

further reflection, staff believes that either option would have significant disadvantages, as the former would make the GDP data less reflective of current economic developments, while the latter would add a significant new element of complexity and judgment to the measure. Accordingly, no change to the three-year average is proposed in this paper.

- **Openness:** There also seems to be wide support for retaining an openness variable in the new quota formula, notwithstanding concerns about possible distortions associated with its measurement on a gross basis. In this context, some have continued to argue that intra-currency union flows should be excluded from the measure. The last staff paper illustrated the potential impact of such an adjustment, and also noted the difficult conceptual and data issues involved. As also discussed previously, data limitations would seem at this stage to preclude development of an alternative openness measure based on value added, and neither of these options is considered further in this paper.
- **Financial Openness:** Some continue to favor broadening the openness measure to give a greater weight to financial openness. As discussed in the last staff paper, there seem to be sound conceptual grounds for doing this, but it also raises difficult data issues because comprehensive data on the most promising measure—IIP—are currently only available for about half of the membership. That paper also discussed options for proxying IIP, including the possible use of investment income.⁶ This paper includes simulations with and without such a proxy pending further guidance from the Board on whether to pursue explicit inclusion of a measure of financial openness at this stage.
- **Variability:** Variability is seen by many as playing an important role in a new quota formula to capture members' potential need for Fund resources. It was previously agreed that the traditional measure should be updated to cover both current receipts and net capital flows. However, some have raised concerns that the global share of advanced economies in this updated measure remains relatively high (63 percent based on data through 2005) and asked for further work on the scope for modifying the variable to make it more reflective of members' likely need to draw on the Fund. Staff has examined a range of options for amending or redefining the measure of variability and the preliminary results of this work are reported in Appendix I. In general, this work points to the continued need for a measure that relates to economic size; this, together with the right of all members to draw on the Fund in case of balance of payments need, may limit to some degree the scope for modifications that result in major changes in global shares of this measure. Modifications that would lead to more moderate changes in shares are also examined. There are pros and cons with all of these options, and no further changes to the definition of variability are proposed in this paper pending further Board guidance.

⁶ Another option would be to use IIP data where available and investment income data for remaining countries.

- **Reserves:** While some continue to favor inclusion of reserves as an indicator of financial strength and ability to contribute to the Fund’s finances, others have noted that the relevance of this indicator may have declined over time, and have also raised concerns about the potential perverse incentives associated with excess reserve accumulation. The latter led to proposals for a cap on the reserves variable, and a number of options for implementing such a cap were considered in the last staff paper. As noted in that paper, the application of a reserves cap would raise a number of difficult issues, and this proposal is not pursued further here. Instead, reserves are included in the simulations below with a relatively low weight.
- **Possible new variables:** Suggestions were made to include population in the new formula, possibly with a low weight, as a measure of members’ relative stakes in the international public goods provided by the Fund. This option was explored in the last staff paper but did not appear to attract significant support. The last paper also explored a proposal to develop a new measure of financial contributions to the Fund, noting that financing considerations have long played a role in determining quota increases for individual members. However, the paper also noted that explicitly including such a variable in the quota formulas would raise a number of practical difficulties, and that it may be preferable to continue to take account of such factors outside of the quota formula itself. While these issues remain open, they are not included in the simulations presented below.

7. **In addition to the quota variables, other issues to be agreed include the weights to be applied in each case and how they should be combined.** Consistent with the goal of simplicity and transparency, there seems to be a broad consensus that the variables in the new formula should be expressed in terms of shares in global totals rather than nominal levels as in the existing quota formulas, and that a linear combination of shares would be preferable to a multiplicative combination. However, a further open issue is whether a compression factor should be included in order to moderate somewhat the effects of the high correlation of size-related variables that tends to favor large economies.

B. Illustrative Simulations

8. **In line with the above, this section presents a range of illustrative simulations of a new quota formula based on updated data through 2005.** As noted in *Quotas—Updated Calculations and Data Adjustments* (2006), the data update tends in general to result in a modest increase in the aggregate calculated quota share of developing countries relative to that using the previous database. However, the new data do not change the broad conclusions drawn in previous papers about the effects of different combinations of variables and variable weights. Therefore, rather than repeat the full range of simulations shown previously, this section presents a more limited set, including some additional simulations drawing on the discussions to date. Again, it should be emphasized that the simulations are intended to be illustrative, and not to prejudge the range of options that could be considered:

- Table 1 presents simulations based on the four traditional variables updated and modernized, including GDP at market exchange rates. In all cases, GDP has the

largest weight, and as suggested by some Directors, the simulations include formulations with a higher weight on variability than in the baseline scenario presented in previous papers. The last simulation illustrates the effects of incorporating a proxy for financial openness in the openness variable.

- Table 2 focuses on simulations incorporating either a blended GDP variable or compression, both of which have been illustrated previously, as well as two new simulations showing the potential effects of combining moderate elements of both factors, which some have suggested could be a way of balancing the divergent views that have been expressed to date.⁷

9. **The broad results of these simulations for the calculated quota shares of major country groups are similar to those discussed previously** (the results for individual members are presented in a supplement to this paper). In all the variants of the simple linear formula with GDP converted at market exchange rates, the aggregate calculated quota share of advanced countries increases relative to the existing quota formulas, while that of developing countries declines. These changes are slightly less pronounced in the simulations with a higher weight on variability, and are more pronounced when the openness variable is explicitly broadened to include financial openness.⁸ They are also moderated somewhat in the scenarios that employ either a GDP blend (with a minority weight on PPP) or a modest element of compression. The only simulations in which the calculated quota share of developing countries as a whole increases are those employing a somewhat higher degree of compression or a combination of both a GDP blend and compression. As discussed in previous papers, however, this result can also be obtained through a higher weight on PPP GDP in a blended GDP variable.

III. BROADER ELEMENTS OF THE REFORM PACKAGE—PRELIMINARY CONSIDERATIONS

A. Key Second Round Parameters

10. **At this point in the process, it may be useful to begin to consider other elements that will need to be decided in moving forward with the second round of ad hoc increases.** These elements include the overall size of the second round ad hoc increases, the way it will be allocated, and the size of the increase in basic votes. Consideration of these elements may help to advance the broader reform discussions. Also, simulation of alternative reform packages may serve to bring out the implications of alternative quota formulas for the distribution of actual quota shares following the second round.

⁷ A suggestion has also been made that the inclusion of such elements should involve a “sunset clause” that would revert back to a simple linear formula at some future date.

⁸ Use of an IIP-investment income based proxy would result in a higher share for advanced countries as a group versus an investment income based proxy, with sizable differences for some individual members.

Size of the second round

11. **On the size of the second round ad hoc quota increases**, the Resolution indicated that the second round should aim to achieve a significant further alignment of members' quotas with their relative positions in the world economy, based on the new quota formula. It was also envisaged that a broader range of countries would participate in the second round than the narrow group included in the first round. The size of the second round increase is, of course, a question for the membership to decide, and on which little guidance has so far been provided. For purely illustrative purposes, the simulations presented in this paper use second round increases of 5.6, 8.1, and 10.5 percent, which—when combined with the first round increase of 1.8 percent—imply overall quota increases of 7.5, 10, and 12.5 percent, respectively. Increases of different sizes to those presented here are of course possible.

Eligibility and allocation mechanism

12. **Various issues related to the eligibility for, and allocation of, increases will also need to be considered.** For illustrative purposes, and as a starting point for the discussions, most of the simulations in this paper assume that all members that are under-represented according to a new formula are considered eligible for quota increases—that is, eligibility is defined solely on the basis of the new quota formula. With the exception of members that may choose to forego some of the increase for which they may be eligible, increases are allocated on the same basis as for the first round. That is, increases for individual members are determined such that each member's out-of-lineness (as measured by the gap between calculated and actual quota share) is reduced by the same proportion.

13. **Other approaches that go beyond simple application of the formula could also be considered, with past practice providing some precedent for this.** In some instances in the past, this has involved the use of an additional filter. For example, for the first round of ad hoc increases, member countries needed to be significantly out-of-line according to the existing quota formulas as well as under-represented with respect to all four variables that the Executive Board was considering for inclusion in the new formula. Also, in previous quota reviews, ad hoc quota increases have at times been restricted to specific groups (e.g., developing countries) or differentiated between groups (e.g., oil producers versus others).

14. **One such approach would be to limit second round increases to members whose quotas are most out of line**—for example, whose ratio of calculated to actual quota shares exceeded a chosen threshold. Alternatively, members whose quotas are most out-of-line could receive larger proportional reductions in their misalignment than less misaligned members.

15. **A further alternative that has recently been suggested is a supplementary filter based on contributions to PPP-weighted real global GDP growth.**⁹ The filter would seek to capture many of those countries whose weight and role in the world economy have been increasing in recent times, including countries that may be somewhat over-represented under the new formula now but are unlikely to remain so in the future. This would be consistent with the reform objective, as emphasized in the April 2007 IMFC Communiqué, of increasing the share of the Fund's most dynamic members. Such a filter could be used to restrict the list of eligible countries to those that have been making a strong contribution to global growth and that are either under-represented according to the formula or whose degree of over-representedness is not too large. Using a filter based on contributions to global growth to restrict eligibility would tend to filter out smaller economies but would achieve a more significant realignment of the shares of countries that remain. Alternatively, such a filter could also be used to add countries to the list of eligible members that otherwise would be limited to those that are under-represented according to the formula.

Treatment of members receiving first round increases

Consideration will also need to be given to the treatment of the ad hoc increases agreed for four members in the first round. These increases were intended as essentially a down payment on a larger reform that would include ad hoc increases for a broader list of members. Moreover, the four countries in question were chosen not because they were the most under-represented, though they were clearly among that group, but rather because they could be viewed as unambiguously under-represented taking account of both the existing quota formulas and their relative shares in the four main quota variables being considered for inclusion in a new formula, as noted above. Given these considerations, and to ensure even-handed treatment across members, it would seem reasonable when considering a broader list of ad hoc increases in the second round to take account of the increases already agreed in Singapore. In the simulations below, members' eligibility for an increase and the uniform reduction factor are determined based on a comparison of calculated quota shares under a new formula with actual quota shares prior to the Singapore increases. In these simulations, the four members receiving increases in Singapore obtain additional increases to the extent required to deliver the same overall proportionate reduction. Other approaches to a uniform reduction are also possible, as noted above.

Foregoing

16. **A further factor that will influence the degree of adjustment in quota shares in the second round is the extent to which some members that are eligible for second round increases may be willing to forego part or all of those increases.** In its report to Governors, the Executive Board noted that large advanced economies that already have sizable voting power in the Fund may be willing to consider foregoing, or at least limiting,

⁹ This approach was suggested by a participant during a G-20 deputies meeting in Istanbul on July 1. A supplementary filter was combined with a formula using GDP at market exchange rates and without compression. This approach is similar to the simulation shown in Table 6.

the increases they request in the second round. This would augment the quota increases available for other eligible members for a given aggregate increase in quotas.¹⁰ The United States has already stated that it would be willing to limit any second round increase that it would be entitled to under a new formula to a level that would restore the US voting share to its pre-Singapore level, and other advanced countries may also be willing not to take up the full amount to which they might otherwise be eligible.

17. Particularly for the Fund’s largest members, the extent of foregoing can make a significant difference in terms of the overall adjustment in quota shares that is possible for any given aggregate second round increase. Any decision on foregoing is of course for individual members to make, and limited guidance on this issue has been provided to date. Accordingly, for purely illustrative purposes, the simulations presented in this paper use the simplifying assumption that G-7 countries will limit any second round quota increases that they are entitled to under a new quota formula to a level that restores their pre-Singapore voting shares. If a G-7 country is not eligible for a second round increase or if that increase is not large enough to affect the desired restoration, the country in question does not have its pre-Singapore voting share restored under this assumption. Other approaches are of course possible, including that the G-7 as a group may agree to limit its take up to a particular level, with some redistribution within the group.¹¹

Size of increase in basic votes

18. Under the Board of Governors Resolution, basic votes are to be at least doubled and, at a minimum, would need to protect the voting share of low-income countries. The increase in basic votes is an integral part of the quota and voice reform, with the Resolution stipulating that the second round quota increases shall not become effective until the amendment of the Articles of Agreement related to basic votes has entered into force. As such, the Board will need to consider the scale of the increase in basic votes along with that of the second round increase. For purely illustrative purposes, in these simulations basic votes are either doubled (to 500 per member) or increased further to preserve the voting power of low-income countries as a whole at its pre-Singapore level.¹²

B. Second Round Simulations

19. The simulations presented in this section seek to provide a very preliminary indication of possible outcomes for the second round based on the above considerations.

¹⁰ *Report of the Managing Director to International Monetary and Financial Committee on IMF Quota and Voice Reform* (2006).

¹¹ An approach along these lines was followed in the Ninth General Review.

¹² Specifically, the simulations determine the size of basic votes that would be necessary for a given size of the second round ad hoc increases to protect low-income country voting shares under the simplifying assumption that no low-income country were to receive a quota increase in the second round. Basic votes are raised either to that level or to 500 per member, whichever is greater.

As noted, they are purely illustrative and intended solely to help advance the discussions on the new quota formula. Tables 3–5 present the results in terms of voting shares for the main country groups of three different illustrative sizes of the second round (corresponding to a total quota increase in the two rounds combined in the range of 7.5–12.5 percent).¹³ In each case, simulations are presented using six alternative formulations for a new quota formula that are drawn from the scenarios considered earlier in this paper. As discussed above, the simulations assume: (a) that second round increases are allocated to all under-represented members to achieve a uniform proportional reduction in out-of-lineness, based on pre-Singapore quota shares and taking into account the first round ad hoc increases provided to four members; (b) that basic votes are doubled, except where a larger increase is needed to protect the voting shares of low-income countries; and (c) foregoing by eligible G-7 members of any increases that would take them beyond their pre-Singapore voting shares.

20. Several very preliminary conclusions may be drawn from these simulations:

- First, while the simulations imply significant increases in shares for individual countries that are eligible for ad hoc quota increases, the results for major country groups generally show little change or a modest increase in the voting share of developing countries as a whole in the second round. This partly reflects that, even with foregoing, major advanced countries tend to take up a significant part of the second round increase, and also that a number of smaller advanced countries would be eligible for ad hoc increases under the allocation mechanism assumed in these simulations.¹⁴ A larger shift in aggregate shares would likely require a greater degree of foregoing or a different allocation mechanism to that illustrated here.
- Second, there tends to be more room for developing countries to gain in share in those scenarios where the overall size of the second round quota increase is larger.
- Third, while the choice of quota formula has a significant effect on the distribution of members' calculated quota shares, as discussed earlier, its impact on actual voting shares after the second round is more muted based on the assumptions used in these scenarios. In general, however, the gain in the share of developing countries is greatest in those scenarios with a formula that utilizes a blended GDP variable or that combines blended GDP with compression.
- Fourth, a relatively large number of countries would be eligible for ad hoc quota increases based purely on the criterion of under-representedness using the new formula, though the precise number and composition of these countries can vary

¹³ A supplement to this report provides individual country details, as well as a list of member countries receiving second round increases under each simulation.

¹⁴ For example, even with all G-7 countries foregoing, 41 percent of the overall increase (first and second rounds combined) would go to major advanced countries under the scenario presented in the third column of Table 3 (i.e., 50/30/15/5, with a 7.5 percent overall increase). If only the United States were to forego, this number would increase to 52 percent.

significantly across the different simulations. The number of qualifying countries is largest in the scenarios involving compression. Also, for a given second round, the extent of the proportionate reduction in out-of-lineness that is possible varies inversely with the number of eligible members.

21. **The alternative approach discussed above of using a supplementary filter to determine eligibility for the second round is illustrated in Table 6.** The scenario uses a new formula based on market rate GDP with weights of 50/30/15/5 and is based on an overall quota increase at the lower end of the above range. The filter has been calculated to capture countries that have contributed more than 0.5 percent to PPP-weighted real global growth during the period 2001–05 (see text table). These parameters have been chosen to make the simulation similar to the approach suggested by one participant at the G-20 meeting in Istanbul on July 1. Under this approach, the filter is used both to exclude countries that do not meet the above test, as well as to add additional countries that meet the test and are not over-represented by more than 50 percent using the above formula.

22. **Based on the parameters illustrated here, it can be seen that such an approach can lead to a significantly different outcome in terms of the second round increases.** In particular, the ad hoc increases would be concentrated on a significantly shorter list of countries that have made sizable contributions to global growth, and are either under-represented or not very over-represented based on the new formula. This would comprise 13 countries (left hand panel of the text table) that are under-represented, and 6 countries (shaded in the right hand panel) that are over-represented. As noted above, a further variant of this approach would be to use the filter to add additional countries to the list. Under this variant, use of the same filter would add the 6 additional countries to the broader list of under-represented countries that would qualify for ad hoc increases based on the methodology described above. It should be stressed that these simulations are intended to be purely illustrative of the potential results of a supplementary filter based on contributions to global growth. Different parameters and combinations involving such an approach could also be considered.

**PPP-Weighted Real Global GDP Growth:
Countries that Contributed more than 0.5 Percent in 2001–05 1/**

Underrepresented countries 2/	Percentage share of global growth	Overrepresented countries 3/	Percentage share of global growth
China 4/	32.08	India	9.50
United States	12.48	Russia	3.85
Japan	2.23	United Kingdom	2.12
Korea	2.03	Brazil	1.89
Spain	1.57	Indonesia	1.71
Thailand	1.15	Iran, I.R. of	1.24
Turkey	1.08	Canada	1.19
Mexico	0.86	France	1.18
Vietnam	0.75	Ukraine	1.01
Germany	0.68	South Africa	0.92
Poland	0.67	Australia	0.86
Italy	0.53	Pakistan	0.78
Malaysia	0.53	Philippines	0.78
		Bangladesh	0.68
		Saudi Arabia	0.59
		Argentina	0.52
		Colombia	0.51
		Myanmar	0.50

Source: Finance Department.

1/ The contribution of a country to global GDP growth in 2001–05 is calculated as the average share of the country in PPP-based global GDP in 2001–05 times its average annual real GDP growth rate (in constant local currency units) during the same period. Data series for 178 member countries were taken from World Economic Outlook database published in April 2007.

2/ Countries that are underrepresented on the basis of a linear formula (based on market rate GDP) with the weights (50/30/15/5).

3/ Countries that are overrepresented on the basis of a linear formula (based on market rate GDP) with the weights (50/30/15/5); countries that are overrepresented by less than 50 percent (with the exception of Canada, France and the UK) are shaded.

4/ Includes China, P.R., and Hong Kong SAR.

IV. ISSUES FOR DISCUSSION

23. **Directors may wish to comment in particular on:**

- The merits of including a blended GDP variable, compression, or a combination of the two in the new quota formula;
- Whether they see merit in continuing to explore the inclusion of financial openness in the formula at this stage, given the data limitations, and if so in what form;
- The importance of further pursuing changes to the definition of variability, in light of the discussion in Appendix 1.

- The appropriate weights for GDP, openness, variability and reserves in the new formula.
- The desirable total size for the second round of ad hoc quota increases, and for the increase in basic votes.
- The appropriate way to allocate second round ad hoc increases, and in particular, whether a supplementary filter along the lines of the approach discussed during the Istanbul G-20 meeting should be further explored.

Table 1. Calculated Quota Shares Based on a Linear Formula with Current Quota Variables and Financial Openness 1/ 2/
(in percent)

	Actual Quotas 3/		Existing Five Formulas	GDP 50%	GDP 50%	GDP 45%	GDP 50%
	Pre First Round	Post First Round		Openness 30%	Openness 25%	Openness 25%	Openness
	Increases	Increases 4/		Variability 15% Reserves 5%	Variability 20% Reserves 5%	Variability 25% Reserves 5%	Blend 30% 5/ Variability 15% Reserves 5%
Advanced economies	61.6	60.5	65.6	69.6	69.3	68.7	71.1
Major advanced economies	46.0	45.2	45.9	53.6	53.4	52.4	54.4
Of which: US	17.4	17.1	16.3	22.2	22.5	22.0	23.0
Other advanced economies	15.6	15.3	19.7	16.0	15.9	16.3	16.7
Developing countries	30.9	32.1	28.6	25.4	25.6	26.1	24.3
Africa	5.5	5.4	2.4	2.1	2.2	2.3	2.0
Asia 6/	10.3	11.5	16.2	13.7	13.7	13.8	13.1
Middle East, Malta & Turkey	7.6	7.6	4.8	4.0	4.1	4.2	3.7
Western Hemisphere	7.5	7.6	5.2	5.5	5.7	5.8	5.4
Transition economies	7.6	7.4	5.7	5.0	5.1	5.2	4.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:							
EU 27	32.9	32.4	37.8	33.9	33.3	33.3	34.4
LICs 7/	7.5	7.4	3.6	3.5	3.5	3.5	3.2

Source: Finance Department.

1/ Calculated as the sum of variable weights multiplied with a country's share in the global total of the respective variables.

2/ Based on 1993–2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold.

3/ For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used. Also includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

4/ Includes ad hoc increases for China, P.R., Korea, Mexico, and Turkey.

5/ Trade openness and financial openness are blended in equal proportion. Financial openness is measured as average investment income in the current account adjusted for international banking interest. Trade openness is the average sum of current receipts and payments, excluding investment income, adjusted for re-exports and non-monetary gold.

6/ Including Korea and Singapore.

7/ PRGF-eligible countries.

Table 2. Calculated Quota Shares Based on a Formula with a GDP Blend, Compression, and Combinations 1/ 2/ (in percent)

	Actual Quotas 3/		Existing Five Formulas	GDP Blend 50% 5/ Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.95 6/	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.90 6/	GDP Blend 50% 5/ Openness 30% Variability 15% Reserves 5% K=0.95 6/	GDP Blend 50% 5/ Openness 25% Variability 20% Reserves 5% K=0.95 6/
	Pre First Round Increases	Post First Round Increases 4/						
Advanced economies	61.6	60.5	65.6	66.4	67.5	65.2	64.5	64.1
Major advanced economies	46.0	45.2	45.9	51.0	50.6	47.5	48.2	48.0
Of which: US	17.4	17.1	16.3	21.1	20.1	18.1	19.1	19.4
Other advanced economies	15.6	15.3	19.7	15.4	16.9	17.6	16.3	16.2
Developing countries	30.9	32.1	28.6	28.3	27.0	28.7	29.7	30.0
Africa	5.5	5.4	2.4	2.4	2.5	3.0	2.8	2.8
Asia 7/	10.3	11.5	16.2	16.1	14.1	14.4	16.1	16.1
Middle East, Malta & Turkey	7.6	7.6	4.8	4.1	4.4	4.9	4.5	4.6
Western Hemisphere	7.5	7.6	5.2	5.9	6.0	6.5	6.3	6.4
Transition economies	7.6	7.4	5.7	5.3	5.5	6.1	5.8	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
EU 27	32.9	32.4	37.8	32.6	34.3	34.6	33.1	32.5
LICs 8/	7.5	7.4	3.6	4.4	4.0	4.5	4.8	4.9

Source: Finance Department.

1/ Calculated as the sum of variable weights multiplied with a country's share in the global total of the respective variables.

2/ Based on 1993–2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold.

3/ For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used. Also includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

4/ Includes ad hoc increases for China, P.R., Korea, Mexico, and Turkey.

5/ GDP is blended using 75 percent GDP weighted at market exchange rates and 25 percent GDP weighted at PPP exchange rates. PPP data were retrieved from the WEO database for 176 countries. For nine countries with no WEO data, PPP GDP was estimated based on the countries' share in global GDP at market rates.

6/ The compression (K) raises the quota formula to the power of K.

7/ Including Korea and Singapore.

8/ PRGF-eligible countries.

**Table 3. Second Round Simulation—Illustration of Voting Shares 1/ 2/
(in percent)**

	Pre First Round Increases	Post First Round Increases	GDP 50% Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 25% Variability 20% Reserves 5%	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.95 4/	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.90 4/	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5% K=0.95 4/
Advanced economies	60.6	59.5	59.5	59.5	59.2	59.5	59.5	59.3
Major advanced economies	45.1	44.4	44.1	44.1	44.0	44.1	43.9	44.0
Of which: US	17.0	16.7	17.0	17.0	17.0	17.0	16.9	17.0
Other advanced economies	15.4	15.2	15.5	15.5	15.2	15.5	15.6	15.3
Developing countries	31.7	32.9	32.9	33.0	33.3	32.9	32.9	33.1
Africa	6.0	5.9	6.0	6.0	6.0	6.0	6.0	6.0
Asia 5/	10.4	11.6	11.9	11.8	12.2	11.7	11.6	12.0
Middle East, Malta & Turkey	7.6	7.6	7.4	7.4	7.4	7.4	7.5	7.4
Western Hemisphere	7.7	7.8	7.6	7.7	7.7	7.7	7.8	7.7
Transition economies	7.7	7.6	7.5	7.5	7.5	7.6	7.6	7.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
No. of countries receiving ad hocs			35	34	37	50	66	52
Uniform reduction factor 6/			34.1	32.9	27.4	27.9	25.1	23.5
EU 27	32.5	32.0	32.1	32.0	31.8	32.1	32.1	31.8
LICs 7/	8.3	8.1	8.4	8.4	8.5	8.4	8.4	8.5

Source: Finance Department.

1/ These simulations assume a uniform proportional reduction of out-of-lineness, based on members' pre-Singapore quota shares and taking into account the first round ad hoc increases provided to four members. They also assume: a) a 5.6 percent increase (total first and second round increase of 7.5 percent); b) at least a doubling of basic votes, and protection of the pre-Singapore voting shares of LICs; and c) foregoing by eligible G-7 members to their pre-Singapore voting shares.

2/ Based on 1993–2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold. For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used. Includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

3/ GDP is blended using 75 percent GDP weighted at market exchange rates and 25 percent GDP weighted at PPP exchange rates. PPP data were retrieved from the WEO database for 176 countries. For nine countries with no WEO data, PPP GDP was estimated based on the countries' share in global GDP at market rates.

4/ The compression (K) raises the quota formula to the power of K.

5/ Including Korea and Singapore.

6/ Uniform proportional reduction in the gap between calculated and actual quota shares, using the formula indicated above.

7/ PRGF-eligible countries.

**Table 4. Second Round Simulation—Illustration of Voting Shares 1/ 2/
(in percent)**

	Pre First Round Increases	Post First Round Increases	GDP 50% Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 25% Variability 20% Reserves 5%	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.95 4/	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.90 4/	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5% K=0.95 4/
Advanced economies	60.6	59.5	59.3	59.3	58.9	59.4	59.3	59.1
Major advanced economies	45.1	44.4	43.8	43.8	43.8	43.8	43.6	43.7
Of which: US	17.0	16.7	17.0	17.0	17.0	17.0	16.9	17.0
Other advanced economies	15.4	15.2	15.6	15.5	15.1	15.6	15.7	15.3
Developing countries	31.7	32.9	33.2	33.3	33.7	33.1	33.1	33.4
Africa	6.0	5.9	5.9	5.9	5.9	5.9	6.0	5.9
Asia 5/	10.4	11.6	12.4	12.3	12.7	12.1	11.9	12.4
Middle East, Malta & Turkey	7.6	7.6	7.4	7.4	7.3	7.4	7.5	7.4
Western Hemisphere	7.7	7.8	7.6	7.7	7.7	7.7	7.8	7.7
Transition economies	7.7	7.6	7.4	7.4	7.4	7.5	7.6	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
No. of countries receiving ad hocs			36	35	38	51	67	53
Uniform reduction factor 6/			46.1	44.6	38.2	38.8	34.5	33.2
EU 27	32.5	32.0	32.0	31.9	31.6	32.0	32.1	31.7
LICs 7/	8.3	8.1	8.3	8.3	8.5	8.3	8.3	8.5

Source: Finance Department.

1/ These simulations assume a uniform proportional reduction of out-of-lineness, based on members' pre-Singapore quota shares and taking into account the first round ad hoc increases provided to four members. They also assume: a) an 8.1 percent increase (total first and second round increase of 10 percent); b) at least a doubling of basic votes, and protection of the pre-Singapore voting shares of LICs; and c) foregoing by eligible G-7 members to their pre-Singapore voting shares.

2/ Based on 1993-2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold. For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used. Includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

3/ GDP is blended using 75 percent GDP weighted at market exchange rates and 25 percent GDP weighted at PPP exchange rates. PPP data were retrieved from the WEO database for 176 countries. For nine countries with no WEO data, PPP GDP was estimated based on the countries' share in global GDP at market rates.

4/ The compression (K) raises the quota formula to the power of K.

5/ Including Korea and Singapore.

6/ Uniform proportional reduction in the gap between calculated and actual quota shares, using the formula indicated above.

7/ PRGF-eligible countries.

**Table 5. Second Round Simulation—Illustration of Voting Shares 1/ 2/
(in percent)**

	Pre First Round Increases	Post First Round Increases	GDP 50% Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 25% Variability 20% Reserves 5%	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5%	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.95 4/	GDP 50% Openness 30% Variability 15% Reserves 5% K=0.90 4/	GDP Blend 50% 3/ Openness 30% Variability 15% Reserves 5% K=0.95 4/
Advanced economies	60.6	59.5	59.1	59.0	58.5	59.1	59.1	58.7
Major advanced economies	45.1	44.4	43.5	43.5	43.5	43.5	43.3	43.4
Of which: US	17.0	16.7	17.0	17.0	17.0	17.0	16.9	17.0
Other advanced economies	15.4	15.2	15.6	15.5	15.1	15.6	15.7	15.3
Developing countries	31.7	32.9	33.6	33.6	34.1	33.4	33.4	33.8
Africa	6.0	5.9	5.9	5.9	5.9	5.9	6.0	5.9
Asia 5/	10.4	11.6	12.8	12.7	13.2	12.4	12.2	12.8
Middle East, Malta & Turkey	7.6	7.6	7.3	7.3	7.2	7.3	7.4	7.3
Western Hemisphere	7.7	7.8	7.6	7.7	7.7	7.7	7.8	7.7
Transition economies	7.7	7.6	7.4	7.3	7.4	7.5	7.6	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
No. of countries receiving ad hocs			36	35	38	51	67	54
Uniform reduction factor 6/			56.3	56.3	46.7	47.5	42.1	40.7
EU 27	32.5	32.0	31.9	31.8	31.4	31.9	32.0	31.5
LICs 7/	8.3	8.1	8.3	8.3	8.5	8.3	8.4	8.6

Source: Finance Department.

1/ These simulations assume a uniform proportional reduction of out-of-lineness, based on members' pre-Singapore quota shares and taking into account the first round ad hoc increases provided to four members. They also assume: a) a 10.5 percent increase (total first and second round increase of 12.5 percent); b) at least a doubling of basic votes, and protection of the pre-Singapore voting shares of LICs; and c) foregoing by eligible G-7 members to their pre-Singapore voting shares.

2/ Based on 1993–2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold. For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used. Includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

3/ GDP is blended using 75 percent GDP weighted at market exchange rates and 25 percent GDP weighted at PPP exchange rates. PPP data were retrieved from the WEO database for 176 countries. For nine countries with no WEO data, PPP GDP was estimated based on the countries' share in global GDP at market rates.

4/ The compression (K) raises the quota formula to the power of K.

5/ Including Korea and Singapore.

6/ Uniform proportional reduction in the gap between calculated and actual quota shares, using the formula indicated above.

7/ PRGF-eligible countries.

Table 6. Second Round Simulation—Illustration of an Alternative Approach Involving a Supplementary Filter 1/ (in percent)

	Voting Share 2/		Actual Quota Share 2/ 4/		Calculated Quota Share 5/		Second Round Simulation 7/	
	Pre First Round Increases	Post First Round Increases 3/	Pre First Round Increases	Post First Round Increases 3/	Existing Five Formulas	New Formula 6/	Quota Share	Voting Share
Advanced economies	60.6	59.5	61.6	60.5	65.6	69.6	60.8	59.0
Major advanced economies	45.1	44.4	46.0	45.2	45.9	53.6	45.7	44.1
Of which: US	17.0	16.7	17.4	17.1	16.3	22.2	17.7	17.0
Other advanced economies	15.4	15.2	15.6	15.3	19.7	16.0	15.1	15.0
Developing countries	31.7	32.9	30.9	32.1	28.6	25.4	32.1	33.5
Africa	6.0	5.9	5.5	5.4	2.4	2.1	5.1	6.0
Asia 8/	10.4	11.6	10.3	11.5	16.2	13.7	12.2	12.3
Middle East, Malta & Turkey	7.6	7.6	7.6	7.6	4.8	4.0	7.3	7.4
Western Hemisphere	7.7	7.8	7.5	7.6	5.2	5.5	7.5	7.9
Transition economies	7.7	7.6	7.6	7.4	5.7	5.0	7.1	7.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
No. of countries receiving ad hocs							19	19
Uniform reduction factor 9/							40.0	40.0
EU 27	32.5	32.0	32.9	32.4	37.8	33.9	32.0	31.3
LICs 10/	8.3	8.1	7.5	7.4	3.6	3.5	7.3	8.6

Source: Finance Department.

1/ Based on an approach outlined by a participant during a G-20 deputies meeting in Istanbul on July 1, 2007.

2/ Includes Montenegro, which became a member on January 18, 2007 (pre-Singapore shares have been adjusted accordingly).

3/ Includes ad hoc increases for China, P.R., Korea, Mexico, and Turkey.

4/ For the three countries that have not yet consented to, and paid for, their quota increases, 11th Review proposed quotas are used.

5/ Based on 1993–2005 data. Reflects the impact of adjustments to current receipts and payments for re-exports, international banking interest, and non-monetary gold.

6/ $0.5 \times \text{GDP} + 0.3 \times \text{Openness} + 0.15 \times \text{Variability} + 0.05 \times \text{Reserves}$.

7/ Under this scenario, members are eligible for a quota increase if i) they contributed more than 0.5% to global GDP growth measured at PPP exchange rates during the period 2001-05 and ii) they are either under-represented or over-represented by not more than 50 percent under the new quota formula. They also assume: a) a 5.6 percent increase (total first and second round increase of 7.5 percent); b) a doubling of basic votes; c) foregoing by eligible G-7 countries (US, Japan, Germany, Italy) to their pre-Singapore voting shares; d) other under-represented eligible countries' out-of-lineness is reduced at a uniform proportional rate; and e) over-represented eligible members receive a 5% increase above their pre-Singapore voting shares (except the UK, Canada, and France).

8/ Including Korea and Singapore.

9/ Uniform proportional reduction in the gap between calculated and actual quota shares, applied to underrepresented countries, using the formula indicated above.

10/ PRGF-eligible countries.

Appendix I. Alternative Measures of Variability¹⁵

I. BACKGROUND

24. Variability has traditionally been included in the quota formulas as a measure of members' potential need for Fund resources, as discussed in *A New Quota Formula—Additional Considerations* (2007). The modernized version of variability is defined as the standard deviation of current receipts and net capital flows (CR+NCF) from a centered, three-year moving average over a recent 13-year period.

25. During the recent informal discussions of the quota formula, questions were raised as to whether the measure adequately captures members' potential need for Fund resources. In particular, it was noted that advanced economies as a group hold the majority share of the variable; while these members have a right to draw should a need arise, such a circumstance was noted to be unlikely. Underlying this issue is the difficulty of capturing and balancing in a simple measure members' relative susceptibility to, and capacity to absorb, exogenous shocks, along with the potential size of access in case a borrowing need occurs.

26. This appendix considers, on a preliminary basis, possible modifications to the current definition of variability, as well as alternative formulations for a variability measure. While it is valuable to consider a range of possibilities, the feasibility and appropriateness of any of the preliminary ideas outlined below would need more rigorous assessment before any consideration of their application to the quota formula. The results of the possible modifications are discussed in each case based on the updated database through 2005 (see Tables A1 and A2). Detailed results by country will be provided in a supplement.

II. MODIFYING THE CALCULATION OF VARIABILITY

A. Scaling Options

27. Some observers have noted the high correlation between GDP and variability and have argued that the current measure does not adequately capture the susceptibility of a member to balance of payments disruptions. One proposal discussed in the March informal Board meeting was to scale variability by GDP or the average of current receipts and net capital flows (CR+NCF). However, scaling in this way does not improve the measurement of susceptibility to balance of payments disruptions, but rather simply eliminates from the calculation the important consideration of the potential size of need. For instance, under a measure scaled by GDP the smallest four Fund members each acquire shares that exceed those held by each of the largest 19 developing and transition economies.¹⁶

¹⁵ All the calculations referred to in this annex are preliminary.

¹⁶ Another possibility is to scale the current variability measure by per capita GDP, under the assumption that an economy has more capacity to absorb volatility as its per capita income rises. The use of per capita GDP as a scaler leads to a sharp reduction in the advanced economy share, but unlike scaling by GDP, it does not yield a relatively large increase in the share of small economies. Nonetheless, such a measure effectively uses

(continued...)

B. The Use of a Three- Versus Five-Year Trend

28. In earlier discussions of the incorporation of net capital flows into a modernized variability measure, the Board generally agreed with the recommendation of staff to move to a three-year as opposed to a five-year trend in calculating variability. Such a move was considered appropriate to capture the greater short-term variability of capital flows. It was recognized that the shift to a three-year average would not have a significant impact at the group level and that a three-year measure would serve to smooth trends while adequately capturing very short-term fluctuations in capital flows.¹⁷

29. There are pros and cons associated with both a three- and five-year trend. The five-year average is smoother, therefore it attributes a greater portion of fluctuations in the series to variability versus a three year average, which would implicitly attribute a greater portion of the fluctuation to underlying trends (see Figure 1). Such fluctuations could be driven, for instance, by cycles in commodity prices, world interest rates or changes in capital flow patterns, which may or may not be associated with an increased demand for Fund resources. The use of five-year averaging, however, can exaggerate the deviations from an accelerating or decelerating growth trend. In the calculation of a centered moving average, the longer the trend of accelerating or decelerating growth, the greater the deviation of the observations from the centered moving average. Such a deviation from trend is not necessarily a case of vulnerability, and accordingly not a good measure of need.

30. As noted above, when the Board previously addressed this issue, it was recognized that the choice of a three- versus a five-year trend did not have a major impact on the distribution of variability over broad groups of members, though it could have a significant impact at an individual country level.¹⁸ This remains the case with the updated database. In particular, switching back to the use of a five-year trend would increase developing country shares by 3.1 percentage points relative to the measure based on a three-year trend. The share of transition economies would decline by 0.4 percentage points and advanced countries by 2.7 percentage points. Developing Asia would benefit the most (+2.4 percentage points), and Western Hemisphere would also gain (+1.1 percentage points).

C. Downside Variability

31. Another option is to measure variability using the squared deviations of below-trend CR+NCF flows, based on the notion that periods of below-trend inflows are most likely to be associated with a greater potential need for Fund resources.¹⁹ Under this method countries

population to scale up variability (scaled down by GDP), giving very large shares to highly populated countries. As such, it also is problematic as a measure of potential need to access Fund resources.

¹⁷ *IMF Executive Board Discusses Quota Formulas, Public Information Notice No. 02/59.*

¹⁸ See *Alternative Quota Formulas—Further Considerations* (2002).

¹⁹ Calculations presented here are based on the sum of squared deviations rather than averages (which are used in the standard variability calculation); this places a greater weight on the frequency of shortfalls.

that exhibit sudden and deep downswings followed by gradual recoveries would be expected to gain shares relative to countries that have symmetric fluctuations around trend.

32. Application of this method results in regional shares that are broadly similar to the current measure, increasing the developing and transition country shares by 1.5 and 0.6 percentage points, respectively.

D. Extreme Variability

33. Another concept that could be considered is to look at below-trend inflows, but focus only on the periods of strongest deviations. The idea behind this approach is that countries develop mechanisms to cope with some degree of cyclical volatility, but remain exposed to events that are extreme relative their own norms and are more likely to seek access to Fund resources under such extreme circumstances. The calculation of extreme variability could be based on the squares of the CR+NCF outturns (in deviation from a moving-average trend) that are one standard-deviation below trend.²⁰ By taking into account only sizeable downturns in inflows, this measure in theory should come closer to capturing the potential demand for Fund resources. Since this calculation is based on a typically small number of extreme observations, it could be subject to large changes over time for each country; this would be the case, for example where a country experienced a crisis in an early year of the current coverage period, followed by a period of relative stability.

34. The result of applying the extreme variability measure is an increase of 2.9 percentage points in the share of variability for developing countries vis-à-vis the standard measure of variability, with all regional groupings gaining. The biggest regional gainers are the Western Hemisphere and Asia (1.1 and 1.2 percentage points, respectively).

35. It should also be noted that these options for modifying the current measure of variability are not necessarily mutually exclusive. For example, combining the concepts of extreme variability and a five-year trend would increase developing and transition country shares by a total of 6.8 percentage points relative to the current measure. All developing regions would gain, with Asia and the Western Hemisphere gaining most (3.4 percentage points and 1.8 percentage points, respectively).

E. Sum of Variability of CR and Variability of NCF

36. In recommending the modernization of the variability measure to include net capital flows, the Quota Formula Review Group (QFRG) proposed a measure similar to that which has been used in recent years, based on the variability of CR+NCF.²¹ In a 2001 staff paper, staff weighed arguments for and against combining CR and NCF in a single variability

²⁰ As with the downside variability measure, calculations for extreme variability presented here are based on the sum of squared deviations.

²¹ *Report to the IMF Board of the Quota Formula Review Group (2000).*

measure as opposed to including the variability of each measure separately; on balance, staff recommended use of the sum of CR and NCF.²² Most Directors supported the use of variability of CR+NCF, though others preferred that the variability of capital flows be included as a stand alone measure.

37. The variability of CR+NCF, as it is currently calculated, captures the net overall impact of balance of payments variability, by taking into account the possible procyclicality or countercyclicality of NCF with respect to CR that would be removed with a measure based on calculating the variability of CR and NCF separately. On the other hand, summing the variability of current receipts and net capital flows individually would be preferable if one believed that the variability of these flows affect an economy in different ways and that the extent of their co-movements should not be emphasized.

38. Empirically, the impact of calculating each term separately is modest, with the developing and transition country shares rising 2.2 and 0.9 percentage points, respectively, and the Western Hemisphere share declining.

III. OTHER POSSIBLE FORMULATIONS OF VARIABILITY

39. A more fundamental redefinition of variability is also conceivable. The objective would be to improve the relationship between the variability measure and the susceptibility of a member to circumstances that would drive potential need for Fund resources. For example, the volatility of real GDP growth or consumption growth or the extent of consumption risk sharing with the rest of the world could be considered.

40. For the purposes of the quota formula, such measures of need would have to be scaled up to reflect the potential size of the access to Fund resources. Since the dispersion in each of the volatility measures considered below is much smaller than the dispersion in size across countries (as captured by consumption or GDP), the resulting measures of variability are still highly correlated with economic size. In other words, given the wide dispersion in economic size across countries and of the scale of potential need, size will continue to play an important role in any measure of variability entering the quota formula.

A. Volatility of GDP Growth

41. The standard deviation of real GDP growth—here multiplied by a recent three-year average of nominal GDP—is a simple measure of the overall vulnerability of a country to

²² In the 2001 paper, staff argued that the overall balance of payments framework suggested that CR and NCR should be combined and that taking the variability of NCF as a stand-alone measure would be equivalent to measuring the variability of the current account plus reserves, a sum that may fluctuate from year to year for reasons that are not necessarily indicative of the degree of balance of payments vulnerability. However, staff also noted that the interpretation to be given to a measure that combines gross CR and NCR was unclear, and noted the question of whether a slowdown in CR ought to be treated in the same way as a capital account reversal. Moreover, staff noted the difficulty in defining the normal level around which variability is measured, given that CR and NCF may have different trends and cyclical behavior. See *Alternative Quota Formulas—Considerations* (2001).

domestically and externally driven shocks. Moreover, this measure has the benefit of a relatively low data requirement, as real GDP data are available for most members. However, the volatility of GDP is only an indirect measure of consumption volatility. Countries employ, with different degrees of success, different mechanisms to cope with income volatility (through financial markets, international financial integration, savings, social security systems) which this measure does not take into account. Also, as with the other variants below, such an approach would represent a more fundamental change from the traditional approach in the quota formulas of considering variability in a member's balance of payments and external sector vulnerability. Importantly, this would give greater weight to shocks of domestic origin, including policy slippages and political upheavals.

42. Based on the updated database, calculating variability as the volatility of GDP growth adds 5.8 and 4.8 percentage points to the shares of developing and transition economies, respectively, with Asia and the Western Hemisphere gaining most strongly.

B. Volatility of Consumption Growth

43. Ultimately, the economic costs of volatility derive from the inability of agents to smooth consumption in the face of a volatile income stream. Thus, a further alternative would be to focus on the volatility of consumption rather than the volatility of overall output. This approach would carry similar pros and cons to those noted above for GDP volatility, reflecting the impact of consumption volatility from all sources. It would, however, take into account mechanisms to cope with the effects of income volatility on consumption.

44. To illustrate this approach, the standard deviation of real consumption growth multiplied by a recent three-year average of nominal consumption provides a direct yet simple measure of consumption volatility in the face of domestically and externally driven shocks. This measure adds 12.5 and 4.5 percentage points to the shares of developing and transition countries, respectively. All regions would gain. However, the technical feasibility of constructing such a measure for the membership would need to be further investigated.

C. Measuring the Extent of Consumption Risk Sharing

45. Access to Fund resources is one way for countries to share risk internationally and reduce consumption volatility relative to income volatility. One measure of the extent to which agents in an economy can smooth consumption in the face of income fluctuations is the volatility of consumption growth relative to the volatility of income growth. A country that can successfully decouple consumption fluctuations from those of output through a high degree of domestic or international risk sharing would exhibit a lower volatility of consumption growth relative to output growth, and such a country would be expected to have a lower probability of need to access Fund resources. For the purposes of the quota formula,

this measure of need would also have to be scaled up to reflect economic size; here this is done using a recent three year average of nominal consumption.²³

46. An advantage of this measure is that it focuses on the relationship between consumption and output, including in the event of a crisis episode affecting both (the numerator and denominator) simultaneously. As with consumption volatility, the technical feasibility of constructing this measure for the membership would also need to be further investigated.

47. Based on preliminary data, this measure reduces shares for both developing and transition economies by 5.8 and 1.7 percentage points, respectively.

²³ Measures of the lack of international consumption risk sharing such as the volatility of consumption relative GDP, or the correlation between consumption and output growth, rank large emerging markets that have had large access to GRA lending higher than the advanced and low income countries. This is in line with findings in the literature that developing countries with higher integration into international capital markets (emerging market economies) have exhibited lower degrees of consumption risk sharing than other developing economies and advanced economies. However, the dispersion in such measures is small by construction; therefore, the scaling-up by size largely determines the country shares in this exercise.

**Table A1. Alternative Measures of Variability 1/
(Shares, in percent)**

	Variability of Current Receipts Plus Net Capital Flows	Variability Scaled by GDP	Variability Scaled by GDP per capita	Variability Using 5-Year Moving Average	Downside Variability 2/	Extreme Variability 3/	Extreme Variability: With a 5-Year Moving Average 4/	Variability of Current Receipts + Variability of Net Capital Flows 5/
Advanced economies	62.7	11.6	8.7	60.1	60.7	58.7	55.9	59.6
Major advanced economies	43.3	0.9	6.0	42.0	41.0	37.3	38.2	40.3
Of which: US	20.7	0.1	2.6	20.2	17.7	12.6	14.2	15.5
Other advanced economies	19.5	10.7	2.7	18.1	19.7	21.4	17.7	19.4
Developing countries	30.7	76.7	81.9	33.8	32.2	33.6	36.7	32.9
Africa	3.2	32.2	21.9	3.0	3.3	3.4	3.5	3.5
Asia 6/	13.5	19.0	37.8	15.9	13.9	14.7	17.0	14.3
Middle East, Malta & Turkey	6.2	10.8	11.7	5.9	6.6	6.7	6.6	8.1
Western Hemisphere	7.8	14.7	10.6	8.9	8.4	8.9	9.6	7.0
Transition economies	6.6	11.7	9.4	6.2	7.1	7.7	7.4	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:								
EU 27	31.3	12.5	6.3	27.8	32.8	35.2	30.2	31.0
LICs 7/	4.0	46.7	39.9	3.7	4.2	4.5	3.8	4.3

Source: Finance Department.

1/ Preliminary calculations based on 1993–2005 data. Reflects the impact of adjustments to current receipts for re-exports, international banking interest, and non-monetary gold. Includes Montenegro, which became a member on January 18, 2007.

2/ Measures the square root of the sum of squared differences from a centered 3-year moving average of below trend (3-year moving average) levels of current receipts plus net capital flows.

3/ Measures only differences from a centered 3-year moving average for observations that are more than one standard deviation below the trend (3-year moving average). Like downside variability, it takes the square root of the sum of squared differences.

4/ Measures only differences from a centered 5-year moving average for observations that are more than one standard deviation below the trend (5-year moving average). Like downside variability, it takes the square root of the sum of squared differences.

5/ Share of the sum of variability of current receipts plus variability of net capital flows.

6/ Including Korea and Singapore.

7/ PRGF-eligible countries.

**Table A2. Alternative Measures of Variability 1/
(Shares, in percent)**

	Variability of Current Receipts Plus Net Capital Flows	Volatility of GDP Growth (unscaled) 2/	Volatility of Consumption Growth (unscaled) 3/	Consumption Growth Volatility Relative to GDP Growth Volatility (unscaled) 2/ 3/ 4/	Volatility of GDP Growth (scaled up by GDP) 2/ 5/	Volatility of Consumption Growth (scaled up by consumption) 3/ 5/	Consumption Growth Volatility Relative to GDP Growth Volatility (scaled up by consumption) 2/ 3/ 4/ 5/
Advanced economies	62.7	5.4	3.5	8.0	52.1	45.7	70.3
Major advanced economies	43.3	1.1	0.6	2.0	42.6	35.7	55.9
Of which: US	20.7	0.2	0.1	0.2	20.2	16.1	23.5
Other advanced economies	19.5	4.3	2.8	6.0	9.5	10.1	14.4
Developing countries	30.7	69.6	81.9	80.4	36.5	43.2	24.9
Africa	3.2	35.6	45.3	40.8	3.0	6.0	3.7
Asia 6/	13.5	11.9	12.7	15.0	16.6	15.3	9.9
Middle East, Malta & Turkey	6.2	7.5	11.1	10.4	6.7	9.7	4.8
Western Hemisphere	7.8	14.7	12.8	14.2	10.1	12.2	6.5
Transition economies	6.6	25.0	14.6	11.6	11.4	11.0	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Item:							
EU 27	31.3	8.1	6.1	10.8	20.2	23.5	38.0
LICs 7/	4.0	45.7	50.4	49.1	4.3	7.3	5.2

Source: Finance Department.

1/ Preliminary calculations based on 1993-2005 data on GDP and consumption from the WEO database, published in April 2007. Reflects the impact of adjustments to current receipts for re-exports, international banking interest, and non-monetary gold. Includes Montenegro, which became a member on January 18, 2007.

2/ Measured as the standard deviation of real GDP growth in constant local currency units for 175 countries.

3/ Measured as the standard deviation of real consumption growth in constant local currency units for 154 countries.

4/ Calculated for 154 countries with available WEO data on real GDP and real consumption.

5/ Scaler is the series average for 2003-05. Measures scaled by consumption result in calculations for 150 countries with available WEO data.

6/ Including Korea and Singapore.

7/ PRGF-eligible countries.

Figure 1. Current Receipts Plus Net Capital Flows Relative to Three and Five Year Moving Averages

