INTERNATIONAL MONETARY FUND

Quota Formula Review—Initial Considerations

Prepared by the Finance Department
(In consultation with other departments)

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Boxes

I. INTRODUCTION[1]

1. **The Board of Governors has asked the Executive Board to complete a comprehensive review of the quota formula by January 2013.** This review is an important part of the 2010 quota and governance reforms. At the Seoul Summit, G-20 Leaders welcomed the reforms, which they noted include *"Continuing the dynamic process aimed at enhancing the voice and representation of emerging market and developing countries, including the poorest, through a comprehensive review of the quota formula by January 2013 to better reflect the economic weights; and through completion of the next general review of quotas by January 2014."*[2] At its most recent meeting in September 2011, the IMFC stressed that governance reform is crucial to the legitimacy and effectiveness of the IMF. The IMFC committed to intensify its efforts to meet the 2012 Annual Meetings target for effectiveness of the 2010 reform, and called for a report on progress in the quota formula review by the time of its next meeting.[3]

2. **This paper provides a basis for an initial Board discussion on the review.** It builds on Directors' previous guidance on areas for further work. This includes the agreement at the conclusion of the 2008 quota and voice reform that further work was needed in several areas: the scope for measuring openness on a value added rather than a gross basis, the appropriate treatment of intra-currency union flows, the appropriate way of capturing financial openness, and how to improve the measure of variability to adequately capture members' potential need for Fund resources.[4] It also reflects Directors' views provided at an informal meeting in September 2011, based on an issues paper for the review.[5]

3. **A wide range of views were expressed at the September meeting.** These included various calls to further simplify the formula by reducing it to GDP alone (or perhaps combined with one other variable); increase the weight on financial openness; and explore the scope for capturing members' financial contributions to the Fund. This paper reports on the results of further technical work by the staff on the above issues. Given the early stage of discussions, no proposals are made. However, the paper does include a limited number of

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[1] Prepared by a staff team led by M.S. Kumar and S. Bassett, and comprising H. Treichel, R. Rozenov, C. Janada, A. Buzaushina, F. Bacall, and A. Perez.

[2] G20 Seoul Summit Document, paragraph 16. The Seoul Action Plan included a commitment to a modernized IMF that better reflects the changes in the world economy through greater representation of dynamic emerging markets and developing countries. In requesting the Executive Board to advance the timetable for completing the 15th Review to January 2014, the Board of Governors noted that "any realignment is expected to result in increases in the quota shares of dynamic economies in line with their relative positions in the world economy, and hence likely in the share of emerging market and developing countries as a whole. Steps shall be taken to protect the voice and representation of the poorest members." (See Board of Governors Resolution No. 66-2, para 10).

[3] IMFC Communiqué, September, 2011.

[4] See *Reform of Quota and Voice in the International Monetary Fund—Report of the Executive Board to the Board of Governors* (3/28/08).

[5] See *Quota Formula Review—Data Update and Issues* (8/17/11).

simulations aimed at illustrating the potential impact of some of the possible reforms discussed to date.

4. **The paper is organized as follows:** Section II briefly takes stock of the role of the formula and previous discussions, and explores some of its properties. Section III reports on the results of further staff technical analysis on the key issues that have been raised to date, while Section IV presents illustrative simulations to highlight the potential impact on calculated quota shares (CQS) of some possible modifications to the formula that have been discussed. Section V concludes. Further analytical work on the formula variables and individual country details for the simulations are presented in the Appendices.

II. STOCKTAKING

A. Setting for the Review

5. **The September paper discussed the setting for the review.** In particular, it highlighted the following points:

- **The quota formula has traditionally served as a guide to quota adjustments.** The Fund has broad discretion to decide the considerations that should guide decisions on quotas. The practice has been that the formula provides an important indicator, and since the 8th Review, a significant part of overall quota increases has been distributed based on the formula. However, history provides many examples where other relevant factors (outside the formula) have been taken into account. Thus, while some have stressed that the formula should play a greater role in future allocations, there may be a trade-off between the goal of a simple and transparent formula on the one hand, and trying to capture all considerations that might be relevant to future quota realignments on the other.
- **The formula seeks to capture the multiple roles of quotas.** These include their key role in determining the Fund's financial resources, their role in decisions on members' access to Fund resources, and their close link with members' voting rights. Thus, the formula has typically sought to capture members' relative positions in the world economy, their financial strength and ability to contribute usable resources, as well as their potential need to borrow from the Fund. Some individual quota variables are intended to capture more than one aspect.
- **Several principles underpinned the 2008 reform.** These were that the formula should (i) be simple and transparent, so that the basis for differences in relative quota shares is readily understandable; (ii) be consistent with the multiple roles of quotas, appropriately reflecting global economic and financial trends and capturing members' relative positions in the world economy; (iii) result in calculated quota shares that are broadly acceptable to the membership; and (iv) be feasible to implement based on timely, high quality, and widely available data. In staff's view, these principles remain relevant for the current review.
- **While the formula is a major improvement over the previous five formulas, considerable dissatisfaction remains.** In terms of simplicity and transparency, the current formula represents a major advance (Box 1). It is also less prone to producing

counter-intuitive results, and has allowed the previous practice of selective adjustments in the quota database to be discontinued. Nonetheless, the current formula represented a difficult compromise, and many have continued to argue that the formula is flawed and should be improved.

6. **Continued dissatisfaction with the formula may complicate future discussions on governance reform.** It must be recognized that there is no perfect formula. Different countries are likely to have different perspectives on what indicators are most relevant, and an important element of compromise is inevitable. In addition, as noted, it may not be possible to capture all relevant considerations for future quota adjustments in the formula itself. Nonetheless, if the basic indicator used to measure members' relative positions is widely viewed as flawed, consensus over future changes in quota distribution may be more difficult to reach, and there will be a much greater tendency to employ other metrics outside the formula.[6] Thus, it would be desirable to use the opportunity of the current review to implement reforms that are widely viewed as yielding an improved formula, assuming that the necessary broad consensus can be reached.

B. Key Properties of the Current Formula

7. **In the current formula, all quota variables are expressed as shares in global totals (Box 1).** In the 2008 reform, it was agreed that the variables in the new formula should be expressed in terms of shares in global totals, rather than nominal levels as was previously the case, and that a linear combination was preferable to a multiplicative combination. Staff believes these conclusions remain valid, and no changes in the basic formula structure are proposed. The formula also includes a compression factor of 0.95 that was introduced in the 2008 reform to moderate the effects of the high correlation of size-related variables that tends to favor large economies (see below). The compression factor was a compromise and the agreement was that it would be included for a period of 20 years, after which it would be reviewed.

8. **The quota variables are all partly related to economic size, and therefore are quite highly correlated in most cases.** One advantage of this approach is that there is no need to scale the variables, as would be required, for example, if a variable was expressed as a ratio. The correlations between variables are shown in Table 1. While the correlations between GDP, openness, and variability are quite high, they are not perfect, implying that the results can diverge significantly from an outcome based purely on GDP. For example, the correlations are lower for openness in the case of advanced economies, and for variability in the case of Emerging Market and Developing Countries (EMDCs).[7] The lowest correlation is between the other quota variables and reserves for advanced economies.

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[6] For example, in the 14th Review, while the formula was used to allocate 60 percent of the overall increase, it played only a supplementary role in allocating the remainder through various protection mechanisms.

[7] The country classifications used in this paper are unchanged from those in the 14th Review. As discussed in Appendix I, the current classification is becoming significantly out-dated and a case can be made for updating this classification to bring it into line with the current WEO ahead of the 15th Review. Against this, maintaining

(continued)

Box 1. The Quota Formula

The current quota formula was agreed in 2008. It includes four variables (GDP, openness, variability, and reserves), expressed in shares of global totals, with the variables assigned weights totaling to 1.0. The formula also includes a compression factor that reduces dispersion in calculated quota shares with a greater impact on large economies than small ones. The formula is:

$$CQS = (0.5*Y + 0.3*O + 0.15*V + 0.05*R)^k$$

where:

CQS = calculated quota share;

Y = a blend of GDP converted at market exchange rates and PPP rates averaged over a three year period. The weights of market-based and PPP GDP are 0.60 and 0.40, respectively;

O = the annual average of the sum of current payments and current receipts (goods, services, income, and transfers) for a five year period;

V = variability of current receipts and net capital flows (measured as the standard deviation from a centered three-year trend over a thirteen year period);

R = twelve month average over one year of official reserves (foreign exchange, SDR holdings, reserve position in the Fund, and monetary gold);

and k = a compression factor of 0.95. The compression factor is applied to the uncompressed calculated quota shares which are then rescaled to sum to 100.

The original formula used at the Bretton Woods Conference contained five variables—national income, gold and foreign exchange reserves, the five-year average of annual exports and imports, and a variability measure based on the maximum fluctuation in exports over a five-year period. It was significantly revised in 1962/63, when it was expanded to five formulas that produced somewhat higher calculated quotas for members with relatively small and more open economies. In 1983, a further revision of the five formulas took place—the influence of variability of current receipts was reduced, GDP replaced national income, and reserves, which had been dropped earlier, were reintroduced. During the discussions on the 11th Review, many Directors requested that the quota formula be reviewed again—and in April 1997 the Interim Committee asked the Executive Board to promptly review the quota formula after the completion of the 11th Review.[1] A group of external experts (the Quota Formula Review Group (QFRG)) led by Professor Cooper was asked to review the formula and propose possible changes. The QFRG recommended the adoption of a single formula with two variables—market GDP and variability (see *External Review of the Quota Formula* (EBAP/00/52, 5/1/00)). However, no further changes were agreed until the 2008 reform.

[1] *Communiqué of the Interim Committee of the Board of Governors of the International Monetary Fund* (4/28/97).

continuity in the classifications could be useful to the extent that the 15th Review is viewed as part of a broader process of governance reform that was initiated in 2008.

Table 1. Corrections between Quota Variables

ALL Countries 1/

	Market GDP	*PPP GDP*	*Openness*	*Variability*	*Reserves*
Market GDP	1.00				
PPP GDP	0.96	1.00			
Openness	0.92	0.89	1.00		
Variability	0.95	0.90	0.96	1.00	
Reserves	0.41	0.58	0.46	0.41	1.00

Advanced Economies

	Market GDP	*PPP GDP*	*Openness*	*Variability*	*Reserves*
Market GDP	1.00				
PPP GDP	1.00	1.00			
Openness	0.91	0.90	1.00		
Variability	0.97	0.96	0.96	1.00	
Reserves	0.32	0.30	0.23	0.32	1.00

EMDCs

	Market GDP	*PPP GDP*	*Openness*	*Variability*	*Reserves*
Market GDP	1.00				
PPP GDP	0.98	1.00			
Openness	0.95	0.93	1.00		
Variability	0.84	0.80	0.88	1.00	
Reserves	0.93	0.94	0.94	0.79	1.00

Source: Finance Department.

1/ Given the heterogeneity of data and differing distributions, it is possible for correlations in the total sample to fall outside of the range for the two sub samples.

9. **These effects can be observed in the relationship between shares in the individual quota variables and the overall outcome of the formula.** Figure 1 plots this relationship using the latest data through 2009.[8] As can be seen from the upper left-hand side (LHS) panel, the relationship between members' shares in the GDP blend variable and CQS is reasonably close for most members.[9] This reflects both the large weight of GDP in the formula as well as the high correlation of GDP with two of the other variables. The dispersion is wider for openness (upper right-hand side, RHS), where a number of advanced economies have higher shares in openness than in CQS, with the reverse being true for a number of EMDCs. It is wider again for variability without any noticeable differentiation between advanced economies and EMDCs (lower LHS). A marked differentiation among country groups is evident for reserves, with several EMDCs having much higher shares in reserves in relation to CQS, while the reverse is true for most advanced economies (lower RHS).

[8] The next data update through 2010 is expected to be issued in July.

[9] The charts are based on a logarithmic scale.

Box 2. External Work on the Formula

Most external work on the quota formula predates the adoption of the current formula in 2008, but some more recent work has examined issues related to the current formula. The main focus of the external work has been on the selection and definition of variables.

Many earlier contributors—including from the G24 Secretariat—argued for the substitution of PPP GDP for market-based GDP or the use of a GDP blend in the quota formula. The rationale was that PPP GDP more correctly measures the level of economic activity in EMDCs where market prices of non-tradeables tend to be significantly below those prices in advanced economies. Within this group of contributors, Truman[1] argued for the Cooper formula with PPP GDP substituted for market-based GDP. Several authors also favored the use of population in the quota formula—from the perspective of measuring members' relative stake in the international public goods provided by the Fund or as a variable to capture per capita income differences.[2]

More recent concern has focused on the fact that the current formula does not deliver the "desired" shift in quota and voting power[3] and alternatives have been proposed that result in a more "acceptable" quota distributions. Bryant[4] proposes an illustrative formula with a GDP blend variable as well as population, measured in shares of global totals. He then adds a second set of variables—openness and variability—measured as ratios to market GDP to better capture qualitative differences between countries.

The G24 Secretariat has criticized the current quota formula arguing that it does not adequately recognize economic dynamism, improperly categorizes some advanced countries as under-represented because of distortions in measuring openness and variability, and incorrectly specifies variability to the disadvantage of borrowing members. It suggests reducing the weight of openness and scaling (and possibly capping) variability. At a recent High Level Brookings–CIGI-G24 Seminar on IMF governance, several of the participants expressed similar concerns.[5]

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[1] *International Monetary Fund Reform: An Overview of the Issues,* Background Paper prepared for the IIE Conference on IMF Reform, September 23, 2005.

[2] Ngaire Woods: *Structural Adjustment for the IMF,* Briefing, Bretton Woods Project, January 2001; and *Report to the IMF Executive Board of the Quota Formula Review Group* (4/28/00).

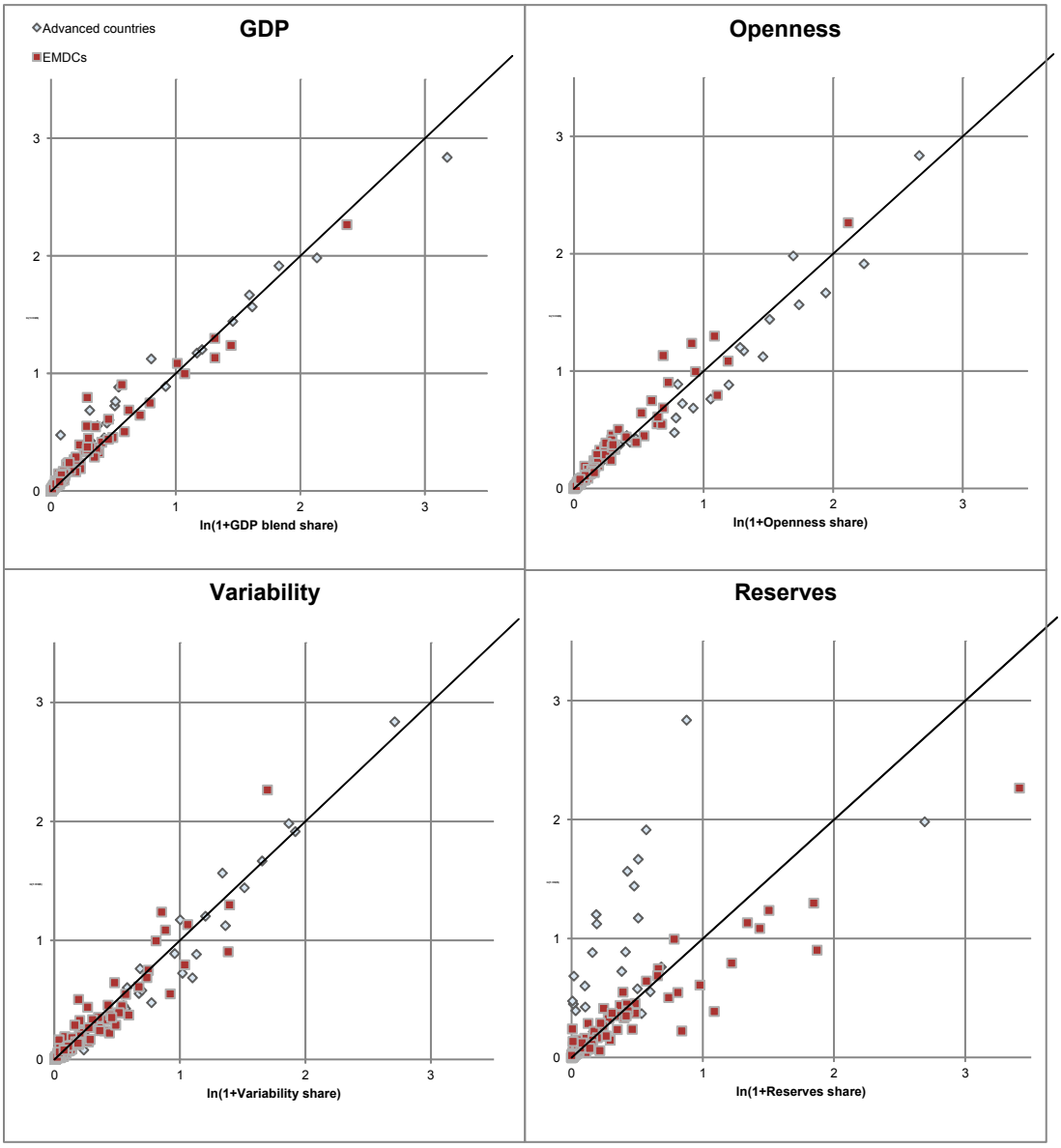
[3] See for example Ted Truman: *Governance of the Bretton Woods Sisters: Making Progress on the Agenda,* Center for Global Development Bretton Woods Non-Commission, March 2009.

[4] *Governance Shares for the International Monetary Fund: Principles, Guidelines, Current Status*, Brookings Institution, March/April 2010.

[5] For an overview of the issues by the G-24 Secretariat, see Bhattacharya, A., *Overview and Summary Assessment of the 2006-2010 IMF Quota and Voting Reforms, January 2012*.

10. **Further insight can be gained from exploring the marginal contribution of each variable to CQS.** These contributions are obtained by computing the CQS that results from successively dropping individual variables, and rescaling the coefficients of the remaining variables to sum to one so that the relative weights of the variables that are still included in the formula are the same as in the current formula. For instance, the marginal impact of dropping reserves is defined as the difference between calculated quota shares in a formula containing only three variables (GDP, openness, and variability) and the current quota formula with all four variables. A similar procedure is used for the other two variables—variability and openness. Individual variables are dropped from the formula in the order determined by the weights, e.g., reserves first, then variability, then openness.

Figure 1. Relationship Between Quota Variables and CQS



Source: Finance Department.

11. **The results of this exercise are summarized for the largest economies in Table 2** (see Appendix Table A1 for the full results).[10] The key points are:

- Dropping reserves results in a decline in CQS for a relatively small number of countries, mostly EMDCs (China, Saudi Arabia, Russia, India, Korea, and Singapore) but also for Japan. The overall effect is a significant shift (1.7 percentage points based on the current data) towards advanced economies, with the largest individual gainer being the United States.

- Dropping variability results in a modest shift in shares from EMDCs to advanced economies (0.5 percentage points), but the changes for some individual countries are significant. Within advanced economies, major advanced economies tend to gain, partly offset by a decline for other advanced economies. Among EMDCs, China is the largest gainer, and Saudi Arabia records the largest decline. As discussed further below, shares in variability can change significantly from year-to-year, suggesting a need for particular caution in generalizing on the marginal effect of this variable.

- Dropping openness results in the largest shift in shares from advanced economies to EMDCs (1.4 percentage points). Within groups, there is an even larger decline (3.6 percentage points) for other advanced economies, which tend to be more open and therefore gain from this variable. Major advanced economies gain from excluding this variable, with large gains for the United States and to a lesser extent Japan, partly offset by losses for Germany and the United Kingdom. Within the group of EMDCs, the largest gains are recorded by China, India, and Brazil.

- The cumulative impact of dropping reserves, variability and openness results in a GDP only formula (compressed GDP blend share). As shown in the penultimate column of Table 2, the impact at the aggregate level is a modest shift (0.8 percentage points) from EMDCs to advanced economies. However, this masks larger shifts within groups. Among advanced economies, the major advanced economies gain (except for Germany and the United Kingdom) and most other advanced economies lose (in total by 4.0 percentage points). Within EMDCs, the largest gainers are India, China, and Brazil, while Saudi Arabia records the largest decline.

- For low income countries (LICs), the overall impact of any of these changes is modest. LICs as a group gain slightly from dropping openness and lose slightly from dropping variability but the aggregate impact in both cases is 0.1 percentage points.

[10] The results are sensitive to the underlying data set and the order in which variables are dropped from the formula.

Table 2: Contributions of Quota Variables to Calculated Quota Shares

	14th Review Proposed Quotas	Calculated Quota Share	Impact of Incrementally Dropping:			Total impact of dropping reserves, openness and variability	Compressed GDP Share
			Reserves	Variability	Openness		
		(1)	(2)	(3)	(4)	(2)+(3)+(4)	(1)+(2)+(3)+(4)
Advanced economies	57.7	57.5	1.7	0.5	-1.4	0.8	58.3
Major advanced economies	43.4	41.6	1.2	1.4	2.2	4.9	46.5
United States	17.4	16.1	0.7	0.8	3.3	4.8	20.9
Japan	6.5	6.3	-0.3	0.1	1.1	0.9	7.1
Germany	5.6	5.8	0.3	0.1	-1.0	-0.7	5.1
France	4.2	3.8	0.2	0.2	-0.2	0.2	4.0
United Kingdom	4.2	4.3	0.2	0.1	-0.7	-0.4	3.9
Italy	3.2	3.2	0.1	0.0	-0.1	0.1	3.3
Canada	2.3	2.2	0.1	0.1	-0.2	0.0	2.3
Other advanced economies	14.3	15.9	0.5	-0.9	-3.6	-4.0	11.8
Spain	2.0	2.3	0.1	0.0	-0.1	0.1	2.4
Netherlands	1.8	2.1	0.1	-0.1	-0.7	-0.8	1.3
Australia	1.4	1.4	0.0	0.0	0.1	0.1	1.6
Belgium	1.3	1.4	0.1	-0.1	-0.6	-0.6	0.8
Switzerland	1.2	1.1	0.0	0.0	-0.4	-0.4	0.7
Sweden	0.9	1.1	0.0	-0.1	-0.2	-0.3	0.7
Austria	0.8	0.8	0.0	0.0	-0.2	-0.2	0.6
Norway	0.8	0.8	0.0	0.0	-0.1	-0.2	0.6
Ireland	0.7	1.0	0.0	-0.2	-0.4	-0.6	0.4
Denmark	0.7	0.7	0.0	0.0	-0.2	-0.2	0.5
Emerging Market and Developing Countries 1/	42.3	42.5	-1.7	-0.5	1.4	-0.8	41.7
Developing countries	35.1	34.7	-1.6	0.0	1.7	0.1	34.8
Africa	4.4	3.2	-0.1	-0.2	0.0	-0.3	3.0
South Africa	0.6	0.6	0.0	0.0	0.0	0.1	0.6
Nigeria	0.5	0.5	0.0	0.0	0.0	0.0	0.4
Asia	16.1	18.3	-1.2	0.8	0.6	0.3	18.6
China	6.4	8.6	-0.9	0.6	0.9	0.6	9.2
India	2.8	2.4	-0.1	0.2	0.7	0.8	3.2
Korea	1.8	2.0	-0.1	0.1	-0.2	-0.2	1.8
Indonesia	1.0	0.9	0.0	0.0	0.1	0.2	1.1
Malaysia	0.8	0.7	0.0	0.0	-0.2	-0.3	0.5
Singapore	0.8	1.2	-0.1	-0.1	-0.6	-0.8	0.4
Thailand	0.7	0.8	0.0	0.0	-0.1	-0.2	0.6
Middle East, Malta, and Turkey	6.7	6.2	-0.3	-0.6	-0.1	-1.0	5.2
Saudi Arabia	2.1	1.5	-0.2	-0.3	-0.1	-0.6	0.8
Turkey	1.0	1.1	0.0	0.0	0.2	0.2	1.3
Iran	0.7	0.7	0.0	0.1	0.2	0.2	0.9
Western Hemisphere	7.9	6.9	0.0	0.0	1.1	1.1	8.0
Brazil	2.3	2.1	0.0	0.0	0.6	0.6	2.7
Mexico	1.9	1.7	0.0	0.1	0.1	0.3	2.0
Venezuela	0.8	0.5	0.0	0.0	0.1	0.0	0.5
Argentina	0.7	0.6	0.0	0.0	0.1	0.1	0.7
Transition economies	7.2	7.8	-0.1	-0.5	-0.3	-0.9	6.8
Russia	2.7	2.7	-0.1	-0.1	0.3	0.1	2.7
Poland	0.9	1.0	0.0	0.0	0.0	-0.1	0.9
Total	100.0	100.0	0.0	0.0	0.0	0.0	100.0
Memorandum items:							
EU27	30.2	32.2	1.2	-0.7	-5.6	-5.0	27.2
LICs 2/	4.0	2.6	0.0	-0.1	0.1	-0.1	2.5

Source: Finance Department.

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
2/ PRGT-eligible countries.

Indicates a decline of more than -0.5 pp or an increase of more than 0.5 pp respectively.

III. QUOTA FORMULA VARIABLES

12. **This section reviews a number of issues raised to date with the formula variables and reports on the results of additional technical work.** To keep the exercise manageable, it focuses on those topics that were highlighted in the September 2011 meeting and gained the most traction in previous Board discussions. Additional topics could be explored as the review proceeds, keeping in mind the need for a broad consensus for any changes.

GDP

13. **It is generally agreed that GDP is the most important quota variable.** It provides a comprehensive measure of economic size and is a widely reported and used measure that is available on a timely basis for the vast majority of the membership. GDP is measured as a 3 year average. This change from using a single year was introduced as part of the 2008 reform to ensure that quota adjustments are not unduly influenced by temporary fluctuations in GDP or exchange rates (in the case of market GDP).

14. **GDP is relevant for the multiple roles of quotas.** Market GDP has been viewed as the single most relevant indicator of a member's ability to contribute to the Fund's finances, though it is not the only such measure. GDP is also relevant to a member's potential demand for Fund resources, and staff reports on requests for exceptional access are required to provide information on access in terms of GDP (and other supplementary metrics) in a standard table.[11] PPP GDP has been viewed as a relevant measure of members' weight in the global economy from the perspective of the Fund's non-financial activities. The GDP blend variable also captures dynamism, as reflected in the rising share of EMDCs in the global total for this variable in light of their more rapid economic growth; this trend is expected to continue in coming years (see Figure 2).

15. **The current GDP blend variable represented a difficult compromise.** PPP GDP was introduced into the formula for the first time as part of the 2008 reform. It was given a 40 percent weight in the GDP blend, taking account of the central role of quotas in the Fund's financial operations for which market GDP is the most relevant indicator. It was also agreed to include PPP GDP (and compression) in the formula for a period of 20 years, after which the scope for retaining them should be reviewed. Since the 2008 reform, Directors have continued to express diverging views on the relative importance of market vs. PPP GDP in the formula. While staff sees an analytical case for including both, the weights are a matter for judgment and could be revisited as part of the review.

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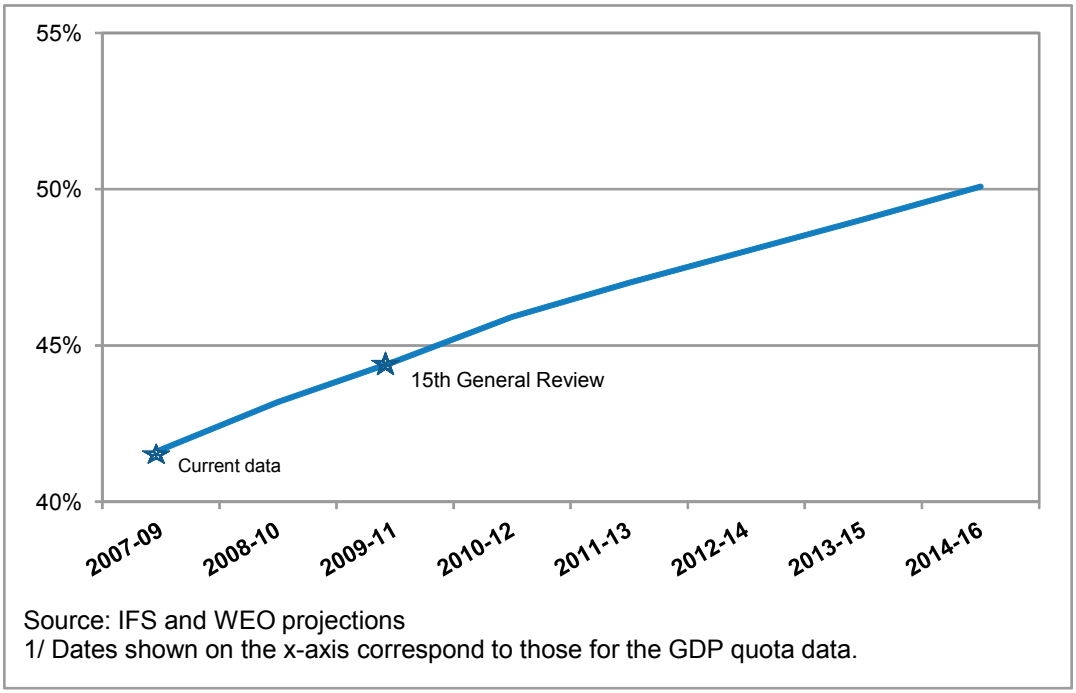
[11] *The Acting Chair's Summing Up Review of Access Policy Under the Credit Tranches and the Extended Fund Facility, and Access Policy in Capital Account Crises-Modifications to the Supplemental Reserve Facility and Follow-Up Issues Related to Exceptional Access Policy*, (3/5/2003). As noted in Annex III of *Quota Formula Review—Data Update and Issues* (8/17/2011), there are indications that market GDP is closely linked to members' access to Fund resources in recent exceptional access cases.

16. **A global exercise has been launched to update the PPP GDP data.** This project, coordinated by the International Comparison Program (ICP), will update the underlying price surveys from 2005 to 2011 and further broaden the coverage to at least 154 countries.[12] The new data are expected to be published in December 2013, just before the deadline for completing the 15th Review. Staff has been discussing with the World Bank the scope for advancing the timetable but prospects appear slim at this stage given the large number of countries and organizations involved. Accordingly, it is not yet clear whether the results will be available in time to be taken into account in the 15th Review (see Box 3).

Figure 2: Projected GDP Blend Shares for EMDCs 1/
(In percent)



Source: IFS and WEO projections
1/ Dates shown on the x-axis correspond to those for the GDP quota data.

[12] The revisions are expected to be more limited than the previous survey, which resulted in a substantial improvement in methodology and consistency. Nonetheless, the changes could be significant in some cases.

Box 3: The International Comparison Program[1, 2]

Worldwide PPP-based comparisons of GDP require a comprehensive data collection effort beyond what national statistical offices do. This work has been the objective of the International Comparison Program which began in 1968 as a modest research project jointly conducted by the United Nations Statistical Division and the International Comparisons Unit of the University of Pennsylvania. The first round of the ICP in 1970 included only 10 countries but this grew to 146 countries for the 2005 round.

Regionalization of the effort began after the 1975 comparison and the Eurostat-OECD PPP Program became part of the ICP in the early 1980s. The first time all regions of the world were covered was in 1993. Since 1993, the World Bank has been the global coordinator for the ICP. The most current round of the ICP is the 2005 comparison, but work on a 2011 round is ongoing.

The 2005 round of the ICP was an unprecedented global statistical effort and represented a major overhaul. The number of participating economies far exceeded that of any previous ICP survey. Work was done in six "regions" of the world (Africa, Asia, CIS, OECD-Eurostat, South America, and West Asia), overseen by the ICP Global Office in the World Bank. National agencies were responsible for conducting surveys and regional agencies worked on regional comparisons which were then combined in a world comparison. Regional estimates of PPPs were linked into a global data set so that economic activity and price levels could be compared between economies in different regions. The improvements made in this round of the ICP made it feasible to include PPP GDP estimates into the quota formula as part of the 2008 reform. The forthcoming 2011 round of the ICP seeks to make further headway in strengthening the PPP data, and the results are expected to become available at end-2013.

In addition to being included in the IMF's quota formula, the PPP data are widely used. These data are used by researchers as well as a large number of international and regional organizations, including for poverty headcounts (World Bank), WEO (IMF), allocation of structural and cohesion funds (European Commission), Human Development Index (UNDP), Health inequality assessment (WHO), and assessing per capital expenditures in education (UNESCO).

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[1] Prepared jointly with STA.

[2] Comprehensive information on the ICP can be found at the following website: http://siteresources.worldbank.org/ICPEXT/Resrouces/ICP_2011.html.

Openness

17. **Openness attempts to reflect members' integration in the world economy.** The basic premise underlying its inclusion is that countries that are relatively more open to trade and financial flows may have a greater stake in promoting global economic and financial stability. Openness may also have a bearing on a member's ability to make financial contributions to the Fund as well as on its potential need for Fund resources. Some have questioned the validity of these arguments, noting that larger economies tend to be more closed, but still have major stakes in global stability, and argued that openness should be removed from the formula or its weight reduced. In practice, the marginal impact of the openness variable is to raise the CQS for countries that are more open and lower it for countries that are less open relative to the shares that would be implied by GDP. As discussed above, the impact can be significant in some cases.

18. **A long-standing view has been expressed that openness should in principle be measured on a value added rather than a gross basis.** This would help avoid the problem of double counting cross-border flows which occurs when trade is measured on a gross basis. This effect tends to be magnified over time as the share of trade in global value added increases, reflecting greater vertical integration and trade in intermediate goods, and can result in large shares for smaller highly open economies. For this reason, the scope for measuring openness on a value added rather than a gross basis was one of the issues identified for further work at the conclusion of the 2008 reform. As discussed in the September 2011 paper, however, such a shift does not seem feasible in the near term due to continued data availability constraints.[13]

19. **Another issue discussed in the 2008 reform is the appropriate treatment of intra-currency union flows.** Some have argued that these flows should be excluded as they take place in a common domestic currency and may exaggerate a member's broader integration into the global economy. In addition, it was argued that, since trade takes place in a common currency, the existence of a currency union might reduce an important source of balance of payments risk for its members. Staff has explored this issue on several occasions in the past.[14] This work has identified both conceptual and practical data difficulties with singling out intra-currency union flows for differential treatment. Moreover, the European crisis has further highlighted the potential for members of a currency union to experience balance of payments pressures that could lead to requests for use of Fund resources. Thus, while members of currency unions may benefit from the openness variable when current account flows are highly integrated within the union, the issue appears to be related more to the design of the openness variable itself (i.e., the reliance on gross flows as noted above) than to membership in a currency union per se. Thus, it may be better considered as part of the broader review of the role and weight of openness in the formula.

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[13] Note that in the forthcoming implementation of BPM6 (Balance of Payments and International Investment Position Manual, 6th edition) in the latter half of 2012, the measure of some types of exports and imports will more closely approximate value added trade.

[14] See, for example, *A New Quota Formula—Additional Considerations* (3/14/07, pp. 11-13).

20. **The scope for giving more weight to financial openness has been raised in the past and was highlighted again by some Directors in September.** Financial openness has long been viewed as potentially relevant to the multiple roles of quotas.[15] The conceptual case has been broadly similar to that for the existing openness variable: that integration in global capital markets is an important indicator of a member's stake in the global economy and global financial stability. Furthermore, as financial openness reflects not only a country's external financial assets but also liabilities, it may have a bearing on potential demand for Fund resources. Financial openness is already captured to some extent in the existing openness variable, where investment income represents about 16 percent on average of total current account flows. Thus, the practical question is whether this weight should be increased or, alternatively, whether a new financial openness variable should be introduced.

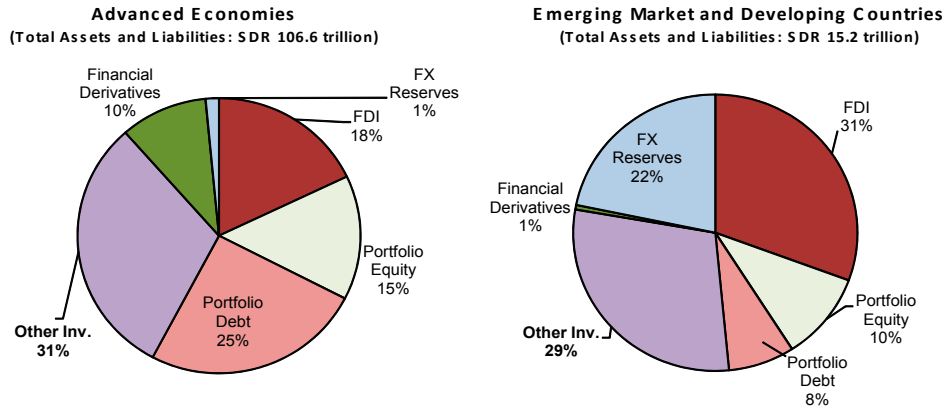
21. **In previous discussions, the International Investment Position (IIP) has been identified as the most promising option if such a variable was to be introduced.**[16] The IIP provides a quantitative measure of a member's foreign financial asset and liability position, and thus in principle captures the extent of investment in a country by non-residents and of investment abroad by residents of the same country. There have been significant improvements in measurement of IIP in recent years, which have led to the inclusion of a broader range of assets and liabilities. However, country coverage remains limited and as of the data cut-off for the current quota database, 2009 IIP data were available for 102 members (compared with 99 countries at the time of the cut-off for the 2008 database). Moreover, a few members with international financial centers have very large shares in global IIP. To the extent that these shares effectively reflect stocks of non-residents, where the member is acting as a conduit, it is doubtful that they should be included in the data used for quota calculations.

22. **A breakdown of the available IIP data sheds further light on its main components and its evolution over time.** Several aspects can be noted. First, as discussed in the past, IIP stocks remain heavily dominated by advanced economies, amounting to over 85 percent of the global total in 2009 (Table 3 and Figure 3). Second, IIP stocks have grown rapidly in recent years, by 41 percent since 2005 for advanced economies and 81 percent for EMDCs (but from a much smaller base). For advanced economies, financial derivatives have been an important source of growth (increasing from 3 to 10 percent of the total) but are highly concentrated in a handful of countries. Third, portfolio debt instruments are an important component for advanced economies but comprise a smaller share for EMDCs. Fourth, for EMDCs, reserves comprise nearly half of the IIP on the asset side and 22 percent overall, and are already captured separately in the quota formula.

[15] See, for example, *Quota Distribution-Selected Issues* (7/17/03).

[16] See *A New Quota Formula—Additional Considerations* (3/14/07, pp 6-10).

Figure 3. Composition of IIP in 2009



Source: IFS.

23. **The above discussion raises questions concerning the suitability of IIP for inclusion in the quota formula.** First, as noted, IIP data coverage is still only partial, and the data gaps are particularly acute for countries in the Middle East and Sub-Saharan Africa. Second, increasingly complex international financial transactions pose measurement challenges and there are particular issues with international financial centers (Box 4). Third, there is some overlap with existing variables in the case of reserves.

24. **Staff has also explored the scope for using other data sources to fill in the gaps in IIP coverage.** One option is the dataset compiled by Lane and Milesi-Ferretti, which covers 178 countries and has been used in a variety of research and analytical work. However, this data set is subject to the same conceptual and measurement issues as the IFS' IIP data set since it relies heavily on those data and methodology. It also involves significant estimation and assumptions for the countries who do not report to IFS. On balance, staff does not propose use of this data set.

25. **A further alternative that has been considered in the past is investment income.** As noted, investment income is already included in the openness variable and therefore not constrained by data availability. Thus, it could potentially be used as a proxy for financial openness and assigned a larger weight. As shown in Table 3, the overall distribution of investment income flows is broadly similar to that for IIP, though there are some differences for individual countries. Nonetheless, some significant issues remain. Rates of return on similar investments vary substantially across countries arising from a lack of congruence between stocks and flows for a variety of reasons (e.g., exchange controls, domestic legislation, etc.) making it an imperfect substitute for the underlying stock measure. Other measurement issues include under-recording of investment income receipts,[17] as well as the

[17] This issue appears to be receding over time: recorded payments exceeded recorded receipts by US$125 billion per year in 1994-2000 (*Annual Report of the IMF Committee on Balance of Payments Statistics*, 2001) but the differential fell to US$47 billion in 2006-09.

recording of credit and debit components on a net rather than on a gross basis.[18] Also, as with IIP, such a measure gives a large weight to countries that are international financial centers. For example, while the average for the membership's investment income with respect to its market GDP (2007-09) is about 11 percent, there are 146 members whose ratios are below this threshold (over three-fourths of the membership), 30 members with ratios between 11 percent and 33 percent (including the United Kingdom), and 11 members with ratios higher than 33 percent (Luxembourg, Ireland, Switzerland, Singapore, Bahrain, Iceland, Malta, Equatorial Guinea, Timor-Leste, Kiribati, and Tuvalu).

26. **Staff has also explored whether alternative openness indicators have added information in terms of explaining members' potential need for Fund resources.** As noted above, this is only one of the rationales for including openness in the quota formula. One way of approaching this question is to examine the extent to which the impact of the openness variable, as measured by the differences in shares between openness and GDP, is correlated with actual requests for use of Fund resources. If a significant positive correlation exists, one could conclude that openness is adding value at least in terms of reflecting potential demand for Fund resources. Figure 4 presents the results for the 20-year period from 1990-2009.[19] The correlation is essentially zero for the existing openness variable and for trade openness, and negative for investment income and for a variable that combines trade openness with investment income flows in equal weights. Thus, it does not appear from this measure that financial openness (or the current openness variable) has significant predictive power in terms of members' potential need to use Fund resources.

27. **On balance, staff continues to see significant challenges with proposals to increase the weight of financial openness in the formula.** Official IIP data are not yet sufficiently comprehensive, and an examination of their composition raises questions regarding their suitability for quota calculations. Investment income flows could serve as a proxy, but also have measurement issues and leave unresolved the question of how to treat countries that are significant international financial centers. If these data were to be used, the question would arise of whether there is a need to make adjustments to the data in such cases. As noted, this practice was discontinued as part of the 2008 reform, and has been seen as arbitrary and controversial in the past.

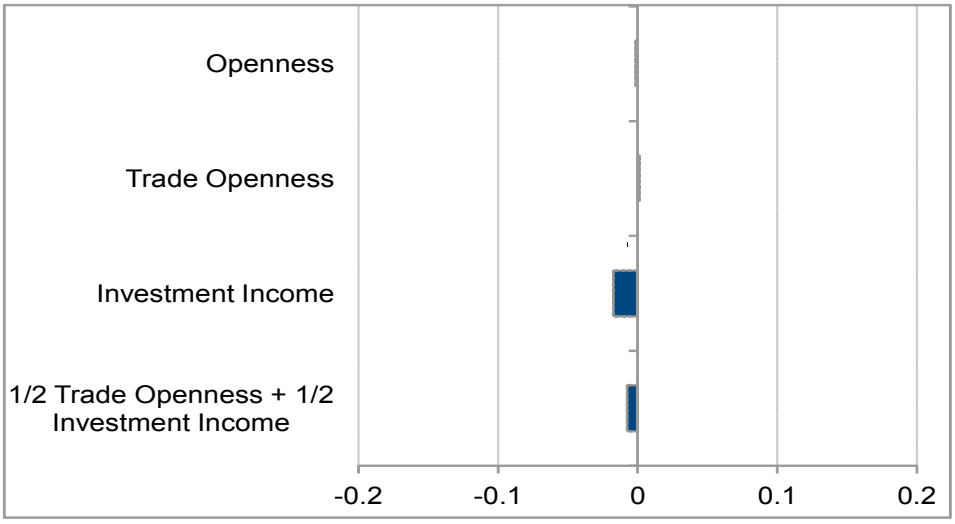
28. **Recent staff work on interconnectedness suggests a further potential avenue for future exploration but does not yet appear sufficiently advanced to be a candidate for inclusion in the quota formula.** A number of IMF studies have developed measures for evaluating financial or trade inter-linkages based on network analysis to assess the extent to

[18] For instance, reinvested earnings reflect net profits or net losses for direct investment abroad on the credit side; similarly for foreign direct investment in the reporting country on the debit side. The recording on a net basis in the formula is due to lack of more disaggregated information reported by the members.

[19] The correlation is between a binary variable indicating the approval of a Fund arrangement and the difference between shares in openness and GDP. For country "i" in year "t", the binary variable takes the value of 1 if an IMF arrangement was approved in a particular year and 0 otherwise.

which a financial or trade sector in a country is "central" in the global system.[20] The network is defined as a set of bilateral financial or trade relationships expressed in a matrix form whose elements are qualitative indicators, based on whether a link between different jurisdictions exists or not. A number of measures of "centrality" are calculated for each country, and all countries are then ranked by each of the measures. While the analysis and the rankings provide a wealth of useful information, there are a number of important limitations in terms of its potential use at this stage for the quota formula: (i) current measures are predominantly qualitative indicators (rankings); (ii) given data limitations, even these rankings are obtained using data only for banking sectors in case of financial interconnectedness and using only trade in goods in case of trade interconnectedness; and (iii) bilateral banking statistics report data only for 42 countries with data for non-reporting countries obtained solely from the reporting country data, and linkages between non-reporting countries are not reflected in the statistics. Table 4 shows countries' rankings based on financial interconnectedness, which deviate significantly from rankings according to shares in investment income and IIP, highlighting some of the conceptual and measurement differences between these variables.

Figure 4: Correlation between Openness Indicators and Need for Fund Resources 1/ 2/



Source: Finance Department.

1/ Trade openness is defined as openness minus investment income. Openness indicators are adjusted for economic size and calculated as the difference between the country's share in openness and its share in GDP.
2/ Need for Fund resources is a binary variable indicating the approval of an IMF arrangement.

[20] See *"Understanding Financial Interconnectedness"* (10/4/2010, page 4). See also "*Integrating Stability Assessments Under the Financial Sector Assessment Program into Article IV Surveillance: Background Material*" (08/27/2010) and Errico, Luca and Allesandro Massara (2011): *Assessing Systemic Trade Interconnectedness – An Empirical Approach*, IMF WP 214.

Table 3: Measures of Financial Openness 1/
(as percent of total)

	2009	2005-09	
	IIP	Inv. Income 2/	Inv. Income
Advanced economies	**85.8**	**83.1**	**82.1**
Major advanced economies	58.1	56.1	54.4
Canada	1.4	2.1	2.1
France	7.1	6.2	6.0
Germany	6.8	7.6	7.3
Italy	3.1	2.9	2.8
Japan	4.7	3.7	3.6
United Kingdom	14.6	13.1	12.7
United States	20.2	20.6	20.0
Other advanced economies	27.7	27.0	27.6
Australia	n.a.	n.a.	1.4
Belgium	2.3	2.4	2.3
Ireland	3.5	3.4	3.3
Netherlands	3.5	3.9	3.8
Spain	2.7	2.6	2.5
Switzerland	2.8	3.0	2.9
Luxembourg	6.6	4.9	4.8
Emerging Market and Developing Countries 3/	**14.2**	**16.9**	**17.9**
Developing countries	11.4	13.2	14.3
Africa	0.6	0.8	1.1
Nigeria	0.1	0.2	0.2
South Africa	0.3	0.3	0.3
Asia	7.9	8.8	8.6
China	4.9	5.0	4.9
India	0.5	0.4	0.4
Indonesia	0.2	0.3	0.3
Korea	0.7	0.5	0.5
Malaysia	0.2	0.4	0.3
Singapore	1.1	1.6	1.6
Thailand	0.2	0.3	0.3
Middle East, Malta & Turkey	0.7	0.9	1.7
Saudi Arabia	n.a.	n.a.	0.3
Turkey	0.3	0.3	0.3
Western Hemisphere	2.2	2.8	2.7
Brazil	0.8	0.8	0.8
Mexico	0.4	0.5	0.4
Transition economies	2.7	3.7	3.7
Russia	1.1	1.6	1.5
Total	**100.0**	**100.0**	**100.0**

Source: Finance Department.

n.a. = not available
1/ IIP includes 102 countries; Investment Income covers 185 countries.
2/ Data for those members with IIP data only.
3/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.

Table 4. Countries' Rankings according to Financial Openness and Interconnectedness 1/

	Investment Income	IIP	Inter-connectedness 2/
United States	1	1	10
United Kingdom	2	2	1
Germany	3	3	2
France	4	4	3
Luxembourg	5	5	7
China 3/	6	7	34
Ireland	7	9	9
Netherlands	8	8	6
Japan	9	6	14
Italy	10	10	8
Spain	11	12	11
Switzerland	12	11	4
Belgium	13	13	5
Canada	14	14	14
Russia	15	19	31
Sweden	16	16	16
Singapore	17	17	12
Australia	18	18	17
Norway	19	20	33
Austria	20	15	13
Denmark	21	21	18
Brazil	22	23	32
Portugal	23	25	23
Finland	24	22	27
Hungary	25	29	54
Korea	26	24	22
Saudi Arabia	27	n.a.	40
India	28	28	29
Greece	29	26	39
Mexico	30	27	49

Sources: IFS and IMF staff calculations.

1/ Table shows the top 30 countries ranked according to their shares in investment income in 2008 (to match the dat
for interconnectedness rankings which were available only for 2008) and the corresponding rankings in IIP shares.
2/ Based on *"Integrating Stability Assessments Under the Financial Sector Assessment Program into Article IV Surveillance: Background Material"* (08/27/2010).
3/Data for interconnectedness for China does not include data for Hong Kong SAR and Macao SAR.

Box 4. Financial Openness: Conceptual Issues and Data Limitations[1]

There are a number of data and conceptual issues with measures of financial openness. A proxy for financial openness that has received attention is the international investment position of countries (IIP). As noted in text, while coverage has been improving, data for IIP are still not available for a significant number of members. The lack of source IIP data is particularly acute for countries in the Middle-East and sub-Saharan Africa. In addition, the increasingly complex international financial transactions pose measurement challenges. Data for small financial centers that tend to have very large and volatile gross positions relative to their economic size (mainly in the Caribbean), also raise measurement issues. Following the BoP conventions, transactions are recorded according to the residency principle, such that banking centers with many branches and subsidiaries in other countries tend to have the highest gross positions in external assets and liabilities (e.g., in Europe the UK with gross positions exceeding 600 percent of GDP in 2010, and Switzerland). An additional source of distortion is the discrepancy between current account transactions and financial flows, i.e., net errors and omissions. The most robust segment of the data relates to official reserves. An alternative proxy for financial openness is the investment income for cross-border activities. This is available for most members, but as noted in text, it is affected by the same methodological issues as IIP, as well as additional measurement issues for some countries.

There are currently no official data sets which can be used to gap fill the data for IIP. The data set prepared by Lane and Milesi-Ferretti (L-MF)[2] provides time series for the IIP of 178 members. This data set suffers from the same conceptual and measurement issues as discussed above. The methodology relies on a mix of (i) direct measures of stocks (which are available for almost all of the AEs), and (ii) cumulative flows with valuation adjustments (which are applied mostly to EMDCs to generate their IIP stock estimates). It relies on other sources for underlying IFS data (e.g., the World Bank's Global Development Finance database, the IMF's World Economic Outlook, the IMF's Coordinated Portfolio Investment Survey [CPIS], the Bank of International Settlements [BIS] data, OECD data, national sources, etc.) which could be used as alternative data sets to gap fill the data. However, this requires decisions about appropriate valuation techniques (price adjustments to stocks and flows, exchange rate corrections, book value adjustment, etc.) and assumptions to estimate IIP time series in the same investment categories as the ones used by IFS's IIP.

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[1] Prepared jointly with STA.

[2] See The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004, Philip Lane and Gian Maria Milesi-Ferretti (Journal of International Economics 73 [2007] pp. 223-250).

Variability

29. **Variability is intended to capture members' vulnerability to balance of payments shocks and potential need for Fund financing.** As with openness, variability has been included in the quota formula since Bretton Woods, and has been modified over time, most recently in 2008 when it was updated to include net capital flows in order to take into account their growing importance in the global economy.[21] However, there have been continued questions regarding the extent to which it adequately captures what is intended. Staff examined in detail a range of possibilities for reform as part of the work for the 2008 reform, and this work was updated in 2009.[22] The options considered included: scaling the existing measure of variability to GDP or the average of current receipts and net capital flows; use of a three- versus five-year trend; focusing on downside or extreme variability; and summing variability of current receipts and variability of net capital flows. In addition, staff also explored broader indicators such as volatility of GDP growth, volatility of consumption growth and measures of consumption risk sharing. None of these measures proved clearly superior to the current variable.[23]

30. **The recent sharp increase in demand for Fund resources provides more data to assess the predictive powers of variability as a measure of potential need.** Figure 5 plots the shares in the GDP blend against the shares in variability of members with and without GRA programs since September 2008. While the majority of the program countries (27 out of 34 members, or 79 percent) have larger variability shares than their shares in GDP, this proportion is broadly the same as for the group of countries that have not had IMF arrangements (116 out of 153 members, or 76 percent). Thus, it is not clear from such a simple analysis that variability provides any additional information.

31. **Staff has also sought to explore this issue in more depth.** First, the correlation between variability (both the current measure and some of the alternatives explored earlier) and actual use of Fund resources was estimated for a larger sample. The methodology used is the same as that for financial openness reported above. Specifically, for the period 1990-2009, the correlations compare the difference between a country's share in variability and its share in GDP with a binary variable that takes the value 1 if an arrangement was approved in a particular year (and 0 otherwise). The results show only a very small and in most cases

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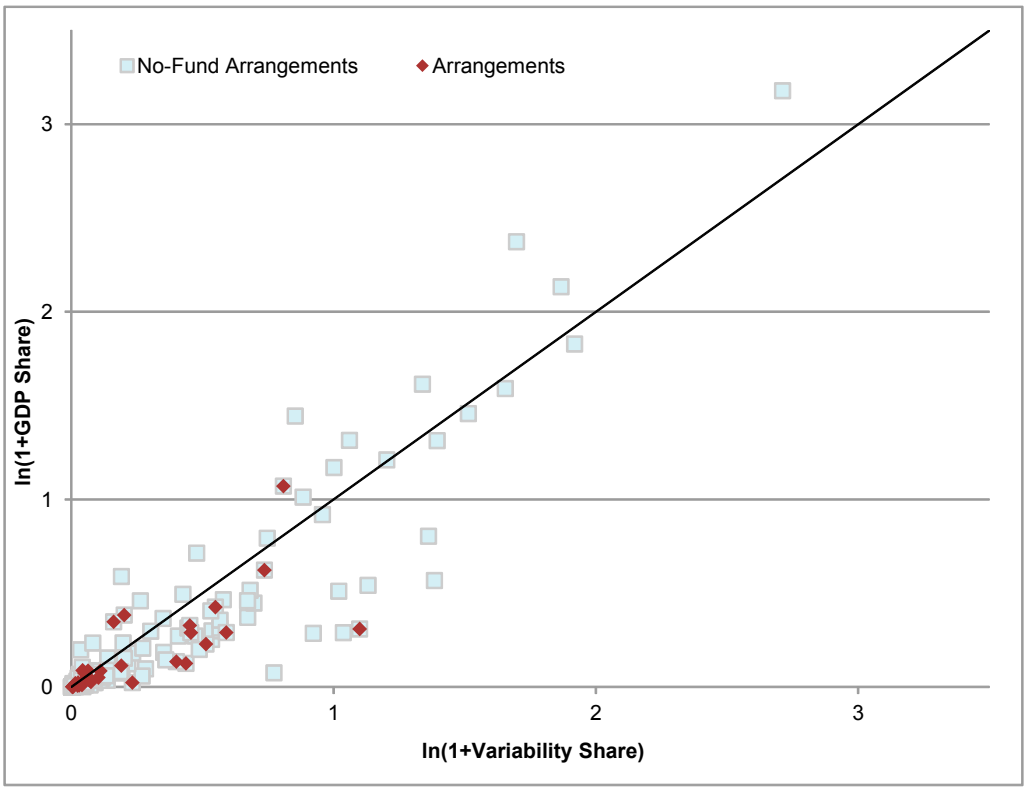
[21] Appendix II provides more information on the evolution of the variability measure, including some alternative definitions, as well as analysis of variability as an indicator of potential balance of payments need.

[22] See Appendix 1 of *Quota and Voice Reform – Stocktaking and Further Considerations* (07/11/07); Appendix 2 of *Quota and Voice—Key Elements of a Potential Package of Reforms* (2/26/08); and *Quotas—Updated Calculations and Variables* (08/28/09).

[23] Questions about the variability measure pre-date the 2008 reform. For example, in the 8th General Review, J.J. Polak argued for eliminating variability from the quota formula, remarking that all different versions of variability suggested by staff did not work and arguing that "the best starting point for our further work would be to operate on a formula that would leave variability out". (*Statement by Mr. Polak on the Statistical Examination of, and Variability in, Quota Formulas —Eighth General Review of Quotas Committee of the Whole on the Review of Quotas Meeting 81/3, October 16, 1981*, (10/21/81).

statistically insignificant correlation for the various measures shown in Figure 6 (see Appendix II for a detailed discussion). Second, other approaches were also tried. These include accounting for possible lags between shifts in variability and program dates, as well as including variability in a larger model to estimate the probability of using Fund resources (GRA or PRGT) conditional on a set of macroeconomic variables.[24] The latter approach also does not yield any positive results—the marginal effect of variability is generally statistically insignificant.

Figure 5. Variability and GDP Shares: Comparison of Countries with and without Recent GRA Programs 1/

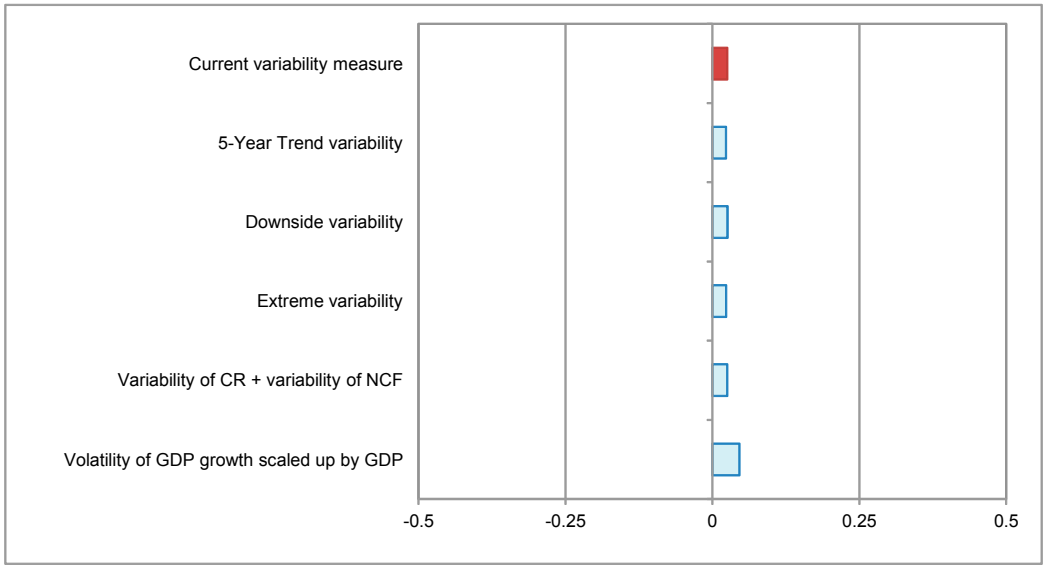


Source: Finance Department.

1/ The chart compares the shares in blend GDP and variability (shown on a logarithmic scale) of two groups of members – members who have had a GRA program since September 2008 and those who have not.

[24] The explanatory variables have been traditionally identified in the literature as determinants of potential use of Fund resources (see Appendix II for details).

Figure 6. Correlation between Variability Indicators and Need for Fund Resources1/2/



Source: Finance Department.

1/ Need for Fund resources is a binary variable indicating the approval of an IMF arrangement.
2/ Variability indicators are adjusted for economic size, calculated as the difference between the country's share in variability and its share in GDP.

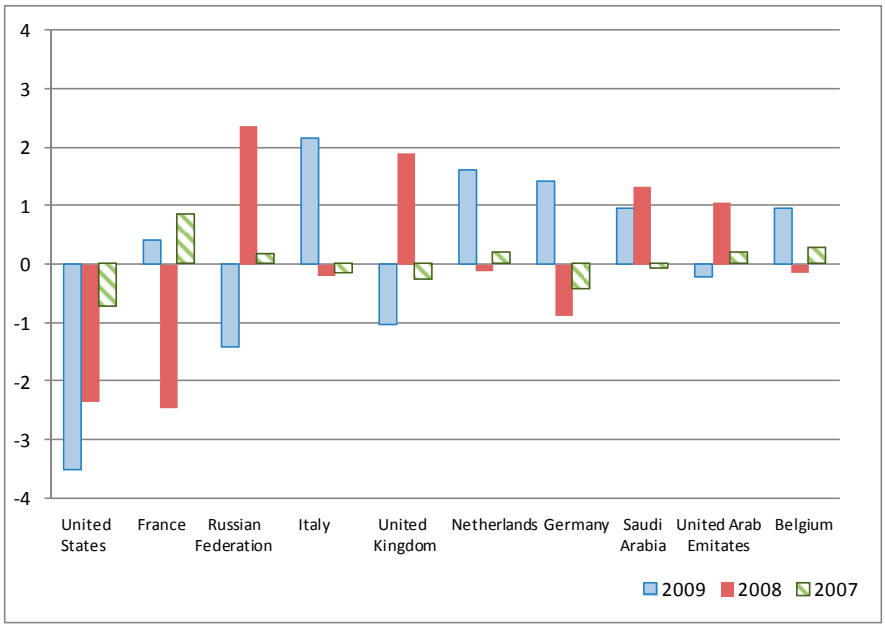
32. **There are also several conceptual and measurement issues with variability.** The September paper highlighted the large changes in members' variability shares resulting from the 2009 data update, which had a large impact on the quota calculations despite their relatively small weight in the formula.[25] This instability can be further illustrated by looking at some of the largest swings in shares resulting from the last three data updates (Figure 7). These swings tend to be larger than for the other variables, and often go in different directions from year-to-year. The instability partly arises from the way the variable is constructed, which being a root mean squared deviation, tends to be heavily influenced by extreme observations, including those arising from data revisions, and effectively gives a larger weight to the most recent observations.[26] It can also lead to other counterintuitive results. For instance, if a country experiences a sudden surge in current receipts which remain elevated for some time, followed by another sharp increase, the formula would produce a large increase in variability, even though this pattern would not signal an obvious increase in balance of payments need.

[25] See *Quota Formula Review—Data Update and Issues* (8/17/11, page 15 and Annex I).

[26] In this context, the forthcoming BPM6 will impact the underlying data for variability and openness. The change in the treatment of goods for processing will mainly affect data for those countries that have substantial receipts for goods that they process for a fee (both imports and exports of goods could fall significantly). Given the sensitivity of variability to data revisions, it may lead to unexpected and potentially large changes in members' CQS. See Box A2 of*Quota Formula Review—Data Update and Issues*, Supp. 1, 8/17/2011.

33. **On balance, this work suggests that a case could be made for dropping variability from the formula.** There is little evidence that the current measure is capturing what is intended, and it also appears to add significant instability to the formula results. Given the changing nature of balance of payments crises, it is difficult to design a single measure of variability that would be appropriate under all circumstances, and previous efforts to identify a superior measure have not been successful. Also, as noted, the Fund has recently demonstrated considerable flexibility in access levels relative to quotas when lending to members, such that the case for including a separate measure in the quota formula may have further diminished.

Figure 7: Changes in Variability Shares
(in percent)



Reserves and Financial Contributions

34. **Reserves provide an indicator of a member's financial strength and ability to contribute to the Fund's finances.** While reserves have long been included in the quota formula, differing views have been expressed on their continued relevance. In the lead-up to the 2008 reform, many Directors continued to see a role for reserves as a relevant indicator of members' financial strength and ability to contribute to the Fund's finances. However, a number of others argued that the relevance of this indicator has declined over time and raised concerns about the potential distortions associated with excess reserve accumulation. One option that was explored was the feasibility of introducing a cap on reserves, but this was considered challenging given the absence of a clear benchmark for excess reserve accumulation.[27] The scope to consider actual contributions was also discussed. In the end, the consensus was to retain reserves in the formula with a relatively small weight.

[27] See *A New Quota Formula— Additional Considerations* (3/14/07).

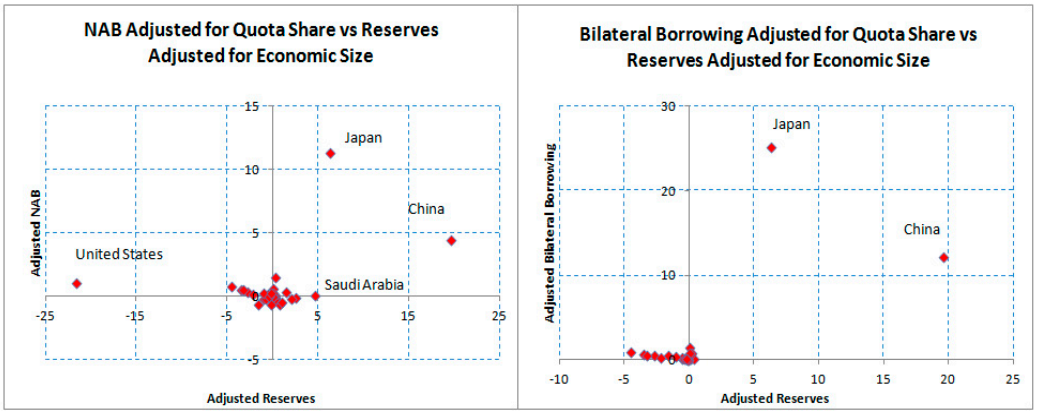
35. **Several issues arise regarding the reserves variable.** One is whether more recent analytical work provides any firmer basis for considering the introduction of a cap on the reserves variable for the purpose of its role in the quota formula. A second question is whether there is empirical support for the view that reserves do indeed provide an indicator of members' financial contributions to the Fund. Third, it would seem appropriate to revisit the question of whether there is scope to develop a measure of actual financial contributions as an alternative (or complement) to the reserves variable.

36. **A cap on reserves has been proposed in the past to address the concern that the reserves variable may reward excessive reserve accumulation.** As noted, however, earlier work found no clear basis for determining the appropriate level of such a cap. Since then, further staff work has been done on the broader issue of measures of reserve adequacy.[28] A general conclusion of that work is that there is no single measure that can fit all countries in all circumstances, and that country-specific characteristics should be taken into account when assessing reserve adequacy. Traditional indicators focusing on ratios to imports, short-term debt or broad money, while simple and intuitive, are somewhat arbitrary and often point to very different reserve adequacy levels. Optimization-based models, on the other hand, are sensitive to the assumptions about costs and benefits of holding reserves and the stylized facts assumed. More generally, different approaches appear suitable for different types of countries. For instance, metrics based on capital flows are regarded as more relevant for emerging markets, whereas trade-based indicators are more appropriate for LICs where shocks occur more to the current account. The exchange rate regime is also an important factor in countries' decisions to hold reserves.

37. **Recent resource mobilization efforts may shed some light on the link between reserves and members' actual financial contributions to the Fund.** While members contribute to the Fund's finances in a variety of ways, as discussed below, two recent important resource mobilization exercises—the 2009 bilateral borrowing and the expanded NAB—may provide a partial indication. In this connection, staff has examined the statistical association between members' contributions to these efforts and the relative strength of their reserves (Figure 8). For most countries, no clear relationship is observed. This may partly reflect the fact that members' quota shares are often used as an initial key when considering possible contributions, and that reserve currency issuers are often important contributors but tend to hold relatively low reserves. However, those cases where countries have contributed well above their quota share have generally (though not always) involved countries with relatively large reserves, suggesting that this variable still has relevance to potential to contribute to the Fund's finances, at least for a small but important part of the membership.

[28] See *Assessing Reserve Adequacy* (2/15/11) and =*Public Information Notice No. 11/47* (4/7//11).

Figure 8. Voluntary GRA Contributions and Reserves



Source: Finance Department.

38. **Given that reserves may not be a good proxy of actual contributions in many cases, the question arises whether a measure of members' actual financial contributions to the Fund could be included in the formula.** This issue was also discussed in the context of the 2008 reform and the 14th Review.[29] A key difficulty identified in the past is that members' financial contributions to the Fund come in a wide variety of forms, reflecting the cooperative nature of Fund membership.[30] These include (i) voluntary bilateral and multilateral support for Fund liquidity in the GRA, loan and subsidy contributions to the PRGT and its predecessors, contributions for debt relief operations, voluntary SDR trading arrangements, and financial support for other Fund activities, such as technical assistance and training; and (ii) contributions mandated by Fund policies (e.g., the key role of the Fund's strongest members who are included for transfers in the FTP), the charges and fees associated with borrowing from the Fund, and also burden-shared contributions.

39. **Given these diverse contributions, a number of issues arise in seeking to develop a single measure for the purposes of inclusion in the quota formula.** These include how to combine loan versus subsidy resources, and loan commitments to the GRA versus the PRGT, how to adjust for other forms of contributions, such as voluntary SDR trading arrangements or financing for technical assistance and training, and whether and how to take

[29] During its 2010 reform, the World Bank explicitly took into account members' IDA contributions in realigning members' shareholdings. Three measures were considered—economic weight (the GDP-blend variable from the IMF's quota formula), financial contributions (IDA contributions) and development contributions (client contributions to the WBG mission). Seventy-five percent of the realignment relied on economic weight, twenty percent on financial contributions, and the rest on development contributions. The bulk of the realignment benefitted members with above-average past contributions, and some protection was provided for countries with substantially increased pledges to the upcoming IDA round. (see World Bank Group Voice Reform: DC2010-0006/1, 4/25/10).

[30] See *Fourteenth General Review of Quotas—Realigning Quota Shares—Initial Considerations* (3/5/10) which discussed this issue and provided information on members' contributions.

account of contributions arising from Fund policies. Further questions include what time period(s) should be considered and how to aggregate contributions over time. More generally, it would be important to avoid signaling that some forms of financing are more highly valued than others, which could discourage members from contributing in some areas in future.

40. **To illustrate some of the issues involved, Table 5 presents various indicators of actual and potential contributions for members with the largest quotas.** The table shows members' shares in global reserves, the frequency of their inclusion for transfers in the FTP, and four areas of voluntary contributions: participation in the NAB (based on shares after the rollback), loan contributions to the PRGT, subsidy contributions to the PRGT, and contributions to financing IMF technical assistance and training. Several points can be noted:

- A judgment is required as to which forms of contribution to include, and for example whether to focus primarily on voluntary contributions. Inevitably, this implies a partial picture as it would be difficult to capture all the forms in which members contribute, as discussed above.
- The choice of which forms of contribution to include is likely to change over time, and would need to be reconsidered periodically. Current discussions on a further major resource mobilization effort provide a case in point.
- The form, timing, and amounts of voluntary contributions can differ substantially. For example, the table shows contributions made over widely different periods, and includes both loans on which contributors are paid interest and subsidies and TA contributions which typically require budgetary allocations.
- Judgment is also required on how to combine these contributions towards a measure that could be included in the quota formula.

41. **It is also possible to take such contributions into account outside the formula.** As noted, this has been done on a few occasions in the past, mainly in recognition of cases of particularly generous contributions.[31] This could potentially be done both to provide an additional quota increase to recognize major contributions, and also in the design of certain protection mechanisms for members facing a potential loss of quota share.[32]

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[31] These include the quota increases agreed for certain industrial countries in the 1959 and the Fourth General Reviews aimed at improving the Fund's liquidity, ad hoc quota increases for Italy in 1964 and Saudi Arabia in 1981; the selective increases for major oil-exporting countries in the Sixth Review; the ad hoc increase for Japan in the Ninth Review, and the additional increases for Korea, Luxembourg, Singapore, Malaysia, and Thailand in the Eleventh Review. *See A New Quota Formula—Additional Considerations* (3/14/07).

[32] In the 14th review discussions, staff prepared several quota allocation simulations showing the implications of protection mechanisms proposed by several Directors for taking into account financial contributions (e.g., PRGT, externally financed technical assistance, and the NAB). However, these did not garner sufficient support to be incorporated into the final quota calculations. See *Fourteenth General Review of Quotas—Realigning Quota Shares: Further Considerations—Simulation Requests* (8/30/10).

Table 5. Financial Contributions to the Fund: Selected Indicators 1/
(In percent unless indicated)

Country	14th Review Quota Share	Reserves Share	Participation in FTP 2/	Share in Financial Contributions to			
				NAB 3/	PRGT Loans 4/	PRGT Subsidies 5/	Technical Assistance 6/
United States	17.41	1.40	80	15.54	0.00	9.33	0.35
Japan	6.46	13.74	80	18.46	26.82	16.74	48.27
China	6.39	29.34	76	8.74	3.87	0.97	0.06
Germany	5.59	0.77	80	7.10	10.64	5.83	2.35
France	4.23	0.53	80	5.22	18.95	8.54	1.57
United Kingdom	4.23	0.66	80	5.22	5.14	10.97	8.33
Italy	3.16	0.61	64	3.80	8.43	5.66	1.22
India	2.75	3.50	37	2.45	0.00	0.66	0.05
Russian Federation	2.71	5.32	27	2.45	0.00	0.85	0.07
Brazil	2.32	2.82	11	2.45	0.00	0.28	0.22
Canada	2.31	0.66	80	2.13	4.64	6.09	6.14
Saudi Arabia	2.10	5.49	47	3.11	2.13	2.06	0.20
Spain	2.00	0.21	80	1.88	4.31	1.02	0.87
Mexico	1.87	1.19	38	1.40	0.00	1.04	0.44
Netherlands	1.83	0.21	80	2.53	3.67	3.49	3.31
Korea, Republic of	1.80	3.19	60	1.84	2.29	1.62	0.18
Australia	1.38	0.51	57	1.22	0.00	1.11	5.07
Belgium	1.34	0.17	80	2.20	1.35	2.68	1.90
Switzerland	1.21	0.98	76	3.05	4.26	2.88	6.70
Turkey	0.98	0.94	0	0.00	0.00	0.22	0.00
Indonesia	0.97	0.77	18	0.00	0.00	0.27	0.00
Sweden	0.93	0.47	64	1.24	0.00	3.75	1.18
Poland	0.86	0.93	49	0.71	0.00	0.23	0.00
Austria	0.82	0.11	80	1.00	0.00	1.51	0.00
Singapore	0.82	2.39	80	0.36	0.00	0.65	0.00
Norway	0.79	0.65	80	1.08	1.74	1.63	2.27
Venezuela, R.B. de	0.78	0.28	0	0.00	0.00	0.00	0.00
Malaysia	0.76	1.25	61	0.19	0.00	0.82	0.00
Iran, Islamic Republic of	0.75	1.10	0	0.00	0.00	0.07	0.00
Ireland	0.72	0.02	73	0.00	0.00	0.26	0.00
Total	80.3	80.2		95.4	98.2	91.2	90.8
Memorandum items:							
Total contributions (in millions of SDRs)				181,486	25,854	5,256	443
Advanced Economies	57.7	57.7	n.a.	74.5	91.1	85.5	92.1
EMDCs	42.3	42.3	n.a.	25.5	8.9	14.5	7.9

Source: Finance Department.

1/ The table contains information for the 30 members with the largest proposed quotas under the 14th General Review.

2/ Number of quarters a member has been included in the FTP for transfer for the period 1992 - December 2011 (maximum number is 80).

3/ NAB credit arrangements reflecting the rollback agreed by the Executive Board excluding members that have not yet adhered to the NAB decision and bilateral credit agreements for Czech Republic, Malta, Slovak Republic, and Slovenia.

4/ Loan commitments to the PRGF-ESF Trust as of June 30, 2011.

5/ Total bilateral resources received since 1987 for subsidizing concessional lending, HIPC and MDRI debt relief as of June 30, 2011 plus all pledges made under current fundraising as of December 31, 2011.

6/ Cash contributions to the IMF for technical assistance and training (excluding in kind contributions), FY1999-January 9, 2012.

42. **Staff proposes to explore the issue of capturing financial contributions further as part of the work program for the review.** The immediate focus would be on options for including a measure of actual financial contributions in the formula itself.

IV. Implications of Modifying the Formula: Illustrative Calculations

43. **This section presents a set of purely illustrative calculations that seek to highlight the potential impact on CQS of some of the issues covered in this paper** (see Tables 6-8 and Appendix Tables). The calculations are intended to help inform the discussion of these issues, and do not in any way represent proposals, which can only be formulated in light of Directors' views on the material presented here. Two sets of simulations are shown: (i) simplifying the formula by dropping one or more variables; and (ii) including a measure of financial openness, proxied by investment income, explicitly in the formula. The results of using different weights for market GDP and PPP GDP in the GDP blend variable are also shown to illustrate the sensitivity of CQS to changes in these weights. It is envisaged that a broader range of options would be considered in subsequent papers, including different combinations of variables and variable weights and further work on a financial contributions variable.

44. **The first set of simulations shows the implications of simplifying the formula by dropping one or more variables (Table 6)**. Two options are examined: one which preserves the relative weights of the remaining variables and another that distributes the weight(s) of the dropped variables evenly among the remaining variables—for instance, the coefficient of GDP, openness, and reserves are each increased by 5 percentage points when variability is dropped. The main findings are as follows:

- Dropping variability and preserving relative weights of the remaining variables leaves the overall CQS distribution between advanced economies and EMDCs broadly unchanged. However, there are significant shifts within these groups, including from other advanced to major advanced economies, reflecting the higher weight for GDP. When the weight of variability is distributed evenly over the other three variables, EMDCs as a group tend to gain, reflecting the higher weight on reserves and relatively lower weight on GDP.
- Dropping both variability and reserves results in a sizable overall shift in favor of the major advanced economies. EMDCs lose share as a whole and across most regions, with the largest declines recorded for the Middle East, Malta, and Turkey and the transition economies.
- When the formula is limited to GDP and reserves, EMDCs gain significantly relative to advanced economies. This is so for both methodologies of redistributing the weights, but is most pronounced when the weights are redistributed evenly (given the large impact on reserves, which would have a weight of 27.5 percent). Within groups, there is a large decline in the share of other advanced economies, that is partly offset by a gain for the major advanced economies; for EMDCs, Asia and Western Hemisphere record large gains and there are declines for the other groups.

- The last column shows the impact of a GDP only formula, based on the current GDP blend variable (compressed). Here the overall distribution between advanced economies and EMDCs changes only modestly but there are large changes in the distribution within these two groups in favor of the major advanced economies for the former, and Western Hemisphere for the latter.

Table 6. Illustrative Calculations—Simplifying the Formula
(In percent)

	14th Review Proposed Quotas	Calculated Quota Share	Without Variability		GDP and Openness		GDP and Reserves		GDP Only (60/40)
			Preserving Relative Weights	Distributed Evenly	Preserving Relative Weights	Distributed Evenly	Preserving Relative Weights	Distributed Evenly	
Advanced economies	57.7	57.5	57.7	56.2	59.7	59.8	55.2	49.0	58.3
Major advanced economies	43.4	41.6	42.8	41.6	44.3	44.2	43.9	38.8	46.5
Of which: US	17.4	16.1	16.7	15.9	17.6	17.4	19.1	15.6	20.9
Other advanced economies	14.3	15.9	14.9	14.6	15.4	15.7	11.3	10.2	11.8
Emerging Market and Developing Countries 1/	42.3	42.5	42.3	43.8	40.3	40.2	44.8	51.0	41.7
Developing countries	35.1	34.7	35.1	36.3	33.2	33.1	37.6	43.2	34.8
Africa	4.4	3.2	3.0	3.1	2.9	2.9	3.1	3.5	3.0
Asia	16.1	18.3	19.3	20.2	18.0	17.9	20.7	24.8	18.6
Middle East, Malta and Turkey	6.7	6.2	5.7	6.0	5.3	5.3	5.9	7.2	5.2
Western Hemisphere	7.9	6.9	7.0	6.9	7.0	6.9	7.9	7.8	8.0
Transition economies	7.2	7.8	7.3	7.4	7.1	7.1	7.2	7.8	6.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:									
EU27	30.2	32.2	31.3	30.5	32.7	33.1	25.5	22.1	27.2
LICs 2/	4.0	2.6	2.5	2.5	2.5	2.5	2.6	2.6	2.5
Coefficients for quota variables									
GDP		0.500	0.590	0.550	0.625	0.600	0.909	0.725	1.000
Openness		0.300	0.350	0.350	0.375	0.400	0.000	0.000	0.000
Variability		0.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Reserves		0.050	0.060	0.100	0.000	0.000	0.091	0.275	0.000

Source: Finance Department.

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.
2/ PRGT-eligible countries.

45. **The second set of illustrative calculations explores a formula in which a larger weight is given to financial openness, using investment income as a proxy.** For purely illustrative purposes, the openness variable is modified to give equal weights to trade and financial openness (Table 7). When this variable is included in the current formula, the result is a shift of about 2 percentage points in favor of advanced economies. If variability is dropped, the share of other advanced economies declines back to close to its previous level, and there are significant shifts within the EMDC group. If only GDP and the revised openness variable are included, there is an even larger shift towards advanced economies, and sizable declines for all EMDC groups.

46. **Table 8 illustrates the impact of changes in the weights of GDP measured at market exchange rates and at PPP in the GDP blend variable**. Increasing the weight for PPP GDP in the blend from the current 40 to 50 percent would result in a 0.7 percentage point increase in the share of EMDCs in CQS, with all sub-groups benefitting.

Table 7. Illustrative Calculations—Formula Including Investment Income
(In percent)

	14th Review Proposed Quotas	Calculated Quota Share	Calculated Quota Share Modified Formula 1/	Modified Formula without Variability 1/		Modified Formula with GDP and Openness 1/	
				Preserving Relative Weights	Distributed Evenly	Preserving Relative Weights	Distributed Evenly
Advanced economies	57.7	57.5	59.7	60.2	58.8	62.5	62.7
Major advanced economies	43.4	41.6	42.9	44.3	43.2	45.9	45.9
Of which: US	17.4	16.1	16.8	17.5	16.8	18.5	18.3
Other advanced economies	14.3	15.9	16.7	15.9	15.6	16.5	16.8
Emerging Market and Developing Countries 2/	42.3	42.5	40.3	39.8	41.2	37.5	37.3
Developing countries	35.1	34.7	33.0	33.0	34.3	31.0	30.7
Africa	4.4	3.2	3.1	2.8	2.9	2.7	2.7
Asia	16.1	18.3	17.4	18.2	19.1	16.8	16.7
Middle East, Malta and Turkey	6.7	6.2	5.8	5.3	5.6	4.8	4.8
Western Hemisphere	7.9	6.9	6.7	6.7	6.7	6.7	6.6
Transition economies	7.2	7.8	7.4	6.8	6.9	6.6	6.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:							
EU27	30.2	32.2	33.4	32.7	31.9	34.2	34.7
LICs 3/	4.0	2.6	2.4	2.3	2.3	2.2	2.2
Coefficients for quota variables							
GDP		0.500	0.500	0.588	0.550	0.625	0.600
Openness		0.300	0.300	0.353	0.350	0.375	0.400
Variability		0.150	0.150	0.000	0.000	0.000	0.000
Reserves		0.050	0.050	0.059	0.100	0.000	0.000

Source: Finance Department.

1/ The traditional openness variable in the formula is replaced with Investment Income, as a proxy for financial openness, and trade openness (openness minus investment income) weighted equally.
2/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.
3/ PRGT-eligible countries.

Table 8. Illustrative Calculations—Formula with Various GDP Blends
(In percent)

	14th Review Proposed Quotas	Calculated Quota Share	Formula with various GDP blends	
			50-50 blend	70-30 blend
Advanced economies	57.7	57.5	56.8	58.2
Major advanced economies	43.4	41.6	41.1	42.2
Of which: US	17.4	16.1	15.9	16.2
Other advanced economies	14.3	15.9	15.7	16.0
Emerging Market and Developing Countries 1/	42.3	42.5	43.2	41.8
Developing countries	35.1	34.7	35.4	34.1
Africa	4.4	3.2	3.3	3.2
Asia	16.1	18.3	18.8	17.9
Middle East, Malta and Turkey	6.7	6.2	6.3	6.2
Western Hemisphere	7.9	6.9	7.0	6.9
Transition economies	7.2	7.8	7.9	7.7
Total	100.0	100.0	100.0	100.0
Memorandum items:				
EU27	30.2	32.2	31.8	32.6
LICs 2/	4.0	2.6	2.7	2.5

Source: Finance Department.

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.
2/ PRGT-eligible countries.

V. CONCLUDING REMARKS

47. **This paper seeks to provide initial background for the quota formula review.** It focuses on several key issues that have been raised by Directors' in previous quota discussions, and reports on the results of additional technical work in a number of these areas. No proposals are made at this stage as this would be premature given the very early stage of discussions. However, it is hoped that the material presented in this paper could help to begin to narrow the range of options to be considered as part of the review. Staff plans to come back to the Board with a follow up paper in the period after the Spring Meetings that would seek to further advance the discussions in light of Directors' comments on this paper.

48. **In this context, Directors may wish to comment on the following issues**:

- Do they agree that the four principles that underpinned the 2008 reform of the quota formula remain relevant for the current review?

- Do they agree that GDP remains the most important formula variable? What are Directors' views on the composition of the blend variable and its overall weight in the formula?

- What are Directors' views on the role and weight of openness in the formula? Do they agree with staff's assessment that differential treatment of intra-currency union flows would be problematic? What are Directors' views on the treatment of financial openness given the difficult data and conceptual issues identified in the paper?

- Do Directors see a case for dropping variability from the formula, given that it does not appear to be measuring what was intended and adds significant instability to the formula results?

- What are Directors' views on the role of reserves in the formula? Do they agree that further work is needed on the scope for including a measure of actual financial contributions?