV:

$(0.0045Y + 0.03896768R + 0.07P + 0.76976VC) \times (1 + C/Y)$
 Adjustment factor: 0.84551136 (Eighth General Review)
 0.81397393 (Ninth General Review)
 0.82841610 (Tenth General Review)

Scheme M4:

$0.005Y + 0.042280464R + 0.044 (P + C) + 0.8352VC$
 Adjustment factor: 0.89705949 (Eighth General Review)
 0.90739479 (Ninth General Review)
 0.88218144 (Tenth General Review)

Scheme M7:

$0.0045Y + 0.05281008R + 0.039 (P + C) + 1.0432VC$
 Adjustment factor: 0.89571728 (Eighth General Review)
 0.90627363 (Ninth General Review)
 0.87688849 (Tenth General Review)

4. Relationship between calculated quotas and variables entering into the quota formulas

Calculated quotas tend to exhibit relatively greater stability over time than the variables that enter into the quota formulas. This characteristic of the calculated quotas reflects in part their composite character and the fact that the various indicators included in them are not perfectly correlated. Furthermore, the impact of a given variable on a member's calculated quota depends on which particular formulas are used to determine the member's calculated quota, given that, as noted above, the calculated quota is determined as the higher of the results of the Bretton Woods (reduced) formula and the average of the lowest two results from the four derivative formulas.

To illustrate the relationship, at the margin, between calculated quotas and the variables that enter into the quota formulas, calculations have been made of the partial elasticities of each country's calculated quota with respect to GDP, current receipts, current payments, variability, and reserves. ^{1/} These partial elasticities provide an indication of the extent to which a given member's calculated quota would change when a particular variable changes, while other factors are kept constant, and it also indicates the margin of error in the calculated quota to the extent that a particular variable is itself subject to statistical or estimation errors or to distortions arising from valuation problems or any particular

^{1/} It should be noted that the partial elasticity of the calculated quota with respect to GDP for an individual country, can be quite different from the percentage contribution of GDP to that country's calculated quota.

data weaknesses. Appendix Table 14 presents a summary of the results of these elasticity calculations, while Appendix Table 15 provides the data for each member. Each of the entries in the table may be interpreted as the percentage change in the calculated quota arising from a one percentage point increase in the given variable.

As can be seen from the tables, the marginal impact on calculated quotas of changes in the economic variables vary widely, both by variable and across countries. For the membership as a whole, GDP has the smallest marginal impact on calculated quotas, i.e., the average elasticity of the calculated quota with respect to GDP is 0.034 while the variable with the largest marginal impact on calculated quotas is current payments (0.424). For many individual members, there are substantial differences between the elasticities attached to the variables that have the largest and smallest effects on their calculated quotas reflecting the nonlinear nature of three of the quota formulas and the fact that the coefficients on some variables differ significantly across equations. For example, variability has only a slight impact on the calculated quotas of most industrial countries while GDP has a large impact only for the United States and Japan. The same pattern can be seen for Afghanistan and Iran, whereas for such relatively open economies as Saudi Arabia and Solomon Islands, GDP has only a negligible impact on the calculated quota, whereas the partial elasticity with respect to variability, for these countries, is relatively high.

With respect to the working of the formulas for the major groups of countries, the averages of partial elasticities shown in Appendix Table 14 indicate that GDP and current payments have the largest marginal impact on the calculated quotas of the industrial countries, whereas the relative size of the external sector (current receipts or payments) has the greatest influence on the calculated quotas of non-oil developing countries. For the major oil-exporting countries, changes in the variability of current receipts are singularly the most important variable that determines the changes in their calculated quotas.

As can also be seen in Appendix Table 15, the marginal influence of variables on the calculated quotas of individual member countries depends not only on which of the five formulas effectively determine a member's calculated quota but also on the relative openness of their economies. As noted in the text, the nonlinear element in three of the quota formulas reflects the application of the openness ratio as a multiplicative factor, and for these nonlinear formulas, the marginal impact of GDP falls as the openness of a country rises. This feature of the quota formulas implies that for many countries with large external sectors, regardless of their classifications as industrial or developing countries, the marginal impact of GDP is effectively negligible. The marginal impact of the current account variables on the calculated quotas also tends to rise along with the openness ratio of the currencies of member countries, whereas the marginal impact of variability and reserves tend to reflect the size of these variables in relation to the other variables that enter into the quota formulas.

Table 14. Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: <u>1/</u>				
	Gross Domestic Product (1)	Current Receipts (2)	Current Payments (3)	Variability (4)	Reserves (5)
All members	0.034	0.225	0.424	0.261	0.055
Industrial countries	0.107	0.246	0.491	0.099	0.060
Developing countries	0.021	0.222	0.413	0.290	0.054
Major-oil exporters	0.018	0.182	0.239	0.530	0.030
Non-oil developing countries	0.021	0.226	0.429	0.267	0.057

1/ Entries are averages, over all members in each group, of the elasticity of the calculated quotas of individual members with respect to the given variable. The elasticity of the calculated quota CQ with respect to a variable X is defined as:

$$E = \frac{\partial CQ}{\partial X} \cdot \frac{X}{CQ}$$

where all other variables entering into the quota formulas are held constant. The figures shown indicate the impact on the calculated quota of a change at the margin of a given variable.

Table 15. Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: 1/					Memo:	
	-----					Equation for calculated quota	Ratio of Current Receipts to GDP
	GDP	CURRENT RECEIPTS	CURRENT PAYMENTS	VARIA- BILITY	RESERVES		
United States	0.47	0.09	0.34	0.08	0.02	BW	0.10
Japan	0.49	0.11	0.29	0.07	0.04	BW	0.12
Spain	0.34	0.13	0.38	0.04	0.11	BW	0.15
Australia	0.29	0.13	0.43	0.09	0.06	BW	0.15
Italy	0.33	0.14	0.40	0.05	0.07	BW	0.17
France	0.28	0.17	0.46	0.07	0.03	BW	0.20
Greece	0.20	0.17	0.50	0.08	0.04	BW	0.21
Finland	0.23	0.17	0.47	0.06	0.06	BW	0.21
Canada	0.06	0.23	0.45	0.25	0.02	M4 III	0.24
United Kingdom	0.18	0.20	0.50	0.09	0.03	BW	0.25
New Zealand	0.14	0.20	0.50	0.08	0.07	BW	0.25
Germany	0.20	0.21	0.48	0.06	0.05	BW	0.27
Sweden	0.15	0.22	0.53	0.05	0.05	BW	0.28
Denmark	0.09	0.25	0.57	0.05	0.06	BW	0.33
Iceland	0.06	0.25	0.56	0.08	0.05	BW	0.33
Portugal	0.09	0.26	0.26	0.20	0.20	M4 M7	0.34
Switzerland	0.08	0.26	0.52	0.04	0.10	BW	0.34
Austria	0.05	0.27	0.57	0.06	0.05	BW	0.37
Norway	0.07	0.24	0.25	0.34	0.09	M4 M7	0.38
Netherlands	-0.06	0.33	0.61	0.08	0.05	BW	0.49
Ireland	-0.14	0.36	0.65	0.08	0.06	BW	0.56
Belgium	-0.13	0.37	0.65	0.08	0.04	BW	0.58
San Marino	-0.43	0.55	0.69	0.12	0.07	BW	1.24
Luxembourg	-0.47	0.59	0.72	0.16	0.00	BW	1.43
Average elasticity	0.107	0.246	0.491	0.099	0.060		
Major Oil Exporting Countries							
Iran	0.71	0.02	0.11	0.15	0.00	BW	0.02
Iraq	0.03	0.10	0.22	0.63	0.01	III M4	0.15
Algeria	0.03	0.16	0.31	0.46	0.01	III M4	0.19
Indonesia	0.04	0.18	0.34	0.40	0.03	III M4	0.22
Libya	-0.02	0.15	0.20	0.61	0.06	III M4	0.26
Venezuela	-0.03	0.19	0.27	0.53	0.04	III M4	0.32
Nigeria	-0.06	0.16	0.20	0.68	0.02	III M4	0.33

Table 15 (continued). Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: 1/					Memo:		Ratio of Current Receipts to GDP
	-----					Equation for calculated quota		
	GDP	CURRENT RECEIPTS	CURRENT PAYMENTS	VARIA- BILITY	RESERVES			
Qatar	-0.05	0.20	0.22	0.60	0.03	III	M4	0.37
United Arab Emirate	-0.06	0.22	0.22	0.57	0.05	III	M4	0.41
Saudi Arabia	-0.09	0.19	0.22	0.66	0.02	III	M4	0.42
Oman	-0.09	0.24	0.30	0.51	0.04	III	M4	0.46
Kuwait	-0.22	0.36	0.27	0.56	0.03	M4	III	0.98
	-----	-----	-----	-----	-----			
Average elasticity	0.018	0.182	0.239	0.530	0.030			
Non-Oil Developing Countries								

Myanmar	0.74	0.03	0.15	0.05	0.03	BW		0.03
Sudan	0.15	0.07	0.34	0.45	0.00	III	IV	0.07
India	0.52	0.07	0.34	0.05	0.02	BW		0.08
Brazil	0.49	0.08	0.26	0.14	0.03	BW		0.09
Rwanda	0.34	0.08	0.42	0.11	0.04	BW		0.09
Laos	0.31	0.09	0.45	0.08	0.07	BW		0.09
Bangladesh	0.40	0.10	0.41	0.06	0.03	BW		0.11
Argentina	0.40	0.10	0.32	0.15	0.03	BW		0.11
Peru	0.39	0.10	0.35	0.13	0.03	BW		0.11
Afghanistan	0.11	0.12	0.40	0.31	0.06	III	M4	0.11
FSU	0.53	0.11	0.29	0.05	0.02	BW		0.12
Somalia	0.13	0.11	0.65	0.09	0.02	BW		0.12
Burundi	0.09	0.12	0.46	0.26	0.07	M4	III	0.13
China	0.39	0.11	0.33	0.08	0.09	BW		0.13
Guinea-Bissau	0.09	0.10	0.35	0.37	0.08	M4	M7	0.13
Nepal	0.29	0.12	0.44	0.07	0.08	BW		0.14
Cambodia	0.05	0.13	0.46	0.30	0.02	III	IV	0.14
Ethiopia	0.09	0.16	0.40	0.29	0.01	M4	IV	0.15
Mexico	0.07	0.13	0.42	0.36	0.03	III	IV	0.15
Benin	0.04	0.12	0.27	0.56	0.01	III	M4	0.16
Syrian Arab Rep	-0.01	0.14	0.26	0.61	0.01	III	IV	0.16
Mali	0.12	0.17	0.31	0.33	0.08	M4	M7	0.17
Niger	0.07	0.15	0.38	0.34	0.06	III	M4	0.17
Chad	0.09	0.14	0.30	0.38	0.10	M4	M7	0.17
Central African Rep	0.18	0.15	0.52	0.08	0.08	BW		0.17

Table 15 (continued). Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: 1/					Memo:		Ratio of Current Receipts to GDP
	GDP	CURRENT RECEIPTS	CURRENT PAYMENTS	VARIA- BILITY	RESERVES	Equation for calculated quota		
Thailand	-0.01	0.17	0.27	0.51	0.06	III	M4	0.28
Korea	-0.05	0.22	0.45	0.21	0.05	IV	III	0.28
Zambia	-0.01	0.21	0.40	0.37	0.02	III	M4	0.28
Romania	0.02	0.23	0.35	0.39	0.02	III	M4	0.29
Sri Lanka	0.08	0.22	0.27	0.39	0.04	M4	M7	0.30
Angola	-0.01	0.21	0.34	0.45	0.01	III	M4	0.30
Chile	0.00	0.24	0.44	0.22	0.10	M4	III	0.31
Bhutan	-0.02	0.24	0.57	0.05	0.17	BW		0.31
Dominican Rep.	0.09	0.24	0.27	0.39	0.01	M4	M7	0.32
Hungary	0.11	0.31	0.49	0.25	0.03	M7	M4	0.32
Zimbabwe	0.09	0.25	0.26	0.38	0.02	M4	M7	0.32
Costa Rica	0.08	0.23	0.29	0.32	0.09	M4	M7	0.33
Gabon	-0.04	0.20	0.34	0.49	0.01	III	M4	0.33
Nicaragua	0.03	0.10	0.32	0.50	0.05	M4	M7	0.34
Djibouti	-0.05	0.22	0.37	0.31	0.07	M4	III	0.34
Israel	0.03	0.25	0.57	0.07	0.08	BW		0.34
Yemen, Rep. of	-0.04	0.23	0.41	0.38	0.02	M4	III	0.34
Egypt	0.07	0.22	0.27	0.41	0.05	M4	M7	0.37
Trinidad & Tob	-0.06	0.21	0.28	0.55	0.02	III	M4	0.38
Cote d'Ivoire	0.07	0.23	0.30	0.40	0.00	M4	M7	0.38
Liberia	0.07	0.23	0.27	0.43	0.00	M4	M7	0.38
Tanzania	-0.08	0.28	0.65	0.13	0.02	BW		0.38
Tunisia	0.07	0.25	0.27	0.36	0.05	M4	M7	0.39
Suriname	-0.03	0.28	0.37	0.37	0.01	III	M4	0.40
Czech & Slovak Rep	0.03	0.29	0.61	0.05	0.03	BW		0.40
Congo	-0.08	0.23	0.38	0.48	0.00	M4	III	0.41
Zaire	0.06	0.21	0.28	0.43	0.02	M4	M7	0.41
Cyprus	-0.04	0.29	0.52	0.09	0.14	BW		0.42
Marshall Island	-0.21	0.33	0.61	0.11	0.17	BW		0.50
Mauritania	-0.15	0.34	0.66	0.13	0.03	BW		0.50
Barbados	-0.10	0.28	0.37	0.42	0.03	M4	III	0.51
Seychelles	-0.15	0.35	0.66	0.13	0.01	BW		0.54
Panama	-0.12	0.26	0.32	0.53	0.01	III	M4	0.54
Tonga	0.05	0.22	0.23	0.40	0.10	M4	M7	0.54
Jamaica	-0.14	0.35	0.64	0.13	0.02	BW		0.54
Mongolia	-0.22	0.35	0.72	0.10	0.05	BW		0.55

Tables 15 (continued). Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: 1/					Memo:		Ratio of Current Receipts to GDP

	GDP	CURRENT RECEIPTS	CURRENT PAYMENTS	VARIA- BILITY	RESERVES	Equation for calculated quota		
Bolivia	0.08	0.16	0.44	0.27	0.05	III	M4	0.17
Madagascar	0.23	0.15	0.50	0.08	0.05	BW		0.17
Honduras	0.27	0.15	0.47	0.10	0.01	BW		0.17
Mozambique	0.02	0.15	0.63	0.10	0.09	BW		0.18
Comoros	0.03	0.15	0.45	0.29	0.08	M4	III	0.18
Viet Nam	0.24	0.15	0.50	0.09	0.01	BW		0.18
Burkina Faso	0.07	0.17	0.46	0.22	0.08	M4	III	0.18
Turkey	0.03	0.16	0.49	0.26	0.06	III	IV	0.19
Pakistan	0.27	0.16	0.48	0.08	0.01	BW		0.19
Ghana	0.08	0.18	0.41	0.29	0.04	III	M4	0.19
Uganda	0.07	0.18	0.42	0.32	0.01	III	M4	0.19
Paraguay	-0.02	0.16	0.42	0.37	0.07	III	IV	0.20
Albania	-0.01	0.17	0.46	0.28	0.10	III	IV	0.20
Malawi	0.06	0.18	0.42	0.30	0.04	III	M4	0.20
Guatemala	0.07	0.20	0.43	0.26	0.04	III	M4	0.21
Haiti	0.21	0.17	0.52	0.10	0.00	BW		0.21
Cameroon	0.06	0.19	0.44	0.31	0.00	III	M4	0.21
Sao Tome	-0.04	0.12	0.39	0.41	0.11	III	M4	0.22
Columbia	-0.01	0.18	0.49	0.26	0.08	III	IV	0.22
Micronesia	-0.02	0.15	0.48	0.13	0.27	M4	III	0.22
El Salvador	0.06	0.21	0.44	0.25	0.05	III	M4	0.22
Togo	-0.01	0.14	0.32	0.48	0.07	III	M4	0.22
Gambia, The	-0.02	0.14	0.37	0.47	0.04	III	M4	0.23
Guinea	0.16	0.19	0.54	0.10	0.02	BW		0.23
Senegal	0.15	0.19	0.55	0.11	0.00	BW		0.24
Sierra Leone	0.02	0.18	0.33	0.46	0.00	III	M4	0.24
Uruguay	-0.04	0.20	0.51	0.28	0.06	III	IV	0.25
Kenya	0.10	0.23	0.30	0.35	0.02	M4	M7	0.25
South Africa	-0.05	0.20	0.48	0.36	0.01	III	IV	0.26
Former Yugoslavia	-0.04	0.22	0.40	0.26	0.06	III	M4	0.26
Equatorial Guin	0.07	0.16	0.36	0.41	0.01	M4	M7	0.26
Morocco	0.18	0.21	0.53	0.05	0.04	BW		0.26
Cape Verde	0.01	0.20	0.41	0.28	0.10	III	M4	0.26
Poland	0.05	0.24	0.44	0.22	0.05	III	M4	0.26
Philippines	0.12	0.27	0.29	0.30	0.03	M7	M4	0.26
Ecuador	-0.00	0.20	0.37	0.41	0.02	III	M4	0.28

Table 15 (concluded). Relationship Between Calculated Quotas and Variables Entering into the Quota Formulas

	Partial Elasticity of the Calculated Quota with respect to: 1/					Memo:		Ratio of Current Receipts to GDP
	-----					-----		
	GDP	CURRENT RECEIPTS	CURRENT PAYMENTS	VARIA- BILITY	RESERVES	Equation for calculated quota		
Belize	0.05	0.24	0.24	0.39	0.09	M4	M7	0.55
Nambia	0.04	0.19	0.26	0.51	0.01	M4	M7	0.56
Botswana	-0.12	0.28	0.33	0.26	0.26	III	M4	0.56
Papua New Guinea	-0.17	0.36	0.64	0.12	0.06	BW		0.56
Fiji	0.05	0.22	0.22	0.43	0.08	M4	M7	0.56
Mauritius	-0.17	0.37	0.59	0.09	0.12	BW		0.58
Dominica	-0.19	0.37	0.68	0.11	0.03	BW		0.59
Solomon Islands	0.03	0.18	0.27	0.48	0.04	M4	M7	0.59
Malaysia	0.04	0.22	0.20	0.44	0.09	M4	M7	0.60
Grenada	-0.19	0.38	0.70	0.09	0.03	BW		0.60
St. Kitts & Nevis	-0.20	0.38	0.68	0.11	0.04	BW		0.61
Bahrain	0.04	0.19	0.20	0.42	0.14	M4	M7	0.63
Lebanon	-0.17	0.26	0.30	0.55	0.06	M4	III	0.65
Vanuatu	0.03	0.19	0.24	0.45	0.08	M4	M7	0.66
Western Samoa	-0.29	0.40	0.61	0.11	0.16	BW		0.68
St. Lucia	-0.22	0.40	0.69	0.08	0.05	BW		0.68
Bahamas	-0.23	0.41	0.64	0.16	0.03	BW		0.69
Malta	-0.27	0.42	0.53	0.11	0.21	BW		0.71
Swaziland	0.03	0.22	0.23	0.45	0.07	M4	M7	0.77
St. Vincent	-0.28	0.44	0.62	0.17	0.05	BW		0.77
Lesotho	-0.33	0.45	0.62	0.23	0.03	BW		0.81
Antigua & Barbu.	-0.33	0.46	0.69	0.16	0.02	BW		0.86
Kiribati	-0.42	0.46	0.24	0.13	0.58	BW		0.87
Jordan	-0.34	0.47	0.65	0.19	0.04	BW		0.88
Guyana	-0.39	0.48	0.62	0.28	0.01	BW		0.93
Maldives	-0.34	0.48	0.67	0.13	0.06	BW		0.93
Singapore	-0.42	0.52	0.58	0.16	0.17	BW		1.09
Bulgaria	-0.47	0.57	0.67	0.23	0.00	BW		1.32
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Average elasticity	0.02	0.23	0.43	0.27	0.06			

Estimation Results of Statistical Quota
Formulas that Include New Variables

This Appendix presents the regression equations that have been estimated in the attempt to derive quota formulas that include new variables such as measures of relative financial importance (including capital account variables), a poverty index, external debt, and access to capital markets. The procedures adopted for this exercise and the results are described, including the derivation and use of a poverty index.

1. Regression techniques and results using
financial variables, normal capital flows,
external debt, and exchange-rate variability

In past reviews of quota formulas, regression techniques were employed to find statistical formulas by fitting the traditional and possible new variables either to then existing quotas, as in 1963 and 1973, or to the results of the calculation method then in existence, as in 1981/82 and 1987. ^{1/} These techniques involve the following methodology. First, equations are fitted to actual quotas and calculated quotas, respectively, using ordinary least squares (OLS) estimation and the five variables that enter into the quota formulas (i.e., reserves, GDP, current receipts, current payments, and variability of current receipts). The resulting equations are referred to as the "benchmark" equations. Next, the new variables that have been proposed to be included in the formulas are added to the regressions in order to evaluate their statistical properties and their effects on the regression statistics.

In assessing the statistical performance of the estimated equations, the following statistical diagnostics have been utilized:

a. The goodness-of-fit of the equations as indicated by the average (root mean squared) percentage deviation of the estimated quotas from the calculated quotas.

b. The (unadjusted) t-ratios of the estimated coefficients that apply to the variable entering into the regression equations. With regard to the assessment of t-ratios, two criteria can be applied. For purposes of hypothesis testing, the null hypothesis that a coefficient is insignificant is rejected if the t-ratio is above a critical value (i.e., 1.8). For purposes of maximizing the within sample predictability of the estimated equations (i.e., the R^2), the relevant criterion is that a regression coefficient should have a t-ratio that is greater than unity. ^{2/}

^{1/} See "Ninth General Review of Quotas--Further Consideration of Variables in the Quota Formulas," EB/CQuota/87/3, 12/7/83.

^{2/} See Y. Haitovsky, "A Note on the Maximization of R^2 ," American Statistician, Vol. 23 (No.1), February 1969, pp. 20-21.

c. The Durbin-Watson (DW) statistic, which measures the degree of (first order) autocorrelation in the residuals. A DW statistic near 2.0 indicates the absence of autocorrelation. Autocorrelation is more apt to be a problem in times series data than in cross-section data.

d. In order to test whether the variance of the disturbance term is constant (i.e., absence of heteroskedasticity), the White test (see below) has been used. This test involves an auxiliary regression of the square of the disturbance term on the original regressors and their squares. An F-statistic is used to evaluate whether heteroskedasticity is present. Heteroskedasticity is often found to exist in cross-section data.

e. The LM (Langrange Multiplier) test for omitted variables is a more efficient method than the t-ratio test for determining whether a variable should be included in a regression. Two sets of regression sum of squares are calculated: a restricted sum of squares (RSS_r) whereby the coefficient of the added variable is assumed to equal zero; and an unrestricted sum of squares in which the coefficient takes on its estimated value. An F-test is performed on

$$\left[\frac{RSS_r - RSS_u}{RSS_r} \right]$$

divided by the number of degrees of freedom.

f. The F-test for serial correlation tests for higher-order autocorrelation than does the DW statistic, which tests for serial correlation of order one. Lags of up to seven have been used to test for serial correlation. An F-statistic is used to test whether lags of up to seven in the disturbance term are correlated.

The results of applying the above diagnostic tests to the added variables in the equations for actual and calculated quotas are reported in text Table 12, and Appendix Tables 16, 18, and 19. Text Table 12 shows the average percentage deviation (i.e., regression diagnostic (a) given above) of equations fitted to calculated quotas and actual quotas (see Col. (5)). Appendix Table 16 provides the relative contributions of the variables in the estimated equations and the unadjusted t-ratios. (These t-ratios have not been adjusted for heteroskedasticity, as explained below.) Finally, Appendix Tables 18 and 19 present equations with the estimated coefficients and the remainder of the diagnostic tests (i.e., tests (c) through (f)). The following first discusses the general results as reported in Appendix Table 16 and text Table 12, and then discusses the results of the additional diagnostic tests as reported in Appendix Tables 18 and 19.

Results using financial variables are reported in lines 1-5 of Appendix Table 16. Part A of the table shows the equations fitted to the customary calculated quotas. As shown in the table, the coefficients of these variables enter with a wrong (e.g., negative) sign, and/or are insignificant in terms of hypothesis testing. Similar results are obtained in Part B, which

Table 16. Summary Statistics of Equations Fitted to Calculated and Actual Quotas

(In percent, except as indicated)

	Relative Contribution of Variables 1/					
	GDP (1)	Reserves (2)	Current receipts (3)	Current payments (4)	Vari- ability (5)	New variable (6)
A. Equations fitted to customary calculated quotas						
1(a). Currency denomination of official holdings of foreign exchange reserves	23.0 (42.4)	6.0 (9.7)	13.8 (10.6)	34.9 (23.2)	22.2 (42.6)	0.0 (0.1)
2(a). Currency denomination of of eurocurrency deposits	23.1 (44.7)	5.9 (9.8)	13.7 (10.1)	35.1 (22.0)	22.2 (42.5)	-0.0 (-0.1)
3(a). Currency denomination of international bond issues	23.3 (42.8)	5.9 (10.4)	13.6 (10.4)	35.3 (23.7)	22.2 (42.3)	-0.2 (-0.7)
4(a). Foreign exchange market turnover (applied to trade data)	23.1 (52.4)	6.0 (10.5)	13.8 (10.7)	35.0 (24.1)	22.2 (42.7)	-0.0 (-0.0)
5(a). Currency invoicing of international trade	23.5 (51.1)	5.2 (8.6)	13.4 (10.7)	36.8 (24.2)	21.9 (42.6)	-0.7 (-2.9)
6(a). Normal net capital flows 2/	23.8 (47.7)	6.8 (11.1)	15.3 (11.4)	33.2 (22.3)	22.7 (42.8)	-1.8 (-3.0)
7(a). Real effective exchange 3/ rate variability <u>times</u> current receipts	23.2 (53.8)	6.2 (11.1)	17.4 (10.0)	36.0 (25.5)	22.4 (43.8)	-5.1 (-2.9)
8(a). Financial market accessibility <u>times</u> current payments 4/	23.2 (49.5)	5.1 (8.3)	14.3 (11.4)	32.6 (21.5)	21.3 (39.8)	3.6 (2.7)
9(a). Debt	23.1 (53.9)	6.2 (11.3)	13.7 (11.0)	35.0 (25.5)	22.8 (43.5)	-0.8 (-3.4)
Memorandum:						
Equation using only the traditional variables	23.1 (52.7)	6.0 (10.6)	13.8 (10.8)	35.0 (24.8)	22.2 (42.9)	-- --

Table 16 (concluded). Summary Statistics of Equations Fitted to Calculated and Actual Quotas

(In percent, except as indicated)

	Relative Contribution of Variables 1/					
	GDP (1)	Reserves (2)	Current receipts (3)	Current payments (4)	Vari- ability (5)	New variable (6)
B. Equations fitted to actual quotas						
1(b). Currency denomination of official holdings of foreign exchange reserves	22.9 (5.0)	-13.9 (-2.7)	-47.0 (-4.3)	107.8 (8.6)	32.4 (7.5)	-2.2 (-1.4)
2(b). Currency denomination of of eurocurrency deposits	20.4 (4.7)	-11.9 (-2.3)	-46.1 (-4.0)	105.5 (7.9)	32.9 (7.5)	-0.8 (-0.5)
3(b). Currency denomination of international bond issues	24.0 (5.3)	-11.9 (-2.2)	-48.0 (-4.3)	108.8 (8.9)	31.8 (7.6)	-4.7 (-2.0)
4(b). Foreign exchange market turnover (applied to trade data)	19.5 (5.3)	-10.2 (-2.2)	-46.7 (-4.3)	107.4 (8.9)	32.7 (7.6)	-2.8 (-2.0)
5(b). Currency invoicing of international trade	21.5 (5.5)	-14.6 (-2.8)	-45.5 (-4.3)	110.7 (8.6)	31.3 (7.2)	-3.4 (-1.8)
6(b). Normal net capital flows 2/	29.1 (7.3)	-0.0 (-0.0)	-24.0 (-2.2)	78.5 (6.6)	39.0 (9.2)	-22.6 (-4.9)
7(b). Real effective exchange 3/ rate variability times current receipts	17.3 (6.7)	-5.3 (-1.6)	39.6 (3.8)	112.7 (13.3)	30.4 (10.0)	-94.7 (-11.2)
8(b). Financial market accessibility times current payments 4/	32.3 (7.9)	-27.2 (-5.1)	-34.5 (-3.2)	77.3 (5.9)	26.1 (5.6)	26.0 (6.2)
9(b). Debt	19.4 (5.7)	-12.6 (-2.9)	-40.0 (-4.1)	98.8 (9.1)	27.1 (6.5)	7.4 (3.8)
Memorandum: Equation using only the traditional variables	19.2 (5.2)	-11.0 (-2.3)	-44.2 (-4.1)	102.6 (8.6)	33.2 (7.6)	-- --

1/ The relative contribution is equal to the estimated coefficient applied to the variable, summed over all members and expressed in relation to the total of "estimated" quotas. T-ratios are given in parentheses.

2/ Normal net capital flows (NCF) were proxied by a four-year moving average of actual net private capital flows (inclusive of errors and omissions) (see IMF (1984));

i.e., $NCF_t = [CF_{t+1} + CF_t + CF_{t-1} + CF_{t-2}] / 4.0$, where CF_t is net private capital flows in year t .

3/ Real effective exchange rate variability is defined in terms of the deviation of real effective exchange rate from a normal level, represented by a five-year moving average. Over a sample period of 13 years (1978-90), variability of the real effective exchange rate is calculated as one standard deviation of the data from the normal level thus defined.

4/ Financial market accessibility is proxied by a variable which takes values of 4 for developing countries with limited access to private financial markets, 3 for the rest of developing countries, 2 for industrial countries with easy access to borrowing and 1 for France, Germany, Japan, the United Kingdom, and the United States.

shows the equations fitted to actual quotas. With respect to the criterion of increasing the \bar{R}^2 of the regressions, currency invoicing of foreign trade increases the predictability of the equation for customary calculated quotas, while all of the financial variables except for the currency denomination of eurocurrency deposits increase the explained variance of the equation fitted to actual quotas. However, currency invoicing of foreign trade enters the equation for calculated quotas with a negative sign, as do all of the financial variables in the equation fitted to actual quotas.

The negative coefficients obtained on some of the variables could indicate the presence of multicollinearity problems that arise when the variables in the formulas are highly correlated with each other. ^{1/} As noted in the text, the problem of multicollinearity is apt to be present among the variables used to determine calculated quotas because some of these variables have common underlying (linear) trends. The major undesirable consequence of multicollinearity is that the variances of regression estimates of the parameters based on OLS are quite large. Although OLS parameter estimates remain unbiased, the calculated t-ratios of the parameters are biased. These high variances arise because in the presence of multicollinearity the OLS estimating procedure is not given enough independent variation in a variable to calculate with confidence the effect it has on the dependent variable. As a result, the consequences of this undesirable feature of the sample are indistinguishable from the consequences of inadequate variability of the regressors in a data set. Several criteria exist for detecting multicollinearity, including: (i) insignificant t-ratios on variables that should a priori have an important effect in an equation; (ii) regression results that are changed substantially when an explanatory variable is deleted; and (iii) high correlation coefficients (about 0.8 or 0.9) in absolute value between two independent variables as indicated in the off-diagonal elements of the correlation matrix. ^{2/}

The effects of including the variable representing normal net capital flows are reported on lines 6 of Appendix Table 16 (Parts A and B). The variable appears with a negative sign. Moreover, as shown in text Table 12, Col. (5), the addition of this variable decreases the goodness-of-fit of the equations.

The real exchange-rate-variability regressor is entered as a multiplicative factor applied to each country's current receipts, as the use of the variable by itself would operate only as a shift factor (see the discussion below dealing with the access-to-markets variable). The following index was constructed:

^{1/} A negative sign on a newly-added variable is not, however, a sufficient condition for the existence of multicollinearity.

^{2/} For a discussion of the methods of defeating and dealing with multicollinearity, see D. Belsley, E. Kuh, and R. Welsch, Regression Diagnostics: Identifying Influential Data and Sources of Collinearity, New York, John Wiley, 1980.

$$(1 + \frac{REV}{REA}) \quad (1)$$

where REV is an 11-year moving average of a nation's real effective exchange rate and REA is a nation's average real effective exchange rate. ^{1/} The index was multiplied by each country's current receipts, because to the extent that exchange rate variability has real effects on a nation's economy, the effects are usually considered to operate by way of their influence on a nation's current receipts.

The results of using the exchange-rate-variability regressor are reported in line 7 of Appendix Table 16, Parts A and B, and in text Table 12. As shown in the Appendix table, the variable has a negative and significant coefficient in the equations for both calculated and actual quotas. As shown in text Table 12, the real exchange rate variability variable has little impact on the sum of squared deviations of the equations for actual quotas, while increasing the share of non-oil developing countries in actual quotas.

As noted in the text, the World Bank's data on external debt of the developing countries was used to examine the impact of a nation's external debt. As shown in text Table 12 and Appendix Table 16, the variable has a positive and significant coefficient in the equation for actual quotas and increases the goodness-of-fit of the equation.

2. Financial market accessibility

During the Eighth General Review, it was argued that proportionately larger quotas should be accorded the developing countries that do not have ready access to sources of international liquidity other than their own reserves and the Fund. In order to examine this issue, a variable has been used to measure the effect of members' ability to access capital markets. Four categories of financial market access have been employed in the equations: Group I countries are those industrial countries with unlimited access; Group II are other industrial countries; Group III are developing countries with general access; and Group IV are developing countries with limited access to international capital markets. The countries in each group are listed in Appendix Table 17.

To discern the impact of financial market accessibility, the following equation was fitted to actual quotas (the same equation was fitted to customary calculated quotas):

$$Q = Ax + bG \times CP \quad (2)$$

^{1/} A 12-year moving average was used because the series on real effective rates is available only from 1979.

Table 17. Classification of Countries
According to Access to Capital Markets ^{1/}

<u>Group I</u>	China	St. Vincent	Guyana
France	Columbia	Swaziland	Haiti
Germany	Cyprus	Thailand	Honduras
Japan	Czech & Slovak	Tonga	Iraq
United Kingdom	Republic	Tunisia	Jamaica
United States	Djibouti	Turkey	Jordan
	Dominica	U.S.S.R.	Liberia
	Ethiopia	United Arab	Madagascar
<u>Group II</u>	Fiji	Emirates	Malawi
Australia	Hungary	Vanuatu	Mali
Austria	India	Yugoslavia	Mauritania
Belgium	Indonesia	Zimbabwe	Mexico
Canada	Iran		Morocco
Denmark	Israel	<u>Group IV</u>	Mozambique
Finland	Kenya	Afghanistan	Myanmar
Greece	Kiribati	Antigua & Barbuda	Nicaragua
Iceland	Korea	Argentina	Niger
Ireland	Kuwait	Benin	Nigeria
Italy	Lao, P.D.R.	Bolivia	Panama
Luxembourg	Lebanon	Brazil	Paraguay
Netherlands, The	Lesotho	Burkina Faso	Peru
New Zealand	Libya	Cameroon	Philippines
Norway	Malaysia	Cape Verde	Sao Tome
Portugal	Maldives	Central African	Senegal
San Marino	Malta	Republic	Sierra Leone
Spain	Marshall Islands	Chad	Somalia
Sweden	Mauritius	Chile	South Africa
Switzerland	Micronesia	Comoros	St. Lucia
	Mongolia	Congo	Sudan
<u>Group III</u>	Nambia	Costa Rica	Suriname
Albania	Nepal	Côte d'Ivoire	Syrian Arab
Algeria	Oman	Dominican Republic	Republic
Angola	Pakistan	Ecuador	Tanzania
Bahamas	Papua New Guinea	Egypt	Togo
Bahrain	Poland	El Salvador	Trinidad & Tobago
Bangladesh	Qatar	Equatorial Guinea	Uganda
Barbados	Romania	Gabon	Uruguay
Belize	Rwanda	Gambia, The	Venezuela
Bhutan	Saudi Arabia	Ghana	Viet Nam
Botswana	Seychelles	Grenada	Western Samoa
Bulgaria	Singapore	Guatemala	Yemen, Republic of
Burundi	Solomon Islands	Guinea	Zaire
	Sri Lanka	Guinea-Bissau	Zambia
	St. Kitts & Nevis		

^{1/} Sources: World Economic Outlook, May 1992, p. 102 and data provided by the Research Department.

where Q is actual quotas, X is a regressor matrix that includes the exogenous variables (e.g., GDP, current payments) presently in the quota formulas, CP is current payments, and G is a dummy variable representing access to capital markets; G takes on values of 1, 2, 3, 4, corresponding to Group I, Group II, Group III, and Group IV countries, respectively. As with other regressions, the above equation does not contain a constant term, as this would imply a nonzero quota for a (hypothetical) economy with zero magnitude. The access-to-markets variable is entered as a multiplicative factor applied to each country's current payments as the use of the variable by itself would operate only as a shift factor and would produce distorted results for countries of extremely different size that have the same degree of access to markets.

The incorporation of the access-to-markets variable as a multiplicative factor applied to each country's current payments has the effect of introducing a slope dummy to the current payments variable. In order to show the effect of the access-to-markets variable, consider the regression results on actual quotas reported in Appendix Table 18. The coefficient on the current payments variable in the benchmark equation (row (1)), which is the equation with only the customary variables included, is .047. In effect, this is the average coefficient of variability for Fund members. Equation (8) of the table shows the effect of current payments with the addition of access-to-markets variable. In equation (8), the coefficient of current payments is the sum of two parts: the coefficient on the original current payments variable, which is .032, plus the coefficient of the new variable times the value of the dummy variable. The overall contribution of the current payments variable can be calculated as follows:

Group I countries:	$.032 + (1 \times .010) = .043$
Group II countries:	$.032 + (2 \times .010) = .054$
Group III countries:	$.032 + (3 \times .010) = .065$
Group IV countries:	$.032 + (4 \times .010) = .076$

Therefore, countries with relatively low access-to-markets (Groups III and IV), have been given relatively higher weights with regard to the current payments variable than have countries with higher access.

As shown in Part B of Appendix Table 16, the access-to-markets variable has a positive and significant impact on actual quotas.

3. Regression diagnostic tests

The results of the remaining diagnostic tests can be summarized as follows with respect to the equation for actual quotas (Appendix Table 18):

a. Autocorrelation is a problem in most of the equations for actual quotas, indicating the absence of systematic effects in these equations. The two exceptions are the equations that include real exchange rate variability and market access, respectively. In these equations the DW statistics are close to 2.0. As shown in Col. (13) of the table, these are the only equations that do not exhibit higher order autocorrelation.

Table 18. Regression Results: Actual Quotas

Equation (1)	Dependent variable (2)	Independent Variable						Regression Diagnostics				
		Gross domestic product (3)	Reserves (4)	Current receipts (5)	Current payments (6)	Variability (7)	New variable (8)	Standard error of the equation (SEE) (9)	Durbin-Watson statistic (DW) (10)	Test for Hetero errors (11)	LM test for omitted variables (12)	F-test for serial correlation (13)
Benchmark	AQ	.002 (5.2)	-.024 (2.3)	-.021 (4.1)	.047 (8.6)	.270 (7.6)		492.91	1.27	31.0**		3.27**
1	AQ	.002 (5.0)	-.031 (2.7)	-.022 (4.3)	.049 (8.6)	.266 (7.5)	-29.371 (1.4)	491.29	1.32	33.1**	2.03	3.26**
2	AQ	.002 (4.7)	-.026 (2.3)	-.021 (4.0)	.048 (7.9)	.268 (7.5)	-10.505 (0.5)	494.06	1.29	31.8**	0.28	3.25**
3	AQ	.002 (5.3)	-.026 (2.5)	-.022 (4.4)	.050 (8.5)	.261 (7.3)	-80.477 (2.3)	489.10	1.39	32.3**	3.44*	2.52*
4	AQ	.002 (5.3)	-.022 (2.2)	-.022 (4.4)	.049 (8.9)	.267 (7.6)	-36.67 (2.0)	488.35	1.34	25.4**	3.93*	2.89**
5	AQ	.002 (5.5)	-.033 (2.9)	-.021 (4.2)	.051 (8.6)	.259 (7.2)	-45.41 (1.8)	489.68	1.31	35.1**	3.11*	3.11**
6	AQ	.002 (5.4)	-.027 (2.6)	-.020 (4.0)	.047 (8.7)	.253 (6.7)	44.79 (1.4)	491.76	1.29	25.6**	2.00	3.59**
7	AQ	.002 (6.7)	-.013 (1.6)	.019 (3.8)	.055 (13.3)	.265 (10.0)	-.048 (11.2)	367.11	1.87	6.4**	125.62**	0.82
8	AQ	.002 (7.9)	-.054 (5.1)	-.014 (3.1)	.032 (5.9)	.193 (5.6)	.010 (6.2)	442.93	1.60	58.8**	38.19**	1.70
9	AQ	.002 (5.7)	-.029 (2.9)	-.020 (4.1)	.048 (9.1)	.239 (6.5)	0.11 (3.8)	473.01	1.35	32.8**	14.40**	2.33*
10	AQ	.442 (6.4)	-.051 (1.5)	-.174 (1.3)	.114 (0.8)	.403 (7.8)	.001 (2.7)	0.491	2.04	1.7	7.35**	0.36

Notes to table. AQ is actual quotas. Numbers in parentheses are absolute values of t-ratios, with the standard errors corrected for heteroskedasticity. The symbol * after a number denotes significance at the 5 percent level; the symbol ** denotes significance of the 1 percent level. SEE is the standard error of the equation. DW is the Durbin-Watson statistic. Test for Hetero Errors is an F test for heteroskedastic error terms. LM (Lagrange-Multiplier) Test for omitted variables extends the model by adding and explanatory variable and using an F-test to determine whether the added variable is significant. F-Test for serial correlation is also an Lagrange multiplier test, where the null hypothesis is that there is no autocorrelation; the degree of autocorrelation is assumed to be seven.

b. The F-test for omitted variables (Col. (12)) shows that the addition of three variables is significant in equations for actual quotas at the 1 percent level--debt, real exchange rate variability, and market access. Of these variables, only market access and debt enter the equation with a positive sign.

c. Heteroskedasticity is a problem in all of the equations (Col. (11)). In each case, the null hypotheses of no heteroskedasticity cannot be accepted at the 1 percent level of significance. The major consequence of heteroskedasticity is that the t-ratios on ordinary least squares estimates are biased and, therefore, are not reliable indicators whether a regressor should be included.

d. In order to deal with this problem, the standard errors of the regression coefficients have been corrected using the White procedure. ^{1/} Accordingly, the t-ratios reported in Appendix Table 18 and Appendix Table 19 have been adjusted for heteroskedasticity, and, therefore, could differ from those reported in Appendix Table 16. In most cases, however, the adjusted t-ratios are little changed from the unadjusted t-ratios.

Similar results generally apply to the equations for calculated quotas (Appendix Table 19): (1) four variables (currency invoicing of international trade, real exchange rate variability, debt, and market access) pass the LM test for omitted variables; (2) the market access and debt variables are the only of these variables with positive coefficients; (3) heteroskedasticity is a problem, but less so than in the equations for actual quotas. However, unlike the equations for actual quotas, in the equations for calculated quotas autocorrelation is not a problem. None of the equations for calculated quotas display first-order autocorrelation (Col. (10)) as all of the equations have DW statistics near 2.0. Moreover, none of the equations exhibit higher order autocorrelation as indicated by the low-levels of the F-statistics reported in Col. (13).

As noted, both the equations for actual and calculated quotas display heteroskedasticity. One method of dealing with heteroskedasticity is to estimate the equations in log form. The equations denoted as (10) in Appendix Table 18 and Appendix Table 19 present regression results for actual and calculated quotas when all the variables are entered in log form. In addition to the customary variables, the market access variable has also been included. However, because the variable is in logs, it is already scaled and so it is not multiplied by current payments. As shown in the tables, the market access variable appears with a positive and significant coefficient in the equation for actual quotas, and with a negative and significant coefficient in the equation for calculated quotas. As shown in Col. (11) of the tables, heteroskedasticity is no longer present in the equation for actual quotas but remains significant in the equation for calculated quotas.

^{1/} See H. White, "A Heteroskedasticity-consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity" Econometrica, 1980, pp. 817-838.

Table 19. Regression Results: Calculated Quotas

Equation (1)	Dependent variable (2)	Independent Variable						Regression Diagnostics				
		Gross domestic product (3)	Reserves (4)	Current receipts (5)	Current payments (6)	Variability (7)	New variable (8)	Standard error of the equation (SEE) (9)	Durbin- Watson statistic (DW) (10)	Test for Hetero errors (11)	LM test for omitted variables (12)	F-Test for serial correlation (13)
Benchmark	CC	.007 (52.7)	.044 (10.6)	.022 (10.8)	.054 (24.8)	.611 (42.9)		196.87	1.91	6.00**		1.40
1	CC	.006 (42.4)	.044 (9.7)	.022 (10.6)	.054 (23.2)	.611 (42.6)	0.780 (0.1)	197.50	1.91	5.16**	0.04	1.54
2	CC	.007 (44.7)	.044 (9.8)	.021 (10.1)	.054 (22.0)	.611 (42.5)	-1.046 (0.1)	197.49	1.91	5.31**	0.02	1.53
3	CC	.007 (42.9)	.044 (10.4)	.021 (10.4)	.055 (23.7)	.609 (42.3)	-9.346 (0.7)	197.19	1.92	5.63**	0.49	1.16
4	CC	.007 (52.4)	.044 (10.5)	.022 (10.7)	.054 (24.1)	.611 (42.7)	-0.051 (0.2)	197.51	1.91	7.30**	0.00	1.39
5	CC	.007 (51.1)	0.039 (8.6)	.021 (10.7)	.057 (24.2)	.603 (42.6)	-29.744 (2.9)	192.21	2.00	4.48**	8.65**	0.79
6	CC	.007 (51.7)	.043 (10.1)	.022 (10.9)	.054 (24.4)	.603 (40.2)	18.777 (1.5)	196.12	1.94	4.90**	2.19	1.33
7	CC	.006 (53.7)	.046 (11.1)	.027 (10.0)	.055 (25.5)	.610 (43.8)	- .006 (2.9)	192.47	1.93	5.74**	8.21**	1.12
8	CC	.007 (49.4)	.039 (8.3)	0.023 (11.4)	.051 (21.5)	.596 (39.8)	.002 (2.7)	192.99	1.98	5.02**	7.39**	0.53
9	CC	.007 (53.9)	.047 (11.3)	.021 (11.0)	.054 (25.5)	.625 (43.5)	-.004 (3.4)	190.54	1.83	5.23**	11.53**	1.86
10	CC	.031 (1.4)	.075 (6.6)	.040 (8.6)	-.001 (0.0)	.424 (24.9)	.001 (7.6)	0.16	1.86	3.54**	58.18*	1.72

Note: CC is calculated quotas. See notes to Table 1 for further information.

4. Poverty Index

In considering the inclusion of a poverty index in the quota formulas, it may be noted that the variables normally enter in to the existing formulas in an "additive" manner in that the calculated quota is normally derived as the sum of its various components in the relevant quota formulas. However, the poverty index is not a measure of relative economic size, and it is possible for countries of extremely different economic size to have the same levels of per capita GDP. The inclusion of a poverty index in the customary additive manner in the quota formulas would lead to results in which the impact of the poverty index is disproportionately large for a small country and disproportionately small for a large country with similar poverty levels. It is therefore necessary to use the poverty index in a multiplicative manner to derive "poverty-index-based" calculated quotas. Such a procedure would incorporate the poverty index so that its effect on the calculated quota is in proportion both to a member's relative poverty and its relative economic size.

The construction of a poverty index requires the determination of an average of the per capita GDP data for all members which is used as a benchmark or reference base for making comparisons among members. 1/ The manner in which the poverty index is calculated is shown in Appendix Table 20 and may be summarized as follows:

a. An "average" per capita GDP is calculated; this average represents a "break-even" point in that members whose per capita GDP were higher (lower) than this level of per capita GDP would have illustrative poverty-index-based calculated quotas that are lower (higher) than their customary calculated quotas. 2/

b. The average per capita GDP is used to re-base the data on per capita GDP to derive an index; i.e., the per capita GDP data are divided by the average figure calculated in (i); the re-based per capita GDP data are shown in Col. (2) of Appendix Table 20.

c. The reciprocal of the per capita GDP index data is then calculated, and the result is the poverty index shown in Col. (3) of Appendix Table 20.

1/ A member whose per capita GDP is equal to the base figure is considered to be neither relatively poor nor rich, and taking into account the multiplicative manner whereby the poverty index is to be used, the resulting calculated quota for such a member should not be affected by the use of the poverty index, i.e., the value of the poverty index for such an average-income member is unity.

2/ The break-even per capita GDP is SDR 2,538 which is between those of Iraq and Argentina. This figure is determined by the procedure that has been adopted to constrain the sum of poverty-index-based calculated quotas to the same sum as that of customary calculated quotas.

Table 20. Derivation of the Poverty Index and
Poverty Index-Based Calculated Quotas

MEMBER	PER CAPITA	PER CAPITA	POVERTY INDEX	CUSTOMARY	POVERTY-INDEX
	GDP IN SDRs (1)	GDP, AS AN INDEX 1/ (2)	RECIPROCAL OF COL (2) (3)	QUOTAS IN MILL SDRs (4)	BASED CALCULATED QUOTAS COL.(3)xCOL.(4) (5)
Mozambique	68	0.025	39.695	72.8	2888.68
Tanzania	73	0.027	36.922	131.5	4854.41
Viet Nam	73	0.027	36.919	144.9	5350.92
Ethiopia	90	0.033	29.983	134.0	4019.21
Uganda	90	0.034	29.830	63.7	1900.27
Somalia	92	0.034	29.423	32.8	966.40
Zaire	117	0.043	23.013	301.3	6932.94
Cambodia	124	0.046	21.701	31.7	687.65
Bhutan	133	0.049	20.330	12.4	251.20
Sierra Leone	137	0.051	19.722	28.4	560.20
Nepal	138	0.051	19.562	72.4	1415.32
Bangladesh	145	0.054	18.585	374.1	6952.60
Burundi	150	0.056	17.994	29.9	538.64
Laos	154	0.057	17.516	17.5	306.38
Chad	157	0.058	17.121	40.8	698.01
Malawi	165	0.061	16.313	54.3	886.03
Guinea-Bissau	179	0.066	15.046	8.0	121.06
Nicaragua	188	0.070	14.304	91.4	1307.62
Madagascar	203	0.075	13.295	71.3	948.13
Afghanistan	205	0.076	13.154	108.4	1425.66
Burkina Faso	211	0.078	12.750	72.4	922.85
Nigeria	220	0.082	12.239	2787.1	34112.26
Mali	225	0.084	11.970	66.7	798.82
Niger	239	0.089	11.265	73.2	824.55
China	239	0.089	11.257	6112.2	68801.90
Rwanda	240	0.089	11.240	43.9	493.32
Lesotho	244	0.090	11.058	69.6	769.93
Haiti	244	0.091	11.031	50.8	560.43
Gambia, The	259	0.096	10.391	17.7	183.93
India	260	0.097	10.344	3904.7	40389.23
Mongolia	265	0.098	10.185	71.1	723.85
Kenya	269	0.100	10.033	257.8	2586.03
Guyana	277	0.103	9.719	47.8	464.95
Equatorial Guin	278	0.103	9.684	5.8	56.51
Pakistan	284	0.106	9.472	891.6	8445.17
Ghana	286	0.106	9.419	152.4	1435.54
Benin	287	0.106	9.391	72.4	679.85
Sao Tome	293	0.109	9.194	4.1	37.58
Central African Re	318	0.118	8.471	34.9	295.63
Comoros	327	0.121	8.246	9.2	75.97
Togo	342	0.127	7.890	92.4	729.18

Table 20 (continued). Derivation of the Poverty Index and Poverty Index-Based Calculated Quotas

MEMBER	PER CAPITA	PER CAPITA	POVERTY INDEX	CUSTOMARY	POVERTY-INDEX
	GDP	GDP, AS AN	RECIPROCAL	QUOTAS IN	BASED CALCULATED
	IN SDRs	INDEX 1/	OF COL (2)	MILL SDRs	COL.(3)xCOL.(4)
	(1)	(2)	(3)	(4)	(5)
Sri Lanka	348	0.129	7.734	296.3	2291.85
Kiribati	358	0.133	7.527	10.9	82.00
Sudan	361	0.134	7.472	212.4	1587.12
Mauritania	372	0.138	7.243	62.6	453.25
Guinea	384	0.143	7.009	78.0	546.57
Myanmar	386	0.143	6.983	214.5	1497.67
Yemen, Rep. of	387	0.144	6.955	293.5	2041.34
Zambia	389	0.144	6.925	177.2	1226.83
Solomon Islands	424	0.158	6.348	16.4	104.02
Liberia	430	0.159	6.273	62.7	393.58
Indonesia	436	0.162	6.176	3417.1	21103.30
Albania	447	0.166	6.025	51.4	309.61
Egypt	472	0.175	5.714	1559.6	8911.76
Maldives	485	0.180	5.556	15.1	84.06
Zimbabwe	488	0.181	5.526	215.9	1192.91
Bolivia	494	0.183	5.458	131.1	715.76
Western Samoa	529	0.196	5.097	12.4	63.34
Philippines	530	0.197	5.083	1174.3	5968.80
Senegal	587	0.218	4.590	156.4	717.98
Guatemala	598	0.222	4.505	197.9	891.44
Cote d'Ivoire	608	0.225	4.435	429.0	1902.78
Papua New Guinea	642	0.238	4.199	195.4	820.52
Bulgaria	652	0.242	4.133	1451.3	5998.33
Angola	691	0.256	3.900	418.3	1631.19
Cameroon	715	0.265	3.769	325.8	1228.12
Jordan	723	0.268	3.725	455.8	1698.04
Ecuador	727	0.270	3.708	455.1	1687.70
Dominican Rep.	738	0.274	3.653	250.3	914.26
Vanuatu	751	0.279	3.586	14.4	51.51
Cape Verde	755	0.280	3.571	14.3	50.92
El Salvador	760	0.282	3.545	150.6	533.90
Djibouti	763	0.283	3.531	22.7	80.32
Morocco	764	0.283	3.529	631.2	2227.29
Lebanon	775	0.288	3.478	474.5	1649.97
Swaziland	815	0.302	3.306	80.0	264.40
Columbia	900	0.334	2.994	1002.2	3000.38
Honduras	904	0.336	2.979	128.7	383.53
Paraguay	915	0.339	2.946	154.7	455.65
Congo	922	0.342	2.923	205.0	599.29
Tonga	993	0.369	2.713	8.1	22.06
Marshall Island	1,018	0.378	2.647	6.5	17.12

Table 20 (continued). Derivation of the Poverty Index and Poverty Index-Based Calculated Quotas

MEMBER	PER CAPITA	PER CAPITA	POVERTY INDEX	CUSTOMARY	POVERTY-INDEX
	GDP	GDP, AS AN	RECIPROCAL	QUOTAS IN	BASED CALCULATED
	IN SDRs	INDEX 1/	OF COL (2)	MILL SDRs	COL.(3)xCOL.(4)
	(1)	(2)	(3)	(4)	(5)
Thailand	1,072	0.398	2.514	4220.6	10609.16
Nambia	1,118	0.415	2.410	170.0	409.84
Tunisia	1,143	0.424	2.358	522.2	1231.24
Micronesia	1,164	0.432	2.315	9.4	21.83
Romania	1,195	0.443	2.255	1298.6	2928.04
Poland	1,204	0.447	2.238	1734.7	3882.66
Jamaica	1,210	0.449	2.227	216.5	482.22
St. Vincent	1,219	0.452	2.210	16.8	37.22
Fiji	1,239	0.460	2.174	83.2	180.83
Peru	1,247	0.463	2.162	605.8	1309.53
Costa Rica	1,330	0.494	2.025	210.7	426.85
Belize	1,422	0.528	1.895	23.1	43.76
Turkey	1,427	0.530	1.888	2356.0	4448.64
Syrian Arab Rep	1,454	0.540	1.854	732.8	1358.21
Dominica	1,465	0.544	1.839	10.2	18.77
Chile	1,555	0.577	1.732	1014.6	1757.75
Panama	1,669	0.619	1.615	485.2	783.43
Mauritius	1,756	0.652	1.534	150.5	230.89
Malaysia	1,759	0.653	1.532	3028.7	4640.57
Algeria	1,765	0.655	1.527	1853.2	2829.51
Venezuela	1,853	0.688	1.454	2753.6	4004.09
Grenada	1,865	0.692	1.445	13.0	18.84
St. Lucia	1,918	0.712	1.405	26.1	36.65
Brazil	1,954	0.725	1.379	5596.8	7716.13
Uruguay	1,969	0.731	1.368	227.5	311.28
Botswana	1,977	0.734	1.363	285.4	389.09
Mexico	2,057	0.764	1.310	4908.3	6428.35
Czech & Slovak Rep	2,127	0.789	1.267	1504.2	1905.59
South Africa	2,134	0.792	1.262	2933.0	3702.94
FSU	2,237	0.830	1.205	11342.3	13663.23
Hungary	2,341	0.869	1.151	909.6	1047.10
Argentina	2,373	0.881	1.136	1719.8	1953.23
Iraq	2,572	0.955	1.048	3006.2	3149.14
St. Kitts & Nevis	2,870	1.065	0.939	10.8	10.12
Suriname	2,943	1.092	0.916	68.7	62.90
Former Yugoslavia	3,001	1.114	0.898	2700.4	2424.47
Trinidad & Tob	3,043	1.129	0.885	344.4	304.96
Gabon	3,458	1.283	0.779	319.9	249.29
Antigua & Barbu.	3,694	1.371	0.730	41.8	30.51
Seychelles	3,931	1.459	0.685	21.3	14.57
Korea	4,196	1.557	0.642	6435.9	4133.17

Table 20 (concluded). Derivation of the Poverty Index and Poverty Index-Based Calculated Quotas

MEMBER	PER CAPITA GDP IN SDRs (1)	PER CAPITA GDP, AS AN INDEX 1/ (2)	POVERTY INDEX RECIPROCAL OF COL (2) (3)	CUSTOMARY CALCULATED QUOTAS IN MILL SDRs (4)	POVERTY-INDEX BASED CALCULATED QUOTAS COL.(3)xCOL.(4) (5)
Portugal	4,485	1.664	0.601	2096.7	1259.81
Oman	4,627	1.717	0.582	707.5	412.00
Greece	4,856	1.802	0.555	1612.2	894.58
Malta	4,878	1.810	0.552	201.3	111.17
Barbados	4,969	1.844	0.542	118.8	64.41
Libya	5,035	1.868	0.535	1879.4	1005.87
Saudi Arabia	5,121	1.901	0.526	11121.2	5851.66
Cyprus	5,792	2.150	0.465	230.6	107.28
Bahrain	5,944	2.206	0.453	352.4	159.76
Kuwait	6,388	2.371	0.422	2668.5	1125.64
Iran	7,270	2.698	0.371	5528.5	2049.04
Bahamas	7,430	2.758	0.363	187.9	68.16
Israel	8,217	3.049	0.328	1819.4	596.65
Singapore	8,631	3.203	0.312	5632.7	1758.53
Ireland	9,075	3.368	0.297	2318.9	688.49
Spain	9,303	3.452	0.290	8895.4	2576.59
New Zealand	9,464	3.512	0.285	1161.1	330.58
Qatar	11,071	4.109	0.243	480.2	116.87
United Kingdom	12,610	4.680	0.214	23895.3	5105.88
Australia	12,664	4.700	0.213	5952.2	1266.43
Netherlands	13,762	5.108	0.196	11487.2	2249.08
Italy	13,994	5.194	0.193	19767.9	3806.23
Belgium	14,741	5.471	0.183	9882.6	1806.42
Austria	14,926	5.539	0.181	5043.5	910.48
France	15,490	5.749	0.174	23702.7	4123.20
Canada	15,872	5.890	0.170	15570.4	2643.32
San Marino	15,925	5.910	0.169	58.4	9.89
United States	16,286	6.044	0.165	79551.4	13161.94
United Arab Emirat	16,291	6.046	0.165	2185.1	361.43
Luxembourg	16,919	6.279	0.159	1382.9	220.23
Germany	17,516	6.501	0.154	34370.7	5287.28
Japan	17,542	6.510	0.154	40639.5	6242.29
Iceland	17,747	6.586	0.152	189.7	28.80
Norway	18,374	6.819	0.147	4509.4	661.30
Denmark	18,941	7.029	0.142	3907.9	555.94
Sweden	19,590	7.270	0.138	5882.8	809.13
Finland	20,315	7.540	0.133	3030.1	401.90
Switzerland	24,828	9.214	0.109	6720.2	729.32
	572,537			440,543.4	440,543.4

The calculated quotas as adjusted by the poverty index are shown in Cols. (5) of Appendix Table 20 as poverty-index-based calculated quotas. As can be seen from the table, the totals of the customary and poverty-index-based calculated quotas are the same.

In conducting statistical simulations using the poverty index, a log-linear estimating equation was suggested because of the need to apply the index in a multiplicative manner on the customary calculations, as indicated earlier. The following equation was used:

$$\log Q = k + a \log CQ + b \log I \quad (3)$$

where Q is the quota distribution to be approximated, k is a constant, CQ is the present set of calculated quotas, and I is the poverty index; and a and b are coefficients that are to be estimated. The estimating equation has the property that the partial elasticity of Q with respect to the poverty index is equal to b. For example, if b were equal to 0.1, a 10 percent increase in the poverty index implies a 1 percent rise in the member's calculated quota. Thus, the estimating equation assumes that the marginal influence of the poverty index is constant across countries.

An approach to incorporating a poverty index suggested at the July 1987 discussion of the Committee of the Whole has also been followed and the results are shown in Cols. (4-7) of text Table 11 and Appendix Table 20. Under this alternative approach, the poverty-index-based calculated quota (the customary calculated quota multiplied by the poverty index) and the customary calculated quota are combined, i.e., averaged, to derive a new calculated quota. A simple average would assign a 50 percent weight to either type of calculated quota, or the weights could reflect greater or lesser emphasis to the poverty index relative to that for the traditional economic variables used in the quota formulas. Columns 4-7 of the text Table 11 and Appendix Table 20 illustrate the effect of weights given to the poverty index in the range of 5 percent to 50 percent.

Table 21. Illustrative Percentage Shares in Calculated Quotas
Based on Alternative Quota Calculations

(Ranked according to present quota shares)

	CUSTOMARY CALCULATED QUOTAS		ALTERNATIVE QUOTA CALCULATION BASED ON TENTH REVIEW DATA							
						REAL EFFECTIVE		VARIABILITY	VARIABILITY	GOLD
	NINTH	TENTH	FIVE YEAR	THREE YEAR	PPP	EXCHANGE RATE		REDEFINED AS	COEFFICIENT	VALUED AT
	REVIEW	REVIEW	SAMPLE	SAMPLE	SAMPLE	BASED GDP		MEAN ABSOLUTE	REDUCED BY	MARKET
	(1)	(2)	FOR GDP	FOR GDP	FOR GDP	1980	1985	DEVIATION	20 PERCENT	PRICE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
United States	18.163	18.058	17.879	17.983	16.571	17.477	20.228	17.182	8.346	18.184
Japan	5.643	9.225	9.132	9.374	7.248	8.442	8.576	9.304	9.393	9.124
Germany	5.643	7.802	7.737	7.719	7.444	7.837	7.403	8.357	7.952	7.852
France	5.077	5.380	5.266	5.284	4.905	5.470	5.039	5.307	5.478	5.436
United Kingdom	5.077	5.424	5.407	5.416	5.211	5.472	5.272	5.385	5.500	5.375
FSU	4.682	2.575	2.510	2.501	3.877	3.330	2.730	2.632	2.629	2.536
Saudi Arabia	3.513	2.524	2.634	2.592	2.484	2.444	2.444	2.755	2.261	2.498
Italy	3.143	4.487	4.295	4.350	3.996	4.051	4.035	4.461	4.584	4.527
Canada	2.958	3.534	3.574	3.567	3.443	3.497	3.530	3.617	3.401	3.505
Netherlands	2.358	2.608	2.713	2.663	2.803	2.572	2.618	2.622	2.650	2.659
China	2.318	1.387	1.416	1.447	2.815	2.347	1.773	1.399	1.410	1.367
Belgium	2.124	2.243	2.378	2.315	2.536	2.183	2.327	2.270	2.276	2.276
India	2.092	0.886	0.880	0.885	1.501	1.109	1.101	0.864	0.905	0.889
Switzerland	1.692	1.525	1.549	1.533	1.531	1.501	1.497	1.703	1.560	1.657
Australia	1.598	1.351	1.355	1.352	1.310	1.351	1.329	1.312	1.369	1.343
Brazil	1.486	1.270	1.291	1.285	1.625	1.318	1.247	1.211	1.273	1.258
Venezuela	1.336	0.625	0.637	0.631	0.620	0.626	0.619	0.570	0.576	0.635
Spain	1.325	2.019	1.896	1.937	1.782	1.940	1.781	2.047	2.067	2.014
Mexico	1.201	1.114	1.131	1.119	1.330	1.191	1.128	1.077	1.067	1.099
Sweden	1.105	1.335	1.338	1.333	1.330	1.333	1.285	1.432	1.364	1.326
Argentina	1.052	0.390	0.388	0.383	0.411	0.571	0.385	0.369	0.391	0.391
Indonesia	1.025	0.776	0.790	0.782	1.013	0.797	0.784	0.723	0.737	0.769
South Africa	0.935	0.666	0.679	0.672	0.707	0.669	0.660	0.586	0.637	0.663
Nigeria	0.878	0.633	0.645	0.640	0.631	0.658	0.660	0.544	0.565	0.624
Austria	0.814	1.145	1.169	1.155	1.195	1.132	1.132	1.252	1.166	1.166
Norway	0.756	1.024	1.037	1.029	1.008	1.024	1.016	0.998	0.984	1.005
Iran	0.738	1.255	1.009	1.094	0.750	0.754	0.805	1.200	1.256	1.244
Denmark	0.733	0.887	0.900	0.892	0.927	0.877	0.868	0.955	0.907	0.877
Kuwait	0.681	0.606	0.600	0.594	0.563	0.603	0.551	0.561	0.545	0.600
Poland	0.677	0.394	0.404	0.400	0.500	0.392	0.391	0.377	0.382	0.386
Former Yugoslavia	0.629	0.613	0.624	0.617	0.610	0.614	0.606	0.576	0.599	0.607
Algeria	0.626	0.421	0.430	0.425	0.436	0.420	0.418	0.413	0.394	0.423
Iraq	0.592	0.682	0.696	0.689	0.679	0.680	0.678	0.579	0.615	0.672
Finland	0.590	0.688	0.673	0.679	0.644	0.651	0.643	0.716	0.701	0.681
Czech & Slovak Rep	0.580	0.341	0.352	0.347	0.412	0.361	0.350	0.355	0.349	0.336
Malaysia	0.570	0.687	0.699	0.693	0.668	0.668	0.665	0.654	0.647	0.679
Libya	0.560	0.427	0.439	0.433	0.431	0.425	0.424	0.395	0.387	0.426

Table 21 (continued). Illustrative Percentage Shares
in Calculated Quotas Based on Alternative Quota Calculations

(Ranked according to present quota shares)

	CUSTOMARY CALCULATED QUOTAS		ALTERNATIVE QUOTA CALCULATION BASED ON TENTH REVIEW DATA							
			FIVE YEAR		PPP	REAL EFFECTIVE		VARIABILITY	VARIABILITY	GOLD
	NINTH	TENTH	SAMPLE	SAMPLE	SAMPLE	EXCHANGE RATE		REDEFINED AS	COEFFICIENT	VALUED AT
	REVIEW	REVIEW	FOR GDP	FOR GDP	FOR GDP	1980	1985	MEAN ABSOLUTE DEVIATION	REDUCED BY 20 PERCENT	MARKET PRICE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Qatar	0.130	0.109	0.113	0.111	0.110	0.109	0.108	0.120	0.099	0.109
Myanmar	0.127	0.049	0.037	0.041	0.048	0.029	0.028	0.047	0.050	0.048
Yemen, Rep. of	0.121	0.067	0.068	0.067	0.069	0.066	0.066	0.063	0.064	0.066
Dominican Rep.	0.109	0.057	0.057	0.057	0.061	0.059	0.057	0.053	0.054	0.056
Guatemala	0.105	0.045	0.046	0.046	0.059	0.050	0.060	0.040	0.044	0.045
Panama	0.102	0.110	0.113	0.112	0.107	0.109	0.107	0.145	0.102	0.109
Tanzania	0.101	0.030	0.030	0.030	0.041	0.037	0.040	0.028	0.030	0.029
Lebanon	0.100	0.108	0.114	0.108	0.099	0.107	0.107	0.114	0.099	0.123
Luxembourg	0.093	0.314	0.357	0.338	0.319	0.311	0.348	0.325	0.313	0.310
Cameroon	0.093	0.074	0.076	0.075	0.076	0.075	0.074	0.072	0.071	0.073
Uganda	0.092	0.014	0.015	0.015	0.025	0.051	0.015	0.014	0.014	0.014
Bolivia	0.086	0.030	0.031	0.030	0.036	0.034	0.036	0.029	0.029	0.031
El Salvador	0.086	0.034	0.035	0.034	0.036	0.034	0.037	0.034	0.033	0.034
Jordan	0.083	0.103	0.096	0.099	0.098	0.093	0.093	0.107	0.103	0.104
Afghanistan	0.082	0.025	0.025	0.025	0.032	0.025	0.024	0.027	0.024	0.026
Oman	0.082	0.161	0.166	0.164	0.157	0.157	0.156	0.156	0.149	0.159
Costa Rica	0.081	0.048	0.049	0.048	0.051	0.050	0.049	0.045	0.046	0.047
Senegal	0.081	0.036	0.036	0.035	0.039	0.035	0.035	0.034	0.036	0.035
Gabon	0.076	0.073	0.076	0.074	0.073	0.072	0.072	0.062	0.068	0.072
Cyprus	0.068	0.052	0.055	0.053	0.052	0.052	0.052	0.058	0.053	0.052
Nambia	0.068	0.039	0.039	0.039	0.029	0.038	0.039	0.032	0.036	0.038
Ethiopia	0.067	0.030	0.031	0.031	0.045	0.031	0.033	0.030	0.029	0.030
Liberia	0.066	0.014	0.014	0.014	0.015	0.014	0.014	0.013	0.013	0.014
Nicaragua	0.066	0.021	0.022	0.021	0.024	0.022	0.023	0.019	0.019	0.020
Papua New Guinea	0.065	0.044	0.045	0.044	0.043	0.042	0.043	0.042	0.045	0.044
Honduras	0.065	0.029	0.029	0.029	0.029	0.028	0.029	0.028	0.030	0.029
Bahamas	0.065	0.043	0.044	0.043	0.043	0.042	0.042	0.044	0.043	0.042
Madagascar	0.062	0.016	0.016	0.016	0.023	0.019	0.017	0.015	0.016	0.016
Iceland	0.058	0.043	0.044	0.043	0.043	0.043	0.042	0.045	0.044	0.043
Mozambique	0.058	0.017	0.017	0.017	0.029	0.016	0.023	0.019	0.017	0.016
Bahrain	0.057	0.080	0.082	0.081	0.080	0.078	0.077	0.082	0.076	0.074
Guinea	0.054	0.018	0.018	0.018	0.018	0.018	0.017	0.017	0.018	0.017
Sierra Leone	0.053	0.006	0.007	0.007	0.009	0.007	0.007	0.006	0.006	0.006
Mauritius	0.050	0.034	0.036	0.035	0.034	0.033	0.034	0.037	0.035	0.034
Paraguay	0.049	0.035	0.036	0.036	0.037	0.036	0.036	0.030	0.034	0.035
Mali	0.047	0.015	0.015	0.015	0.018	0.015	0.015	0.014	0.015	0.015
Suriname	0.046	0.016	0.016	0.016	0.016	0.016	0.016	0.015	0.015	0.015

Table 21 (continued). Illustrative Percentage Shares
in Calculated Quotas Based on Alternative Quota Calculations

(Ranked according to present quota shares)

	CUSTOMARY CALCULATED QUOTAS		ALTERNATIVE QUOTA CALCULATION BASED ON TENTH REVIEW DATA							
			FIVE YEAR SAMPLE FOR GDP (3)	THREE YEAR SAMPLE FOR GDP (4)	PPP SAMPLE FOR GDP (5)	REAL EFFECTIVE		VARIABILITY	VARIABILITY	GOLD
	EXCHANGE RATE					REDEFINED AS	COEFFICIENT	VALUED AT		
	BASED GDP	MEAN ABSOLUTE				REDUCED BY	MARKET			
	NINTH REVIEW (1)	TENTH REVIEW (2)				1980 (6)	1985 (7)	DEVIATION (8)	20 PERCENT (9)	PRICE (10)
Korea	0.547	1.461	1.458	1.465	1.456	1.447	1.448	1.661	1.424	1.432
Pakistan	0.519	0.202	0.202	0.202	0.411	0.234	0.234	0.216	0.205	0.203
Hungary	0.517	0.206	0.209	0.207	0.233	0.212	0.208	0.231	0.209	0.203
Romania	0.516	0.295	0.300	0.297	0.298	0.294	0.298	0.279	0.281	0.290
Egypt	0.465	0.354	0.361	0.358	0.407	0.352	0.393	0.378	0.336	0.352
Israel	0.456	0.413	0.423	0.417	0.412	0.409	0.407	0.422	0.420	0.408
New Zealand	0.445	0.264	0.268	0.267	0.257	0.262	0.256	0.273	0.268	0.260
Turkey	0.440	0.535	0.544	0.541	0.645	0.579	0.531	0.556	0.523	0.533
Philippines	0.434	0.267	0.269	0.268	0.360	0.283	0.281	0.269	0.265	0.268
Chile	0.426	0.230	0.235	0.233	0.250	0.248	0.230	0.218	0.226	0.230
Greece	0.402	0.366	0.362	0.363	0.359	0.371	0.351	0.358	0.371	0.366
Thailand	0.393	0.958	0.989	0.972	0.965	0.958	0.952	0.952	0.889	0.948
Columbia	0.384	0.227	0.233	0.230	0.321	0.257	0.250	0.214	0.223	0.225
Portugal	0.382	0.476	0.483	0.475	0.471	0.466	0.471	0.514	0.477	0.499
Ireland	0.359	0.526	0.560	0.544	0.609	0.524	0.529	0.567	0.535	0.519
Peru	0.319	0.138	0.144	0.142	0.158	0.130	0.127	0.130	0.138	0.139
Bulgaria	0.318	0.329	0.275	0.269	0.291	0.326	0.325	0.345	0.324	0.324
Mcrocco	0.293	0.143	0.143	0.143	0.178	0.160	0.139	0.150	0.146	0.142
Zaire	0.270	0.068	0.070	0.070	0.101	0.071	0.069	0.058	0.064	0.067
Bangladesh	0.269	0.085	0.085	0.086	0.179	0.091	0.097	0.085	0.087	0.084
United Arab Emirate	0.268	0.496	0.516	0.507	0.506	0.490	0.489	0.468	0.454	0.490
Zambia	0.249	0.040	0.041	0.041	0.040	0.041	0.040	0.037	0.038	0.040
Singapore	0.245	1.279	1.492	1.381	1.162	1.306	1.189	1.287	1.278	1.259
Sri Lanka	0.208	0.067	0.068	0.068	0.097	0.067	0.068	0.067	0.064	0.066
Ghana	0.188	0.035	0.035	0.035	0.062	0.064	0.041	0.034	0.034	0.034
Zimbabwe	0.179	0.049	0.057	0.061	0.053	0.051	0.049	0.049	0.047	0.049
Trinidad & Tob	0.169	0.078	0.080	0.080	0.077	0.077	0.077	0.077	0.072	0.077
Viet Nam	0.165	0.033	0.054	0.043	0.115	0.033	0.032	0.033	0.033	0.032
Cote d'Ivoire	0.163	0.097	0.100	0.099	0.100	0.097	0.097	0.091	0.093	0.095
Sudan	0.160	0.048	0.049	0.048	0.062	0.048	0.048	0.041	0.045	0.047
Uruguay	0.154	0.052	0.053	0.052	0.057	0.058	0.051	0.050	0.050	0.055
Ecuador	0.150	0.103	0.106	0.105	0.108	0.106	0.107	0.096	0.098	0.103
Syrian Arab Rep	0.144	0.166	0.170	0.169	0.179	0.167	0.168	0.138	0.151	0.165
Angola	0.142	0.095	0.100	0.097	0.096	0.095	0.094	0.085	0.089	0.094
Tunisia	0.141	0.119	0.120	0.119	0.123	0.122	0.120	0.121	0.114	0.117
Jamaica	0.138	0.049	0.051	0.050	0.048	0.049	0.050	0.048	0.049	0.048
Kenya	0.137	0.059	0.060	0.059	0.073	0.065	0.061	0.053	0.056	0.057

(Ranked according to present quota shares)

	CUSTOMARY CALCULATED QUOTAS		ALTERNATIVE QUOTA CALCULATION BASED ON TENTH REVIEW DATA							
						REAL EFFECTIVE		VARIABILITY	VARIABILITY	GOLD
	NINTH	TENTH	FIVE YEAR	THREE YEAR	PPP	EXCHANGE RATE		REDEFINED AS	COEFFICIENT	VALUED AT
	REVIEW	REVIEW	SAMPLE	SAMPLE	SAMPLE	BASED	GDP	MEAN ABSOLUTE	REDUCED BY	MARKET
	(1)	(2)	FOR GDP	FOR GDP	FOR GDP	1980	1985	DEVIATION	20 PERCENT	PRICE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Malta	0.046	0.046	0.050	0.048	0.045	0.044	0.046	0.046	0.046	0.045
Guyana	0.046	0.011	0.011	0.011	0.010	0.010	0.010	0.010	0.011	0.011
Somalia	0.042	0.007	0.008	0.008	0.012	0.007	0.007	0.007	0.008	0.007
Haiti	0.042	0.012	0.012	0.012	0.018	0.011	0.013	0.012	0.012	0.011
Rwanda	0.041	0.010	0.010	0.010	0.013	0.010	0.011	0.009	0.010	0.010
Congo	0.040	0.047	0.048	0.048	0.046	0.046	0.046	0.044	0.043	0.046
Burundi	0.039	0.007	0.007	0.007	0.010	0.008	0.008	0.006	0.007	0.007
Togo	0.037	0.021	0.022	0.021	0.021	0.021	0.021	0.018	0.020	0.021
Nepal	0.036	0.016	0.017	0.016	0.040	0.019	0.019	0.016	0.017	0.016
Fiji	0.035	0.019	0.019	0.019	0.019	0.019	0.019	0.016	0.018	0.018
Malawi	0.035	0.012	0.013	0.012	0.015	0.013	0.012	0.011	0.012	0.012
Cambodia	0.034	0.007	0.014	0.011	0.005	0.007	0.007	0.006	0.007	0.007
Barbados	0.033	0.027	0.028	0.027	0.027	0.027	0.027	0.025	0.025	0.027
Niger	0.033	0.017	0.017	0.017	0.018	0.017	0.017	0.016	0.016	0.016
Mauritania	0.033	0.014	0.015	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Benin	0.031	0.016	0.017	0.017	0.017	0.016	0.016	0.014	0.015	0.016
Burkina Faso	0.030	0.016	0.017	0.017	0.019	0.016	0.016	0.014	0.016	0.016
Chad	0.028	0.009	0.009	0.009	0.010	0.009	0.009	0.009	0.009	0.009
Central African Rep	0.028	0.008	0.008	0.008	0.010	0.008	0.008	0.008	0.008	0.008
Laos	0.027	0.004	0.004	0.004	0.007	0.004	0.004	0.004	0.004	0.004
Mongolia	0.025	0.016	0.017	0.016	0.018	0.016	0.016	0.023	0.016	0.016
Botswana	0.025	0.065	0.069	0.067	0.064	0.065	0.067	0.062	0.063	0.064
Swaziland	0.025	0.018	0.020	0.019	0.018	0.018	0.018	0.019	0.018	0.018
Albania	0.024	0.012	0.012	0.012	0.012	0.012	0.012	0.011	0.011	0.011
Equatorial Guin	0.017	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Lesotho	0.016	0.016	0.018	0.017	0.016	0.015	0.016	0.016	0.016	0.016
Gambia, The	0.016	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Belize	0.009	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Vanuatu	0.009	0.003	0.003	0.003	0.008	0.003	0.003	0.003	0.003	0.003
Djibouti	0.008	0.005	0.005	0.005	0.010	0.005	0.005	0.005	0.005	0.005
St. Lucia	0.008	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.006	0.006
Guinea-Bissau	0.007	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
San Marino	0.007	0.013	0.015	0.014	0.013	0.013	0.013	0.015	0.013	0.013
Antigua & Barbu.	0.006	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009
Western Samoa	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Grenada	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Solomon Islands	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004

(Ranked according to present quota shares)

[illegible]

Table 22. Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
PRESENT CALCULATED QUOTAS (1)	EXCHANGE RESERVES (2)	EURO- CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY	(REAL (FINANCIAL	CAPITAL ACCOUNT TRAN- SACTION (7)	EFFECTIVE EXCHANGE RATE) x (CUR) (8)	MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	MEMO: PRESENT QUOTAS (11)
					INVOICING	OF INTER-					
					NATIONAL	TRADE					
United States	18.058	18.094	18.089	18.054	18.061	18.020	18.037	18.015	17.985	18.182	18.161
Japan	9.225	9.235	9.234	9.230	9.222	9.237	9.184	9.187	9.191	9.301	5.642
Germany	7.802	7.935	7.927	7.889	7.904	7.836	7.868	7.864	7.837	7.940	5.642
France	5.380	5.436	5.439	5.455	5.456	5.453	5.498	5.440	5.422	5.484	5.076
United Kingdom	5.424	5.594	5.597	5.598	5.574	5.605	5.563	5.592	5.560	5.643	5.076
FSU	2.575	2.464	2.469	2.482	2.479	2.491	2.537	2.567	2.524	2.488	4.681
Saudi Arabia	2.524	2.492	2.491	2.483	2.486	2.472	2.488	2.477	2.459	2.536	3.513
Italy	4.487	4.516	4.516	4.527	4.529	4.518	4.544	4.522	4.525	4.558	3.143
Canada	3.534	3.563	3.564	3.576	3.578	3.597	3.518	3.566	3.588	3.606	2.958
Netherlands	2.608	2.475	2.472	2.476	2.476	2.489	2.476	2.467	2.490	2.490	2.358
China	1.387	1.457	1.457	1.459	1.459	1.456	1.489	1.456	1.462	1.437	2.318
Belgium	2.243	2.049	2.049	2.055	2.054	2.067	2.057	2.046	2.067	2.065	2.124
India	0.886	0.828	0.829	0.839	0.837	0.845	0.812	0.835	0.853	0.793	2.092
Switzerland	1.525	1.516	1.526	1.493	1.500	1.509	1.512	1.508	1.505	1.521	1.691
Australia	1.351	1.433	1.433	1.436	1.434	1.443	1.391	1.437	1.435	1.451	1.597
Brazil	1.270	1.395	1.396	1.402	1.401	1.403	1.393	1.395	1.420	1.337	1.486
Venezuela	0.625	0.639	0.639	0.636	0.637	0.634	0.641	0.634	0.637	0.626	1.336
Spain	2.019	2.049	2.047	2.048	2.050	2.045	2.016	2.051	2.032	2.067	1.325
Mexico	1.114	1.228	1.229	1.232	1.232	1.233	1.223	1.224	1.250	1.180	1.200
Sweden	1.335	1.317	1.318	1.323	1.321	1.328	1.319	1.318	1.327	1.328	1.105
Argentina	0.390	0.440	0.440	0.442	0.442	0.442	0.439	0.439	0.448	0.405	1.052
Indonesia	0.776	0.807	0.807	0.808	0.808	0.807	0.806	0.804	0.810	0.772	1.025
South Africa	0.666	0.678	0.678	0.680	0.680	0.681	0.682	0.674	0.694	0.686	0.935
Nigeria	0.633	0.647	0.647	0.644	0.645	0.641	0.640	0.640	0.641	0.634	0.877
Austria	1.145	1.117	1.117	1.121	1.122	1.127	1.136	1.118	1.126	1.126	0.814
Norway	1.024	1.007	1.007	1.006	1.007	1.006	1.020	1.006	1.000	1.018	0.756
Iran	1.255	1.285	1.287	1.297	1.294	1.297	1.314	1.289	1.299	1.302	0.738
Denmark	0.887	0.858	0.858	0.862	0.859	0.866	0.870	0.860	0.865	0.865	0.732
Kuwait	0.606	0.515	0.515	0.512	0.513	0.509	0.519	0.527	0.510	0.522	0.681
Poland	0.394	0.399	0.399	0.400	0.400	0.401	0.400	0.415	0.404	0.370	0.677
Former Yugoslavia	0.613	0.630	0.630	0.630	0.631	0.630	0.643	0.654	0.635	0.623	0.629
Algeria	0.421	0.440	0.440	0.441	0.441	0.442	0.446	0.439	0.443	0.429	0.626
Iraq	0.682	0.732	0.732	0.732	0.732	0.730	0.744	0.740	0.731	0.746	0.592
Finland	0.688	0.700	0.700	0.703	0.702	0.705	0.688	0.702	0.703	0.707	0.590
Czech & Slovak Rep	0.341	0.320	0.320	0.322	0.322	0.324	0.323	0.338	0.330	0.317	0.580
Malaysia	0.687	0.641	0.640	0.638	0.639	0.636	0.647	0.637	0.638	0.634	0.570
Libya	0.427	0.453	0.452	0.450	0.451	0.447	0.462	0.458	0.444	0.460	0.560
Korea	1.461	1.488	1.488	1.490	1.491	1.492	1.520	1.483	1.508	1.478	0.547
Pakistan	0.202	0.205	0.206	0.207	0.207	0.209	0.203	0.206	0.211	0.194	0.519
Hungary	0.206	0.210	0.210	0.211	0.211	0.212	0.211	0.220	0.215	0.198	0.517
Romania	0.295	0.298	0.298	0.298	0.298	0.298	0.299	0.308	0.300	0.302	0.516
Egypt	0.354	0.346	0.346	0.347	0.347	0.348	0.336	0.345	0.355	0.324	0.464
Israel	0.413	0.408	0.408	0.409	0.409	0.410	0.415	0.409	0.415	0.412	0.456
New Zealand	0.264	0.273	0.273	0.274	0.274	0.275	0.276	0.273	0.273	0.276	0.445
Turkey	0.535	0.576	0.576	0.577	0.577	0.578	0.585	0.575	0.581	0.550	0.440

Table 22 (continued). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
	PRESENT CALCULATED QUOTAS (1)	EXCHANGE RESERVES (2)	EURO- CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY INVOICING NATIONAL TRADE (6)	CAPITAL ACCOUNT TRAN- SACTION (7)	(REAL EFFECTIVE EXCHANGE RATE) x (CUR) (8)	(FINANCIAL MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	MEMO:
											PRESENT
											QUOTAS (11)
Costa Rica	0.048	0.048	0.048	0.048	0.048	0.049	0.049	0.048	0.049	0.046	0.081
Senegal	0.036	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.038	0.035	0.081
Gabon	0.073	0.071	0.071	0.071	0.072	0.072	0.072	0.071	0.072	0.070	0.076
Cyprus	0.052	0.053	0.053	0.053	0.053	0.053	0.054	0.053	0.053	0.052	0.068
Nambia	0.039	0.036	0.036	0.036	0.036	0.037	0.036	0.038	0.037	0.037	0.068
Ethiopia	0.030	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.030	0.067
Liberia	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.066
Nicaragua	0.021	0.021	0.020	0.021	0.021	0.021	0.020	0.021	0.021	0.014	0.066
Papua New Guinea	0.044	0.041	0.041	0.042	0.042	0.042	0.041	0.042	0.042	0.040	0.065
Honduras	0.029	0.030	0.030	0.031	0.031	0.031	0.031	0.031	0.032	0.029	0.065
Bahamas	0.043	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.040	0.039	0.065
Madagascar	0.016	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.014	0.062
Iceland	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.044	0.058
Mozambique	0.017	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.015	0.058
Bahrain	0.080	0.076	0.075	0.075	0.075	0.074	0.076	0.075	0.074	0.076	0.057
Guinea	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.019	0.019	0.017	0.054
Sierra Leone	0.006	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.006	0.053
Mauritius	0.034	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.050
Paraguay	0.035	0.038	0.038	0.037	0.038	0.037	0.038	0.037	0.038	0.037	0.049
Mali	0.015	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.015	0.047
Suriname	0.016	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.046
Malta	0.046	0.042	0.042	0.042	0.042	0.041	0.043	0.042	0.041	0.042	0.046
Guyana	0.011	0.009	0.009	0.009	0.009	0.010	0.010	0.009	0.010	0.008	0.046
Cambodia	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.045
Somalia	0.007	0.008	0.008	0.008	0.008	0.008	0.007	0.008	0.008	0.006	0.042
Haiti	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.011	0.042
Rwanda	0.010	0.011	0.011	0.011	0.011	0.011	0.010	0.011	0.011	0.010	0.041
Congo	0.047	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.045	0.041	0.040
Burundi	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.039
Togo	0.021	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.021	0.037
Nepal	0.016	0.017	0.017	0.017	0.017	0.017	0.016	0.017	0.017	0.016	0.036
Fiji	0.019	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.035
Malawi	0.012	0.013	0.013	0.013	0.013	0.013	0.012	0.013	0.013	0.012	0.035
Barbados	0.027	0.025	0.025	0.025	0.025	0.025	0.026	0.025	0.025	0.026	0.033
Niger	0.017	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.017	0.033
Mauritania	0.014	0.013	0.013	0.013	0.013	0.014	0.013	0.013	0.014	0.012	0.033
Benin	0.016	0.017	0.017	0.017	0.017	0.017	0.018	0.018	0.018	0.017	0.031
Burkina Faso	0.016	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.030
Chad	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.028
Central African Re	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.028
Laos	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.027
Mongolia	0.016	0.014	0.014	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.025
Botswana	0.065	0.066	0.066	0.065	0.065	0.064	0.068	0.065	0.063	0.066	0.025
Swaziland	0.018	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.025
Albania	0.012	0.013	0.013	0.013	0.013	0.012	0.012	0.013	0.012	0.013	0.024

Table 22 (continued). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
PRESENT CALCULATED QUOTAS (1)	EXCHANGE RESERVES (2)	EURO- CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY OF INTER- NATIONAL TRADE (6)	CAPITAL ACCOUNT TRAN- SACTION (7)	CURRENCY EFFECTIVE RATE) x (CUR) (8)	(REAL (FINANCIAL MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	MEMO:	
										PRESENT	
										QUOTAS (11)	
Philippines	0.267	0.272	0.273	0.274	0.274	0.276	0.267	0.272	0.283	0.255	0.434
Chile	0.230	0.234	0.234	0.233	0.234	0.233	0.233	0.233	0.236	0.223	0.426
Greece	0.366	0.378	0.377	0.380	0.380	0.382	0.370	0.379	0.380	0.382	0.402
Thailand	0.958	0.998	0.997	0.994	0.995	0.989	0.979	0.993	0.985	0.995	0.393
Columbia	0.227	0.243	0.243	0.243	0.243	0.243	0.249	0.242	0.244	0.234	0.384
Portugal	0.476	0.491	0.490	0.488	0.488	0.485	0.486	0.489	0.481	0.494	0.382
Ireland	0.526	0.477	0.477	0.478	0.478	0.480	0.484	0.477	0.479	0.481	0.359
Peru	0.138	0.149	0.149	0.150	0.150	0.151	0.150	0.149	0.153	0.137	0.319
Bulgaria	0.329	0.241	0.241	0.241	0.242	0.243	0.241	0.251	0.245	0.236	0.318
Morocco	0.143	0.141	0.141	0.142	0.142	0.142	0.139	0.141	0.146	0.126	0.293
Zaire	0.068	0.067	0.066	0.067	0.067	0.067	0.067	0.066	0.069	0.061	0.270
Bangladesh	0.085	0.083	0.083	0.084	0.084	0.085	0.082	0.084	0.086	0.076	0.269
United Arab Emirat	0.496	0.502	0.502	0.499	0.500	0.495	0.514	0.512	0.494	0.509	0.268
Zambia	0.040	0.040	0.040	0.040	0.040	0.040	0.039	0.040	0.041	0.036	0.249
Singapore	1.279	1.005	1.003	0.998	0.990	0.993	1.023	1.001	0.994	1.014	0.245
Sri Lanka	0.067	0.066	0.066	0.067	0.067	0.067	0.065	0.067	0.068	0.063	0.208
Ghana	0.035	0.036	0.036	0.036	0.036	0.036	0.035	0.036	0.037	0.034	0.188
Zimbabwe	0.049	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.049	0.046	0.179
Trinidad & Tob	0.078	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.078	0.077	0.169
Viet Nam	0.033	0.034	0.034	0.034	0.034	0.034	0.034	0.035	0.035	0.034	0.165
Cote d'Ivoire	0.097	0.096	0.096	0.097	0.097	0.097	0.097	0.096	0.100	0.085	0.163
Sudan	0.048	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.056	0.045	0.160
Uruguay	0.052	0.053	0.053	0.053	0.053	0.053	0.054	0.053	0.054	0.051	0.154
Ecuador	0.103	0.104	0.104	0.104	0.104	0.104	0.103	0.104	0.106	0.097	0.150
Syrian Arab Rep	0.166	0.184	0.184	0.184	0.184	0.183	0.183	0.182	0.184	0.176	0.144
Angola	0.095	0.095	0.095	0.095	0.095	0.095	0.092	0.097	0.095	0.091	0.142
Tunisia	0.119	0.116	0.116	0.117	0.117	0.117	0.117	0.116	0.118	0.113	0.141
Jamaica	0.049	0.047	0.047	0.047	0.047	0.047	0.046	0.046	0.048	0.044	0.138
Kenya	0.059	0.059	0.059	0.060	0.060	0.060	0.058	0.060	0.061	0.056	0.137
Qatar	0.109	0.111	0.111	0.110	0.110	0.109	0.113	0.112	0.109	0.112	0.130
Myanmar	0.049	0.042	0.042	0.042	0.042	0.043	0.042	0.042	0.043	0.039	0.127
Yemen, Rep. of	0.067	0.065	0.065	0.065	0.065	0.065	0.061	0.067	0.066	0.062	0.121
Dominican Rep.	0.057	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.058	0.053	0.109
Guatemala	0.045	0.046	0.046	0.046	0.046	0.047	0.046	0.046	0.047	0.045	0.105
Panama	0.110	0.102	0.102	0.102	0.102	0.102	0.100	0.102	0.103	0.099	0.102
Tanzania	0.030	0.029	0.029	0.030	0.030	0.030	0.029	0.030	0.031	0.026	0.101
Lebanon	0.108	0.098	0.098	0.098	0.098	0.097	0.100	0.100	0.097	0.099	0.100
Luxembourg	0.314	0.215	0.216	0.213	0.216	0.217	0.218	0.215	0.218	0.217	0.093
Cameroon	0.074	0.075	0.075	0.075	0.075	0.076	0.075	0.075	0.077	0.072	0.092
Uganda	0.014	0.015	0.015	0.015	0.015	0.015	0.014	0.015	0.015	0.013	0.092
Bolivia	0.030	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.032	0.029	0.086
El Salvador	0.034	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.036	0.021	0.086
Jordan	0.103	0.088	0.088	0.088	0.088	0.088	0.084	0.088	0.090	0.084	0.083
Afghanistan	0.025	0.026	0.026	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.082
Oman	0.161	0.156	0.156	0.155	0.155	0.155	0.158	0.159	0.155	0.156	0.082

Table 22 (concluded). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
PRESENT CALCULATED QUOTAS (1)	EXCHANGE RESERVES (2)	EURO- CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY INVOICING OF INTER- NATIONAL TRADE (6)	CAPITAL ACCOUNT TRAN- SACTION (7)	(REAL EFFECTIVE EXCHANGE RATE) x (CUR) (8)	(FINANCIAL MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	MEMO:	
										PRESENT	
										QUOTAS (11)	
Equatorial Guin	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.017	
Lesotho	0.016	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.016	
Gambia, The	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.016	
Belize	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.009	
Vanuatu	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.009	
Djibouti	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.008	
St. Lucia	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.008	
Guinea-Bissau	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.007	
San Marino	0.013	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.007	
Western Samoa	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.003	0.006	
Grenada	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.006	
Antigua & Barbu.	0.009	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.006	
Solomon Islands	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.004	0.004	0.005	
Cape Verde	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.005	
Comoros	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	
St. Kitts & Nevis	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	
Dominica	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004	
Seychelles	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.004	
St. Vincent	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	
Sao Tome	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	
Maldives	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	
Tonga	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	
Bhutan	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	
Kiribati	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	
Micronesia	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	
Marshall Island	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	
100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	

1/ RESULTS ARE BASED ON SINGLE EQUATION SIMULATIONS USING REGRESSION TECHNIQUES TO OBTAIN COEFFICIENTS FOR THE INDICATED VARIABLES THAT MINIMIZE DEVIATIONS FROM CUSTOMARY CALCULATED QUOTAS.

Table 23. Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
	PRESENT		EURO-	INTER-		CURRENCY		(REAL (FINANCIAL			
	CALCULATED	EXCHANGE	CURRENCY	NATIONAL	EXCHANGE	INVOICING	CAPITAL	EFFECTIVE	MARKET		MEMO:
	QUOTAS	RESERVES	DEPOSITS	BOND	MARKET	OF INTER-	ACCOUNT	EXCHANGE	ACCESSI-	DEBT	PRESENT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
United States	18.058	20.094	20.312	20.165	20.451	19.969	20.142	19.088	18.800	19.353	18.161
Japan	9.225	7.313	7.304	7.108	7.045	7.326	6.710	6.117	6.550	6.833	5.642
Germany	7.802	6.073	6.336	6.417	6.764	5.932	6.280	5.876	5.558	6.215	5.642
France	5.380	5.661	5.551	5.565	5.524	5.473	6.004	5.123	4.861	5.201	5.076
United Kingdom	5.424	6.107	6.030	5.732	5.401	5.971	5.479	5.609	5.075	5.635	5.076
FSU	2.575	2.241	2.141	2.289	2.139	2.256	2.803	4.496	3.027	2.010	4.681
Saudi Arabia	2.524	3.236	3.288	3.263	3.361	3.173	3.355	3.069	2.778	2.850	3.513
Italy	4.487	3.788	3.743	3.835	3.809	3.647	3.959	3.731	3.799	3.439	3.143
Canada	3.534	4.305	4.234	4.178	4.205	4.393	3.478	3.869	4.362	3.877	2.958
Netherlands	2.608	2.340	2.356	2.388	2.362	2.498	2.351	2.149	2.635	2.216	2.358
China	1.387	1.105	1.108	1.184	1.153	1.102	1.491	1.095	1.241	1.291	2.318
Belgium	2.243	2.129	2.104	2.154	2.107	2.236	2.130	1.905	2.357	1.978	2.124
India	0.886	1.097	1.052	1.105	1.035	1.104	0.720	0.985	1.325	1.365	2.092
Switzerland	1.525	0.896	0.872	0.415	0.820	0.992	1.029	0.987	0.947	0.897	1.691
Australia	1.351	1.561	1.544	1.474	1.451	1.580	0.973	1.513	1.457	1.394	1.597
Brazil	1.270	1.573	1.540	1.599	1.544	1.553	1.437	1.382	1.896	2.047	1.486
Venezuela	0.625	0.697	0.710	0.713	0.733	0.686	0.774	0.657	0.718	0.810	1.336
Spain	2.019	1.329	1.350	1.425	1.412	1.343	1.000	1.528	1.115	1.209	1.325
Mexico	1.114	1.430	1.414	1.450	1.428	1.427	1.309	1.216	1.765	1.823	1.200
Sweden	1.335	1.258	1.240	1.293	1.221	1.310	1.198	1.163	1.358	1.159	1.105
Argentina	0.390	0.511	0.503	0.519	0.506	0.508	0.473	0.436	0.628	0.801	1.052
Indonesia	0.776	0.943	0.943	0.957	0.959	0.943	0.924	0.848	0.985	1.229	1.025
South Africa	0.666	0.796	0.785	0.799	0.793	0.805	0.812	0.647	1.069	0.716	0.935
Nigeria	0.633	0.823	0.837	0.831	0.857	0.804	0.791	0.710	0.756	0.930	0.877
Austria	1.145	1.111	1.096	1.133	1.116	1.161	1.269	1.038	1.210	1.026	0.814
Norway	1.024	0.933	0.945	0.970	0.964	0.953	1.123	0.956	0.842	0.852	0.756
Iran	1.255	1.641	1.581	1.654	1.558	1.583	1.776	1.402	1.626	1.456	0.738
Denmark	0.887	0.843	0.832	0.865	0.801	0.882	0.929	0.802	0.909	0.778	0.732
Kuwait	0.606	0.499	0.513	0.508	0.535	0.493	0.603	0.928	0.477	0.451	0.681
Poland	0.394	0.401	0.399	0.412	0.407	0.410	0.398	0.813	0.491	0.648	0.677
Former Yugoslavia	0.613	0.587	0.588	0.607	0.606	0.596	0.745	1.220	0.692	0.652	0.629
Algeria	0.421	0.585	0.581	0.586	0.585	0.583	0.634	0.526	0.606	0.671	0.626
Iraq	0.682	1.043	1.047	1.046	1.059	1.024	1.183	1.252	1.018	0.913	0.592
Finland	0.688	0.680	0.672	0.703	0.671	0.698	0.495	0.672	0.682	0.617	0.590
Czech & Slovak Rep	0.341	0.339	0.331	0.342	0.335	0.357	0.348	0.774	0.493	0.361	0.580
Malaysia	0.687	0.542	0.558	0.567	0.588	0.548	0.674	0.536	0.580	0.608	0.570
Libya	0.427	0.478	0.493	0.493	0.512	0.464	0.639	0.699	0.374	0.421	0.560
Korea	1.461	1.316	1.311	1.360	1.349	1.353	1.681	1.167	1.697	1.404	0.547
Pakistan	0.202	0.268	0.260	0.269	0.259	0.275	0.211	0.234	0.340	0.359	0.519
Hungary	0.206	0.224	0.220	0.226	0.222	0.232	0.222	0.471	0.302	0.327	0.517
Romania	0.295	0.332	0.331	0.335	0.337	0.334	0.347	0.586	0.373	0.301	0.516
Egypt	0.354	0.436	0.434	0.440	0.439	0.445	0.303	0.378	0.589	0.621	0.464
Israel	0.413	0.412	0.411	0.425	0.421	0.427	0.477	0.411	0.522	0.377	0.456
New Zealand	0.264	0.273	0.272	0.282	0.278	0.281	0.299	0.265	0.264	0.248	0.445
Turkey	0.535	0.576	0.573	0.594	0.585	0.581	0.671	0.541	0.660	0.799	0.440

Table 23 (continued). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
	PRESENT CALCULATED QUOTAS (1)	EURO- EXCHANGE RESERVES (2)	CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY INVOICING NATIONAL TRADE (6)	CAPITAL ACCOUNT TRAN- SACTION (7)	(REAL EFFECTIVE EXCHANGE RATE) x (CUR) (8)	(FINANCIAL MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	MEMO: PRESENT QUOTAS (11)
Philippines	0.267	0.332	0.325	0.334	0.326	0.341	0.236	0.279	0.493	0.475	0.434
Chile	0.230	0.180	0.186	0.193	0.196	0.183	0.186	0.195	0.249	0.274	0.426
Greece	0.366	0.458	0.450	0.465	0.451	0.469	0.328	0.438	0.456	0.412	0.402
Thailand	0.958	1.034	1.061	1.069	1.101	1.016	0.896	1.055	0.902	1.066	0.393
Columbia	0.227	0.198	0.201	0.209	0.210	0.199	0.276	0.193	0.220	0.278	0.384
Portugal	0.476	0.235	0.255	0.275	0.283	0.241	0.250	0.323	0.148	0.223	0.382
Ireland	0.526	0.499	0.497	0.510	0.491	0.523	0.562	0.482	0.519	0.461	0.359
Peru	0.138	0.185	0.181	0.187	0.181	0.185	0.179	0.160	0.237	0.284	0.319
Bulgaria	0.329	0.328	0.325	0.326	0.328	0.337	0.320	0.570	0.394	0.360	0.318
Morocco	0.143	0.147	0.144	0.150	0.145	0.153	0.108	0.137	0.240	0.269	0.293
Zaire	0.068	0.096	0.095	0.096	0.095	0.098	0.093	0.074	0.129	0.144	0.270
Bangladesh	0.085	0.111	0.107	0.112	0.106	0.112	0.083	0.102	0.133	0.168	0.269
United Arab Emirat	0.496	0.464	0.479	0.479	0.502	0.453	0.670	0.823	0.403	0.415	0.268
Zambia	0.040	0.054	0.053	0.054	0.054	0.054	0.042	0.046	0.067	0.089	0.249
Singapore	1.279	0.682	0.729	0.750	0.599	0.698	1.050	0.831	0.687	0.635	0.245
Sri Lanka	0.067	0.086	0.085	0.086	0.085	0.087	0.063	0.079	0.100	0.111	0.208
Ghana	0.035	0.043	0.042	0.044	0.043	0.043	0.032	0.028	0.055	0.058	0.188
Zimbabwe	0.049	0.058	0.057	0.058	0.058	0.059	0.057	0.051	0.071	0.071	0.179
Trinidad & Tob	0.078	0.097	0.098	0.097	0.100	0.096	0.099	0.086	0.103	0.099	0.169
Viet Nam	0.033	0.048	0.047	0.048	0.046	0.049	0.047	0.075	0.068	0.043	0.165
Cote d'Ivoire	0.097	0.141	0.138	0.140	0.138	0.145	0.136	0.124	0.197	0.230	0.163
Sudan	0.048	0.080	0.079	0.080	0.078	0.079	0.074	0.070	0.089	0.158	0.160
Uruguay	0.052	0.051	0.051	0.052	0.052	0.051	0.064	0.042	0.070	0.067	0.154
Ecuador	0.103	0.135	0.135	0.136	0.136	0.135	0.120	0.123	0.162	0.189	0.150
Syrian Arab Rep	0.166	0.233	0.233	0.233	0.236	0.228	0.226	0.186	0.238	0.299	0.144
Angola	0.095	0.124	0.123	0.124	0.124	0.124	0.093	0.187	0.131	0.154	0.142
Tunisia	0.119	0.131	0.130	0.133	0.133	0.134	0.133	0.121	0.158	0.162	0.141
Jamaica	0.049	0.060	0.059	0.060	0.059	0.062	0.050	0.050	0.089	0.081	0.138
Kenya	0.059	0.082	0.080	0.082	0.080	0.084	0.058	0.074	0.099	0.113	0.137
Qatar	0.109	0.120	0.122	0.122	0.126	0.117	0.158	0.185	0.105	0.106	0.130
Myanmar	0.049	0.046	0.043	0.047	0.043	0.044	0.041	0.041	0.055	0.066	0.127
Yemen, Rep. of	0.067	0.085	0.085	0.086	0.086	0.086	0.042	0.134	0.107	0.112	0.121
Dominican Rep.	0.057	0.072	0.071	0.072	0.071	0.074	0.070	0.060	0.102	0.091	0.109
Guatemala	0.045	0.056	0.055	0.056	0.056	0.056	0.046	0.051	0.075	0.066	0.105
Panama	0.110	0.130	0.131	0.131	0.134	0.130	0.104	0.120	0.147	0.155	0.102
Tanzania	0.030	0.048	0.047	0.048	0.047	0.049	0.042	0.041	0.066	0.077	0.101
Lebanon	0.108	0.113	0.116	0.116	0.121	0.112	0.145	0.167	0.095	0.111	0.100
Luxembourg	0.314	0.249	0.246	0.132	0.250	0.260	0.265	0.214	0.277	0.231	0.093
Cameroon	0.074	0.109	0.106	0.108	0.106	0.110	0.106	0.097	0.144	0.131	0.092
Uganda	0.014	0.022	0.021	0.021	0.021	0.022	0.012	0.017	0.028	0.035	0.092
Bolivia	0.030	0.039	0.039	0.040	0.039	0.040	0.042	0.029	0.051	0.060	0.086
El Salvador	0.034	0.040	0.040	0.041	0.041	0.041	0.039	0.037	0.055	0.157	0.086
Jordan	0.103	0.112	0.112	0.113	0.114	0.115	0.069	0.107	0.154	0.146	0.083
Afghanistan	0.025	0.035	0.035	0.036	0.035	0.035	0.036	0.049	0.041	0.031	0.082
Oman	0.161	0.170	0.174	0.174	0.179	0.169	0.208	0.279	0.161	0.167	0.082

Table 23 (continued). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
	PRESENT		EURO-		INTER-		CURRENCY		(REAL (FINANCIAL		MEMO:
	CALCULATED	EXCHANGE	CURRENCY	BOND	MARKET	NATIONAL	OF INTER-	ACCOUNT	EFFECTIVE	MARKET	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Costa Rica	0.048	0.053	0.053	0.054	0.054	0.054	0.059	0.052	0.074	0.069	0.081
Senegal	0.036	0.055	0.053	0.055	0.053	0.056	0.051	0.049	0.078	0.070	0.081
Gabon	0.073	0.101	0.101	0.101	0.102	0.101	0.107	0.092	0.116	0.110	0.076
Cyprus	0.052	0.032	0.034	0.035	0.037	0.033	0.044	0.040	0.037	0.047	0.068
Nambia	0.039	0.054	0.053	0.054	0.054	0.055	0.049	0.082	0.061	0.048	0.068
Ethiopia	0.030	0.047	0.046	0.047	0.045	0.048	0.046	0.040	0.055	0.060	0.067
Liberia	0.014	0.019	0.019	0.019	0.019	0.019	0.019	0.031	0.026	0.028	0.066
Nicaragua	0.021	0.036	0.036	0.036	0.036	0.037	0.026	0.035	0.044	0.092	0.066
Papua New Guinea	0.044	0.048	0.048	0.049	0.049	0.050	0.036	0.047	0.059	0.059	0.065
Honduras	0.029	0.042	0.041	0.042	0.041	0.043	0.038	0.037	0.060	0.058	0.065
Bahamas	0.043	0.048	0.047	0.048	0.048	0.050	0.042	0.044	0.060	0.044	0.065
Madagascar	0.016	0.022	0.021	0.022	0.021	0.022	0.021	0.020	0.030	0.042	0.062
Iceland	0.043	0.046	0.045	0.047	0.046	0.048	0.039	0.042	0.048	0.042	0.058
Mozambique	0.017	0.029	0.029	0.029	0.029	0.030	0.025	0.029	0.036	0.053	0.058
Bahrain	0.080	0.054	0.058	0.059	0.052	0.054	0.077	0.062	0.050	0.050	0.057
Guinea	0.018	0.025	0.025	0.025	0.025	0.026	0.023	0.042	0.037	0.037	0.054
Sierra Leone	0.006	0.009	0.009	0.009	0.009	0.009	0.010	0.007	0.011	0.015	0.053
Mauritius	0.034	0.024	0.024	0.025	0.026	0.025	0.020	0.026	0.029	0.027	0.050
Paraguay	0.035	0.036	0.037	0.038	0.038	0.036	0.039	0.037	0.042	0.044	0.049
Mali	0.015	0.021	0.021	0.022	0.021	0.022	0.017	0.021	0.028	0.033	0.047
Suriname	0.016	0.016	0.016	0.016	0.017	0.017	0.016	0.013	0.022	0.015	0.046
Malta	0.046	0.016	0.019	0.020	0.022	0.016	0.040	0.027	0.014	0.019	0.046
Guyana	0.011	0.015	0.014	0.014	0.015	0.015	0.015	0.013	0.018	0.024	0.046
Cambodia	0.007	0.010	0.010	0.011	0.010	0.011	0.011	0.015	0.013	0.009	0.045
Somalia	0.007	0.016	0.016	0.016	0.015	0.016	0.010	0.019	0.021	0.028	0.042
Haiti	0.012	0.017	0.017	0.017	0.017	0.018	0.015	0.015	0.025	0.021	0.042
Rwanda	0.010	0.015	0.015	0.016	0.015	0.016	0.011	0.015	0.017	0.018	0.041
Congo	0.047	0.066	0.066	0.066	0.066	0.066	0.061	0.061	0.078	0.088	0.040
Burundi	0.007	0.010	0.010	0.010	0.010	0.010	0.008	0.010	0.010	0.014	0.039
Togo	0.021	0.026	0.026	0.027	0.027	0.025	0.031	0.027	0.026	0.030	0.037
Nepal	0.016	0.018	0.018	0.019	0.019	0.019	0.004	0.019	0.021	0.026	0.036
Fiji	0.019	0.017	0.017	0.017	0.018	0.017	0.020	0.017	0.018	0.018	0.035
Malawi	0.012	0.016	0.015	0.016	0.016	0.016	0.011	0.015	0.020	0.022	0.035
Barbados	0.027	0.029	0.029	0.029	0.030	0.029	0.034	0.027	0.031	0.026	0.033
Niger	0.017	0.021	0.021	0.021	0.021	0.021	0.024	0.021	0.025	0.029	0.033
Mauritania	0.014	0.020	0.019	0.020	0.019	0.020	0.017	0.018	0.028	0.030	0.033
Benin	0.016	0.025	0.025	0.025	0.026	0.025	0.028	0.032	0.027	0.030	0.031
Burkina Faso	0.016	0.019	0.019	0.020	0.020	0.019	0.022	0.021	0.025	0.022	0.030
Chad	0.009	0.013	0.013	0.013	0.013	0.013	0.012	0.014	0.017	0.015	0.028
Central African Re	0.008	0.011	0.010	0.011	0.011	0.011	0.009	0.011	0.014	0.015	0.028
Laos	0.004	0.006	0.006	0.006	0.006	0.006	0.001	0.008	0.006	0.011	0.027
Mongolia	0.016	0.023	0.023	0.023	0.023	0.024	0.021	0.035	0.027	0.021	0.025
Botswana	0.065	-0.004	0.003	0.005	0.011	-0.006	0.048	0.026	-0.027	0.001	0.025
Swaziland	0.018	0.018	0.018	0.018	0.018	0.018	0.022	0.017	0.019	0.018	0.025
Albania	0.012	0.010	0.011	0.011	0.011	0.010	0.007	0.022	0.011	0.009	0.024

Table 23 (concluded). Illustrative Quota Calculations
Including Financial or Capital Account Variables

(In percent shares)

ILLUSTRATIVE CALCULATED QUOTAS 1/											
											MEMO: PRESENT QUOTAS
	PRESENT CALCULATED QUOTAS (1)	EXCHANGE RESERVES (2)	EURO- CURRENCY DEPOSITS (3)	INTER- NATIONAL BOND ISSUE (4)	EXCHANGE MARKET TURNOVER (5)	CURRENCY INVOICING OF INTER- NATIONAL TRADE (6)	CAPITAL ACCOUNT TRAN- SACTION (7)	(REAL EFFECTIVE EXCHANGE RATE) x (CUR) (8)	(FINANCIAL MARKET ACCESSI- BILITY) x (CUP) (9)	DEBT (10)	
Equatorial Guin	0.001	0.003	0.002	0.002	0.002	0.003	0.002	0.003	0.003	0.003	0.017
Lesotho	0.016	0.020	0.020	0.020	0.020	0.020	0.020	0.019	0.022	0.020	0.016
Gambia, The	0.004	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.008	0.016
Belize	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.009
Vanuatu	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.009
Djibouti	0.005	0.006	0.006	0.006	0.006	0.006	0.007	0.010	0.006	0.006	0.008
St. Lucia	0.006	0.006	0.006	0.006	0.006	0.006	0.003	0.005	0.009	0.006	0.008
Guinea-Bissau	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.006	0.007
San Marino	0.013	0.008	0.008	0.009	0.009	0.009	0.011	0.022	0.009	0.008	0.007
Western Samoa	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.006
Grenada	0.003	0.003	0.003	0.003	0.003	0.004	0.002	0.003	0.005	0.004	0.006
Antigua & Barbu.	0.009	0.011	0.011	0.011	0.011	0.011	0.010	0.010	0.016	0.010	0.006
Solomon Islands	0.004	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.006	0.005	0.005
Cape Verde	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.004	0.004	0.005
Comoros	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.004	0.004
St. Kitts & Nevis	0.002	0.003	0.003	0.003	0.003	0.003	0.000	0.003	0.004	0.003	0.004
Dominica	0.002	0.003	0.003	0.003	0.003	0.003	0.001	0.003	0.003	0.003	0.004
Seychelles	0.005	0.006	0.006	0.006	0.006	0.007	0.005	0.006	0.008	0.007	0.004
St. Vincent	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004
Sao Tome	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.004
Maldives	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.006	0.004	0.003	0.004
Tonga	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003
Bhutan	0.003	0.002	0.002	0.002	0.003	0.002	0.003	0.005	0.002	0.003	0.003
Kiribati	0.002	-0.002	-0.002	-0.001	-0.001	-0.002	0.001	0.000	-0.004	-0.002	0.003
Micronesia	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.000	0.001	0.002
Marshall Island	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.001	0.002
	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000

1/ RESULTS ARE BASED ON SINGLE EQUATION SIMULATIONS USING REGRESSION TECHNIQUES TO OBTAIN COEFFICIENTS FOR THE INDICATED VARIABLES THAT MINIMIZE DEVIATIONS FROM PRESENT QUOTAS.

Table 24. Illustrative Quota Calculations
Incorporating a Poverty Index

(In percent shares, except as indicated)

Cname	POVERTY			ILLUSTRATIVE CALCULATED QUOTAS WITH				MEMO: PRESENT QUOTAS (8)
	PRESENT	POVERTY	INDEX	GIVEN RELATIVE WEIGHTS TO COLS(1) (3)				
	CALCULATED	INDEX	APPLIED					
	QUOTAS	(IRAQ=1)	TO CQ 2/ 1/ (1)x(2)	50/50	75/25	90/10	95/10	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
United States	18.058	0.165	2.988	10.523	14.290	16.551	17.304	18.157
Japan	9.225	0.154	1.417	5.321	7.273	8.444	8.834	5.641
Germany	7.802	0.154	1.200	4.501	6.151	7.142	7.472	5.641
France	5.380	0.174	0.936	3.158	4.269	4.936	5.158	5.075
United Kingdom	5.424	0.214	1.159	3.292	4.358	4.998	5.211	5.075
FSU	2.575	1.205	3.101	2.838	2.706	2.627	2.601	4.680
Saudi Arabia	2.524	0.526	1.328	1.926	2.225	2.405	2.465	3.512
Italy	4.487	0.193	0.864	2.676	3.581	4.125	4.306	3.142
Canada	3.534	0.170	0.600	2.067	2.801	3.241	3.388	2.957
Netherlands	2.608	0.196	0.511	1.559	2.083	2.398	2.503	2.357
China	1.387	11.257	15.618	8.502	4.945	2.810	2.099	2.317
Belgium	2.243	0.183	0.410	1.327	1.785	2.060	2.152	2.123
India	0.886	10.344	9.168	5.027	2.957	1.715	1.300	2.091
Switzerland	1.525	0.109	0.166	0.845	1.185	1.389	1.457	1.691
Australia	1.351	0.213	0.287	0.819	1.085	1.245	1.298	1.597
Brazil	1.270	1.379	1.752	1.511	1.391	1.319	1.294	1.486
Venezuela	0.625	1.454	0.909	0.767	0.696	0.653	0.639	1.336
Spain	2.019	0.290	0.585	1.302	1.661	1.876	1.947	1.325
Mexico	1.114	1.310	1.459	1.287	1.200	1.149	1.131	1.200
Sweden	1.335	0.138	0.184	0.760	1.047	1.220	1.278	1.105
Argentina	0.390	1.136	0.443	0.417	0.404	0.396	0.393	1.052
Indonesia	0.776	6.176	4.790	2.783	1.779	1.177	0.976	1.025
South Africa	0.666	1.262	0.841	0.753	0.709	0.683	0.675	0.935
Nigeria	0.633	12.239	7.743	4.188	2.410	1.344	0.988	0.877
Austria	1.145	0.181	0.207	0.676	0.910	1.051	1.098	0.813
Norway	1.024	0.147	0.150	0.587	0.805	0.936	0.980	0.756
Iran	1.255	0.371	0.465	0.860	1.057	1.176	1.215	0.738
Denmark	0.887	0.142	0.126	0.507	0.697	0.811	0.849	0.732
Kuwait	0.606	0.422	0.256	0.431	0.518	0.571	0.588	0.681
Poland	0.394	2.238	0.881	0.638	0.516	0.443	0.418	0.677
Former Yugoslavia	0.613	0.898	0.550	0.582	0.597	0.607	0.610	0.629
Algeria	0.421	1.527	0.642	0.531	0.476	0.443	0.432	0.626
Iraq	0.682	1.048	0.715	0.699	0.690	0.686	0.684	0.592
Finland	0.688	0.133	0.091	0.390	0.539	0.628	0.658	0.590
Czech & Slovak Rep	0.341	1.267	0.433	0.387	0.364	0.351	0.346	0.580
Malaysia	0.687	1.532	1.053	0.870	0.779	0.724	0.706	0.570
Libya	0.427	0.535	0.228	0.327	0.377	0.407	0.417	0.560
Korea	1.461	0.642	0.938	1.200	1.330	1.409	1.435	0.547

Table 24 (continued). Illustrative Quota Calculations
Incorporating a Poverty Index

(In percent shares, except as indicated)

Cname	POVERTY INDEX			ILLUSTRATIVE CALCULATED QUOTAS WITH				MEMO: PRESENT QUOTAS (8)
	PRESENT CALCULATED QUOTAS (1)	POVERTY INDEX (IRAQ=1) 1/ (2)	INDEX APPLIED TO CQ 2/ (1)x(2) (3)	GIVEN RELATIVE WEIGHTS TO COLS(1) (3)				

				50/50 (4)	75/25 (5)	90/10 (6)	95/10 (7)	
Pakistan	0.202	9.472	1.917	1.060	0.631	0.374	0.288	0.519
Hungary	0.206	1.151	0.238	0.222	0.214	0.210	0.208	0.517
Romania	0.295	2.255	0.665	0.480	0.387	0.332	0.313	0.516
Egypt	0.354	5.714	2.023	1.188	0.771	0.521	0.437	0.464
Israel	0.413	0.328	0.135	0.274	0.344	0.385	0.399	0.456
New Zealand	0.264	0.285	0.075	0.169	0.216	0.245	0.254	0.445
Turkey	0.535	1.888	1.010	0.772	0.654	0.582	0.559	0.439
Philippines	0.267	5.083	1.355	0.811	0.539	0.375	0.321	0.434
Chile	0.230	1.732	0.399	0.315	0.272	0.247	0.239	0.426
Greece	0.366	0.555	0.203	0.285	0.325	0.350	0.358	0.402
Thailand	0.958	2.514	2.408	1.683	1.321	1.103	1.031	0.393
Columbia	0.227	2.994	0.681	0.454	0.341	0.273	0.250	0.384
Portugal	0.476	0.601	0.286	0.381	0.428	0.457	0.466	0.382
Ireland	0.526	0.297	0.156	0.341	0.434	0.489	0.508	0.359
Peru	0.138	2.162	0.297	0.217	0.177	0.153	0.146	0.319
Bulgaria	0.329	4.133	1.362	0.846	0.587	0.433	0.381	0.318
Morocco	0.143	3.529	0.506	0.324	0.234	0.180	0.161	0.293
Zaire	0.068	23.013	1.574	0.821	0.445	0.219	0.144	0.270
Bangladesh	0.085	18.585	1.578	0.832	0.458	0.234	0.160	0.269
United Arab Emirat	0.496	0.165	0.082	0.289	0.393	0.455	0.475	0.268
Zambia	0.040	6.925	0.278	0.159	0.100	0.064	0.052	0.249
Singapore	1.279	0.312	0.399	0.839	1.059	1.191	1.235	0.245
Sri Lanka	0.067	7.734	0.520	0.294	0.181	0.113	0.090	0.208
Ghana	0.035	9.419	0.326	0.180	0.107	0.064	0.049	0.188
Zimbabwe	0.049	5.526	0.271	0.160	0.104	0.071	0.060	0.179
Trinidad & Tob	0.078	0.885	0.069	0.074	0.076	0.077	0.078	0.169
Viet Nam	0.033	36.919	1.215	0.624	0.328	0.151	0.092	0.165
Cote d'Ivoire	0.097	4.435	0.432	0.265	0.181	0.131	0.114	0.163
Sudan	0.048	7.472	0.360	0.204	0.126	0.079	0.064	0.160
Uruguay	0.052	1.368	0.071	0.061	0.056	0.054	0.053	0.154
Ecuador	0.103	3.708	0.383	0.243	0.173	0.131	0.117	0.150
Syrian Arab Rep	0.166	1.854	0.308	0.237	0.202	0.181	0.173	0.144
Angola	0.095	3.900	0.370	0.233	0.164	0.122	0.109	0.142
Tunisia	0.119	2.358	0.279	0.199	0.159	0.135	0.127	0.141
Jamaica	0.049	2.227	0.109	0.079	0.064	0.055	0.052	0.138
Kenya	0.059	10.033	0.587	0.323	0.191	0.111	0.085	0.136
Qatar	0.109	0.243	0.027	0.068	0.088	0.101	0.105	0.130
Myanmar	0.049	6.983	0.340	0.194	0.122	0.078	0.063	0.127

Table 24 (continued). Illustrative Quota Calculations
Incorporating a Poverty Index

(In percent shares, except as indicated)

Cname	POVERTY INDEX ILLUSTRATIVE CALCULATED QUOTAS WITH							
	PRESENT	POVERTY	INDEX	GIVEN RELATIVE WEIGHTS TO COLS(1) (3)				MEMO:
	CALCULATED	INDEX	APPLIED					PRESENT
	QUOTAS	(IRAQ=1)	TO CQ 2/					QUOTAS
	(1)	1/	(1)x(2)	50/50	75/25	90/10	95/10	(8)
		(2)	(3)	(4)	(5)	(6)	(7)	
Yemen, Rep. of	0.067	6.955	0.463	0.265	0.166	0.106	0.086	0.121
Dominican Rep.	0.057	3.653	0.208	0.132	0.094	0.072	0.064	0.109
Guatemala	0.045	4.505	0.202	0.124	0.084	0.061	0.053	0.105
Panama	0.110	1.615	0.178	0.144	0.127	0.117	0.114	0.102
Tanzania	0.030	36.922	1.102	0.566	0.298	0.137	0.083	0.101
Lebanon	0.108	3.478	0.375	0.241	0.174	0.134	0.121	0.100
Luxembourg	0.314	0.159	0.050	0.182	0.248	0.288	0.301	0.093
Cameroon	0.074	3.769	0.279	0.176	0.125	0.094	0.084	0.092
Uganda	0.014	29.830	0.431	0.223	0.119	0.056	0.035	0.092
Bolivia	0.030	5.458	0.162	0.096	0.063	0.043	0.036	0.086
El Salvador	0.034	3.545	0.121	0.078	0.056	0.043	0.039	0.086
Jordan	0.103	3.725	0.385	0.244	0.174	0.132	0.118	0.083
Afghanistan	0.025	13.154	0.324	0.174	0.099	0.055	0.040	0.082
Oman	0.161	0.582	0.094	0.127	0.144	0.154	0.157	0.082
Costa Rica	0.048	2.025	0.097	0.072	0.060	0.053	0.050	0.081
Senegal	0.036	4.590	0.163	0.099	0.067	0.048	0.042	0.081
Gabon	0.073	0.779	0.057	0.065	0.069	0.071	0.072	0.075
Cyprus	0.052	0.465	0.024	0.038	0.045	0.050	0.051	0.068
Nambia	0.039	2.410	0.093	0.066	0.052	0.044	0.041	0.068
Ethiopia	0.030	29.983	0.912	0.471	0.251	0.119	0.075	0.067
Liberia	0.014	6.273	0.089	0.052	0.033	0.022	0.018	0.066
Nicaragua	0.021	14.304	0.297	0.159	0.090	0.048	0.035	0.066
Papua New Guinea	0.044	4.199	0.186	0.115	0.080	0.059	0.051	0.065
Honduras	0.029	2.979	0.087	0.058	0.044	0.035	0.032	0.065
Bahamas	0.043	0.363	0.015	0.029	0.036	0.040	0.041	0.065
Madagascar	0.016	13.295	0.215	0.116	0.066	0.036	0.026	0.062
Iceland	0.043	0.152	0.007	0.025	0.034	0.039	0.041	0.058
Mozambique	0.017	39.695	0.656	0.336	0.176	0.080	0.048	0.057
Bahrain	0.080	0.453	0.036	0.058	0.069	0.076	0.078	0.057
Guinea	0.018	7.009	0.124	0.071	0.044	0.028	0.023	0.054
Sierra Leone	0.006	19.722	0.127	0.067	0.037	0.019	0.012	0.053
Mauritius	0.034	1.534	0.052	0.043	0.039	0.036	0.035	0.050
Paraguay	0.035	2.946	0.103	0.069	0.052	0.042	0.039	0.049
Mali	0.015	11.970	0.181	0.098	0.057	0.032	0.023	0.047
Suriname	0.016	0.916	0.014	0.015	0.015	0.015	0.016	0.046
Malta	0.046	0.552	0.025	0.035	0.041	0.044	0.045	0.046
Guyana	0.011	9.719	0.106	0.058	0.035	0.020	0.016	0.046
Somalia	0.007	29.423	0.219	0.113	0.060	0.029	0.018	0.042

Table 24 (continued). Illustrative Quota Calculations
Incorporating a Poverty Index

(In percent shares, except as indicated)

Cname	POVERTY INDEX			ILLUSTRATIVE CALCULATED QUOTAS WITH				MEMO: PRESENT QUOTAS (8)
	PRESENT	POVERTY	INDEX	GIVEN RELATIVE WEIGHTS TO COLS(1) (3)				
	CALCULATED	INDEX	APPLIED					
	QUOTAS	(IRAQ=1)	TO CQ 2/					
	(1)	1/	(1)x(2)	50/50	75/25	90/10	95/10	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Haiti	0.012	11.031	0.127	0.069	0.040	0.023	0.017	0.042
Rwanda	0.010	11.240	0.112	0.061	0.035	0.020	0.015	0.041
Congo	0.047	2.923	0.136	0.091	0.069	0.055	0.051	0.040
Burundi	0.007	17.994	0.122	0.065	0.036	0.018	0.013	0.039
Togo	0.021	7.890	0.166	0.093	0.057	0.035	0.028	0.037
Nepal	0.016	19.562	0.321	0.169	0.093	0.047	0.032	0.036
Fiji	0.019	2.174	0.041	0.030	0.024	0.021	0.020	0.035
Malawi	0.012	16.313	0.201	0.107	0.060	0.031	0.022	0.035
Barbados	0.027	0.542	0.015	0.021	0.024	0.026	0.026	0.033
Niger	0.017	11.265	0.187	0.102	0.059	0.034	0.025	0.033
Mauritania	0.014	7.243	0.103	0.059	0.036	0.023	0.019	0.033
Benin	0.016	9.391	0.154	0.085	0.051	0.030	0.023	0.031
Burkina Faso	0.016	12.750	0.209	0.113	0.065	0.036	0.026	0.030
Chad	0.009	17.121	0.158	0.084	0.047	0.024	0.017	0.028
Central African Re	0.008	8.471	0.067	0.038	0.023	0.014	0.011	0.028
Laos	0.004	17.516	0.070	0.037	0.020	0.011	0.007	0.027
Mongolia	0.016	10.185	0.164	0.090	0.053	0.031	0.024	0.025
Botswana	0.065	1.363	0.088	0.077	0.071	0.067	0.066	0.025
Swaziland	0.018	3.306	0.060	0.039	0.029	0.022	0.020	0.025
Albania	0.012	6.025	0.070	0.041	0.026	0.018	0.015	0.024
Equatorial Guin	0.001	9.684	0.013	0.007	0.004	0.002	0.002	0.017
Lesotho	0.016	11.058	0.175	0.095	0.056	0.032	0.024	0.016
Gambia, The	0.004	10.391	0.042	0.023	0.013	0.008	0.006	0.016
Belize	0.005	1.895	0.010	0.008	0.006	0.006	0.005	0.009
Vanuatu	0.003	3.586	0.012	0.007	0.005	0.004	0.004	0.009
Djibouti	0.005	3.531	0.018	0.012	0.008	0.006	0.006	0.008
St. Lucia	0.006	1.405	0.008	0.007	0.007	0.006	0.006	0.008
Guinea-Bissau	0.002	15.046	0.027	0.015	0.008	0.004	0.003	0.007
San Marino	0.013	0.169	0.002	0.008	0.011	0.012	0.013	0.007
Western Samoa	0.003	5.097	0.014	0.009	0.006	0.004	0.003	0.006
Antigua & Barbu.	0.009	0.730	0.007	0.008	0.009	0.009	0.009	0.006
Grenada	0.003	1.445	0.004	0.004	0.003	0.003	0.003	0.006
Solomon Islands	0.004	6.348	0.024	0.014	0.009	0.006	0.005	0.005
Cape Verde	0.003	3.571	0.012	0.007	0.005	0.004	0.004	0.005
St. Kitts & Nevis	0.002	0.939	0.002	0.002	0.002	0.002	0.002	0.004
Comoros	0.002	8.246	0.017	0.010	0.006	0.004	0.003	0.004
Dominica	0.002	1.839	0.004	0.003	0.003	0.003	0.002	0.004
St. Vincent	0.004	2.210	0.008	0.006	0.005	0.004	0.004	0.004

Table 24 (concluded). Illustrative Quota Calculations
Incorporating a Poverty Index

(In percent shares, except as indicated)

Cname	POVERTY			ILLUSTRATIVE CALCULATED QUOTAS WITH				MEMO: PRESENT QUOTAS (8)
	PRESENT	POVERTY	INDEX	GIVEN RELATIVE WEIGHTS TO COLS(1) (3)				
	CALCULATED	INDEX	APPLIED					
	QUOTAS	(IRAQ=1)	TO CQ 2/					
	(1)	1/	(1)x(2)	50/50	75/25	90/10	95/10	
	(2)	(3)	(4)	(5)	(6)	(7)		
Seychelles	0.005	0.685	0.003	0.004	0.004	0.005	0.005	0.004
Maldives	0.003	5.556	0.019	0.011	0.007	0.005	0.004	0.004
Sao Tome	0.001	9.194	0.009	0.005	0.003	0.002	0.001	0.004
Tonga	0.002	2.713	0.005	0.003	0.003	0.002	0.002	0.003
Bhutan	0.003	20.330	0.057	0.030	0.016	0.008	0.006	0.003
Kiribati	0.002	7.527	0.019	0.011	0.007	0.004	0.003	0.003
Micronesia	0.002	2.315	0.005	0.004	0.003	0.002	0.002	0.002
Marshall Island	0.001	2.647	0.004	0.003	0.002	0.002	0.002	0.002
Cambodia	0.007	21.701	0.156	0.082	0.044	0.022	0.015	0.000
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	100.000	937.750	100.000	100.000	100.000	100.000	100.000	100.000

1/ THE POVERTY INDEX IS THE RECIPROCAL OF PER CAPITA INCOME, WITH IRAQ CHOSEN AS AN EFFECTIVE MEAN SO THAT THE PRODUCT OF THE POVERTY INDEX AND PRESENT CALCULATED QUOTA SHARES SUM TO UNITY.

Table 25. Illustrative Quota Calculations
with Simplified Formulas

(In percent shares, except as indicated)

	Present	Customary					Deviations from		
	Quota						customary calculations		
	(In mill. of SDRs)	Present Quota	Calcu- lations	MAX of BW & M4	MAX of BWL & M4	MAX of BWL & ML	(4-3)	(5-3)	(6-3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
United States	26526.8	18.161	18.058	17.861	17.815	18.027	-0.197	-0.243	-0.030
Germany	8241.5	5.642	7.802	7.717	7.970	8.065	-0.085	0.168	0.263
Japan	8241.5	5.642	9.225	9.124	9.431	9.543	-0.101	0.206	0.318
France	7414.6	5.076	5.380	5.322	5.448	5.513	-0.059	0.068	0.133
United Kingdom	7414.6	5.076	5.424	5.387	5.434	5.499	-0.037	0.010	0.075
FSU	6837.3	4.681	2.575	2.547	2.620	2.652	-0.028	0.046	0.077
Saudi Arabia	5130.6	3.513	2.524	2.707	2.728	2.632	0.182	0.204	0.108
Italy	4590.7	3.143	4.487	4.438	4.458	4.511	-0.049	-0.029	0.024
Canada	4320.3	2.958	3.534	3.495	3.522	3.484	-0.040	-0.012	-0.051
Netherlands	3444.2	2.358	2.608	2.579	2.469	2.487	-0.028	-0.139	-0.121
China	3385.2	2.318	1.387	1.372	1.382	1.399	-0.015	-0.005	0.011
Belgium	3102.3	2.124	2.243	2.219	2.060	2.095	-0.024	-0.183	-0.148
India	3055.5	2.092	0.886	0.877	0.840	0.850	-0.010	-0.047	-0.037
Switzerland	2470.4	1.691	1.525	1.509	1.474	1.492	-0.017	-0.051	-0.034
Australia	2333.2	1.597	1.351	1.341	1.352	1.348	-0.010	0.001	-0.004
Brazil	2170.8	1.486	1.270	1.330	1.340	1.324	0.060	0.070	0.053
Venezuela	1951.3	1.336	0.625	0.673	0.679	0.648	0.048	0.054	0.023
Spain	1935.4	1.325	2.019	1.997	1.957	1.981	-0.022	-0.062	-0.039
Mexico	1753.3	1.200	1.114	1.209	1.218	1.168	0.095	0.104	0.054
Sweden	1614	1.105	1.335	1.321	1.310	1.326	-0.015	-0.025	-0.010
Argentina	1537.1	1.052	0.390	0.423	0.427	0.408	0.033	0.036	0.018
Indonesia	1497.6	1.025	0.776	0.816	0.822	0.793	0.040	0.046	0.018
South Africa	1365.4	0.935	0.666	0.689	0.694	0.689	0.023	0.028	0.023
Nigeria	1281.6	0.877	0.633	0.703	0.708	0.680	0.070	0.076	0.048
Austria	1188.3	0.814	1.145	1.132	1.103	1.117	-0.012	-0.041	-0.028
Norway	1104.6	0.756	1.024	1.000	1.008	0.971	-0.024	-0.016	-0.053
Iran	1078.5	0.738	1.255	1.241	1.219	1.233	-0.014	-0.036	-0.021
Denmark	1069.9	0.732	0.887	0.877	0.850	0.860	-0.010	-0.037	-0.027
Kuwait	995.2	0.681	0.606	0.568	0.573	0.561	-0.037	-0.033	-0.044
Poland	988.5	0.677	0.394	0.390	0.393	0.382	-0.004	-0.001	-0.012
Former Yugosla	918.3	0.629	0.613	0.622	0.627	0.603	0.009	0.014	-0.010
Algeria	914.4	0.626	0.421	0.450	0.454	0.443	0.030	0.033	0.022
Iraq	864.8	0.592	0.682	0.774	0.780	0.750	0.091	0.097	0.068
Finland	861.8	0.590	0.688	0.680	0.678	0.686	-0.008	-0.010	-0.002
Czech & Slovak	847	0.580	0.341	0.338	0.326	0.330	-0.004	-0.015	-0.011
Malaysia	832.7	0.570	0.687	0.661	0.666	0.641	-0.026	-0.021	-0.046
Libya	817.6	0.560	0.427	0.480	0.484	0.453	0.054	0.058	0.027
Korea	799.6	0.547	1.461	1.459	1.470	1.450	-0.002	0.009	-0.011

Table 25 (continued). Illustrative Quota Calculations
with Simplified Formulas

(In percent shares, except as indicated)

	Present	Customary					Deviations from		
	Quota						customary calculations		
	(In mill. of SDRs)	Present Quota	Calcu- lations	MAX of BW & M4	MAX of BWL & M4	MAX of BWL & ML	(4-3)	(5-3)	(6-3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pakistan	758.2	0.519	0.202	0.200	0.202	0.205	-0.002	-0.000	0.002
Hungary	754.8	0.517	0.206	0.207	0.209	0.210	0.001	0.002	0.004
Romania	754.1	0.516	0.295	0.308	0.310	0.306	0.013	0.015	0.011
Egypt	678.4	0.464	0.354	0.345	0.348	0.344	-0.009	-0.006	-0.010
Israel	666.2	0.456	0.413	0.408	0.392	0.389	-0.005	-0.021	-0.024
New Zealand	650.1	0.445	0.264	0.261	0.262	0.260	-0.003	-0.001	-0.004
Turkey	642	0.440	0.535	0.558	0.562	0.540	0.023	0.027	0.005
Philippines	633.4	0.434	0.267	0.266	0.268	0.267	-0.001	0.001	0.001
Chile	621.7	0.426	0.230	0.227	0.229	0.213	-0.003	-0.002	-0.017
Greece	587.6	0.402	0.366	0.362	0.359	0.361	-0.004	-0.007	-0.005
Thailand	573.9	0.393	0.958	1.036	1.044	0.983	0.078	0.086	0.025
Columbia	561.3	0.384	0.227	0.237	0.239	0.224	0.009	0.011	-0.004
Portugal	557.6	0.382	0.476	0.468	0.472	0.446	-0.007	-0.004	-0.030
Ireland	525	0.359	0.526	0.521	0.470	0.470	-0.006	-0.056	-0.056
Peru	466.1	0.319	0.138	0.141	0.142	0.141	0.004	0.005	0.004
Bulgaria	464.9	0.318	0.329	0.326	0.254	0.261	-0.004	-0.076	-0.069
Morocco	427.7	0.293	0.143	0.142	0.141	0.143	-0.002	-0.002	-0.001
Zaire	394.8	0.270	0.068	0.067	0.067	0.068	-0.002	-0.001	-0.001
Bangladesh	392.5	0.269	0.085	0.084	0.082	0.083	-0.001	-0.003	-0.002
United Arab Em	392.1	0.268	0.496	0.541	0.545	0.520	0.045	0.049	0.024
Zambia	363.5	0.249	0.040	0.040	0.041	0.040	0.000	0.000	-0.000
Singapore	357.6	0.245	1.279	1.265	1.013	0.945	-0.014	-0.266	-0.333
Sri Lanka	303.6	0.208	0.067	0.066	0.066	0.066	-0.001	-0.001	-0.001
Ghana	274	0.188	0.035	0.035	0.035	0.034	0.000	0.001	-0.001
Zimbabwe	261.3	0.179	0.049	0.048	0.049	0.049	-0.001	-0.000	-0.000
Trinidad & Tob	246.8	0.169	0.078	0.083	0.083	0.081	0.004	0.005	0.003
Viet Nam	241.6	0.165	0.033	0.033	0.032	0.033	-0.000	-0.000	-0.000
Cote d'Ivoire	238.2	0.163	0.097	0.096	0.097	0.098	-0.002	-0.001	0.001
Sudan	233.1	0.160	0.048	0.054	0.054	0.052	0.006	0.006	0.004
Uruguay	225.3	0.154	0.052	0.053	0.053	0.051	0.001	0.001	-0.001
Ecuador	219.2	0.150	0.103	0.106	0.107	0.104	0.003	0.003	0.001
Syrian Arab Re	209.9	0.144	0.166	0.194	0.196	0.189	0.028	0.029	0.023
Angola	207.3	0.142	0.095	0.099	0.099	0.098	0.004	0.004	0.003
Tunisia	206	0.141	0.119	0.116	0.117	0.116	-0.002	-0.001	-0.002
Jamaica	200.9	0.138	0.049	0.049	0.047	0.048	-0.001	-0.002	-0.001
Kenya	199.4	0.137	0.059	0.058	0.058	0.058	-0.001	-0.000	-0.000
Qatar	190.5	0.130	0.109	0.120	0.120	0.116	0.011	0.011	0.007
Myanmar	184.9	0.127	0.049	0.048	0.043	0.044	-0.001	-0.005	-0.005

Table 25 (continued). Illustrative Quota Calculations
with Simplified Formulas

(In percent shares, except as indicated)

	Present Quota		Customary			Deviations from customary calculations			
	(In mill. of SDRs)	Present Quota	Calcu- lations	MAX of BW & M4	MAX of BWL & M4	MAX of BWL & ML	(4-3)	(5-3)	(6-3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Yemen, Rep. of	176.5	0.121	0.067	0.066	0.066	0.066	-0.001	-0.000	-0.001
Dominican Rep.	158.8	0.109	0.057	0.056	0.056	0.057	-0.001	-0.001	-0.000
Guatemala	153.8	0.105	0.045	0.045	0.045	0.044	-0.000	0.000	-0.001
Panama	149.6	0.102	0.110	0.110	0.111	0.109	-0.000	0.000	-0.001
Tanzania	146.9	0.101	0.030	0.030	0.029	0.029	-0.000	-0.001	-0.001
Lebanon	146	0.100	0.108	0.104	0.105	0.099	-0.004	-0.003	-0.009
Luxembourg	135.5	0.093	0.314	0.310	0.228	0.238	-0.003	-0.086	-0.076
Cameroon	135.1	0.092	0.074	0.073	0.074	0.074	-0.001	0.000	-0.000
Uganda	133.9	0.092	0.014	0.014	0.015	0.014	0.000	0.000	0.000
Bolivia	126.2	0.086	0.030	0.030	0.030	0.029	-0.000	0.000	-0.001
El Salvador	125.6	0.086	0.034	0.034	0.034	0.033	-0.000	-0.000	-0.001
Jordan	121.7	0.083	0.103	0.102	0.090	0.090	-0.001	-0.013	-0.013
Afghanistan	120.4	0.082	0.025	0.025	0.025	0.024	0.000	0.001	-0.001
Oman	119.4	0.082	0.161	0.165	0.166	0.161	0.005	0.006	0.000
Costa Rica	119	0.081	0.048	0.047	0.047	0.046	-0.001	-0.000	-0.002
Senegal	118.9	0.081	0.036	0.035	0.035	0.036	-0.000	-0.000	0.000
Gabon	110.3	0.076	0.073	0.075	0.075	0.074	0.002	0.003	0.002
Cyprus	100	0.068	0.052	0.052	0.052	0.048	-0.001	-0.000	-0.004
Nambia	99.6	0.068	0.039	0.037	0.038	0.038	-0.001	-0.001	-0.001
Ethiopia	98.3	0.067	0.030	0.030	0.030	0.030	-0.000	-0.000	-0.001
Liberia	96.2	0.066	0.014	0.014	0.014	0.014	-0.000	-0.000	-0.000
Nicaragua	96.1	0.066	0.021	0.020	0.020	0.020	-0.001	-0.001	-0.001
Papua New Guin	95.3	0.065	0.044	0.044	0.041	0.041	-0.000	-0.003	-0.003
Honduras	95	0.065	0.029	0.029	0.029	0.030	-0.000	0.000	0.001
Bahamas	94.9	0.065	0.043	0.042	0.040	0.041	-0.000	-0.003	-0.002
Madagascar	90.4	0.062	0.016	0.016	0.016	0.016	-0.000	-0.001	-0.000
Iceland	85.3	0.058	0.043	0.043	0.042	0.042	-0.000	-0.001	-0.001
Mozambique	84	0.058	0.017	0.016	0.016	0.015	-0.000	-0.000	-0.001
Bahrain	82.8	0.057	0.080	0.076	0.077	0.072	-0.004	-0.003	-0.008
Guinea	78.7	0.054	0.018	0.018	0.018	0.018	-0.000	-0.000	-0.000
Sierra Leone	77.2	0.053	0.006	0.007	0.007	0.007	0.000	0.000	0.000
Mauritius	73.3	0.050	0.034	0.034	0.032	0.030	-0.000	-0.002	-0.004
Paraguay	72.1	0.049	0.035	0.037	0.038	0.035	0.002	0.002	-0.000
Mali	68.9	0.047	0.015	0.015	0.015	0.014	-0.000	-0.000	-0.001
Suriname	67.6	0.046	0.016	0.016	0.016	0.016	0.000	0.000	0.000
Malta	67.5	0.046	0.046	0.045	0.041	0.037	-0.000	-0.004	-0.009
Guyana	67.2	0.046	0.011	0.011	0.010	0.010	-0.000	-0.001	-0.001
Cambodia	65	0.045	0.007	0.007	0.007	0.007	0.000	0.000	-0.000

Table 25 (continued). Illustrative Quota Calculations
with Simplified Formulas

(In percent shares, except as indicated)

	Present						Deviations from		
	Quota		Customary		MAX of		customary calculations		
	(In mill. of SDRs)	Present Quota	Calculations	MAX of BW & M4	MAX of BWL & M4	MAX of BWL & ML	(4-3)	(5-3)	(6-3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Somalia	60.9	0.042	0.007	0.007	0.007	0.007	-0.000	-0.001	-0.001
Haiti	60.7	0.042	0.012	0.011	0.011	0.012	-0.000	-0.000	0.000
Rwanda	59.5	0.041	0.010	0.010	0.010	0.010	-0.000	-0.000	-0.000
Congo	57.9	0.040	0.047	0.046	0.046	0.046	-0.001	-0.000	-0.000
Burundi	57.2	0.039	0.007	0.007	0.007	0.006	-0.000	-0.000	-0.000
Togo	54.3	0.037	0.021	0.022	0.022	0.021	0.001	0.001	-0.000
Nepal	52	0.036	0.016	0.016	0.016	0.016	-0.000	-0.001	-0.001
Fiji	51.1	0.035	0.019	0.018	0.018	0.018	-0.001	-0.001	-0.001
Malawi	50.9	0.035	0.012	0.012	0.013	0.012	0.000	0.000	-0.000
Barbados	48.9	0.033	0.027	0.026	0.027	0.026	-0.000	-0.000	-0.001
Niger	48.3	0.033	0.017	0.017	0.017	0.016	0.000	0.001	-0.000
Mauritania	47.5	0.033	0.014	0.014	0.013	0.013	-0.000	-0.001	-0.001
Benin	45.3	0.031	0.016	0.018	0.018	0.018	0.002	0.002	0.001
Burkina Faso	44.2	0.030	0.016	0.016	0.016	0.015	-0.000	-0.000	-0.001
Chad	41.3	0.028	0.009	0.009	0.009	0.009	-0.000	-0.000	-0.001
Central Africa	41.2	0.028	0.008	0.008	0.008	0.007	-0.000	-0.000	-0.000
Laos	39.1	0.027	0.004	0.004	0.004	0.004	-0.000	-0.000	-0.000
Mongolia	37.1	0.025	0.016	0.016	0.013	0.013	-0.000	-0.003	-0.003
Botswana	36.6	0.025	0.065	0.064	0.065	0.053	-0.000	0.000	-0.011
Swaziland	36.5	0.025	0.018	0.018	0.018	0.017	-0.000	-0.001	-0.001
Albania	35.3	0.024	0.012	0.012	0.012	0.011	0.000	0.001	-0.000
Equatorial Gui	24.3	0.017	0.001	0.001	0.001	0.001	-0.000	-0.000	0.000
Lesotho	23.9	0.016	0.016	0.016	0.015	0.015	-0.000	-0.001	-0.001
Gambia, The	22.9	0.016	0.004	0.004	0.004	0.004	0.000	0.000	-0.000
Belize	13.5	0.009	0.005	0.005	0.005	0.005	-0.000	-0.000	-0.000
Vanuatu	12.5	0.009	0.003	0.003	0.003	0.003	-0.000	-0.000	-0.000
Djibouti	11.5	0.008	0.005	0.005	0.005	0.005	-0.000	-0.000	-0.000
St. Lucia	11	0.008	0.006	0.006	0.005	0.005	-0.000	-0.001	-0.001
Guinea-Bissau	10.5	0.007	0.002	0.002	0.002	0.002	-0.000	-0.000	-0.000
San Marino	10	0.007	0.013	0.013	0.010	0.010	-0.000	-0.003	-0.003
Antigua & Barb	8.5	0.006	0.009	0.009	0.008	0.008	-0.000	-0.001	-0.001
Grenada	8.5	0.006	0.003	0.003	0.003	0.003	-0.000	-0.000	-0.000
Western Samoa	8.5	0.006	0.003	0.003	0.002	0.002	-0.000	-0.000	-0.001
Solomon Island	7.5	0.005	0.004	0.004	0.004	0.004	-0.000	-0.000	-0.000
Cape Verde	7	0.005	0.003	0.003	0.003	0.003	0.000	0.000	-0.000
Comoros	6.5	0.004	0.002	0.002	0.002	0.002	-0.000	-0.000	-0.000
St. Kitts & Ne	6.5	0.004	0.002	0.002	0.002	0.002	-0.000	-0.000	-0.000
Dominica	6	0.004	0.002	0.002	0.002	0.002	-0.000	-0.000	-0.000

(In percent shares, except as indicated)

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