INTERNATIONAL MONETARY FUND

Quota Formula Review—Additional Considerations—Annexes

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ANNEX I. VARIABILITY ISSUES

This annex summarizes recent staff work on alternative measures for variability, and updates staff's previous work on unscaled variability including on a variant discussed by the G-24. None of the alternative measures improve on the current measure.

A. Recent Work on Variability

At the time of the 2008 Reform, staff undertook extensive work and presented a number of alternative formulations of variability measures.[1] (See Table AI.1 for a brief description of variability considered in staff papers). These approaches were then updated at the onset of the 14th General Review, which reinforced the earlier conclusion that it was difficult to identify a measure that was clearly superior to the current one *in terms of providing an indicator of need for Fund resources, or stability.*[2]

More recently, staff explored how well the different measures of variability capture potential need for Fund financing.[3] Staff estimated the correlation between variability (current and alternative measures) adjusted for economic size and a binary variable indicating the approval of a Fund arrangement using data since 1990. The results did not identify a significant relationship between the various variability measures and the potential use of Fund resources. A statistical model in which variability was included as an explanatory variable along with selected macroeconomic indicators largely confirmed these findings.[4]

Staff also examined the instability that the current measure introduces to the calculated quota shares, as highlighted in recent updates.[5] In the June paper, a number of alternative statistical measures of dispersion were explored. The analysis suggested that none of the alternative variability indicators consistently outperformed the current measure. In addition, using the most recent data, they also did not improve on the current measure in terms of reflecting members' potential need.

Staff also explored the feasibility of including a composite of vulnerability indicators. The main advantage of such an approach is that a composite indicator can capture different kinds of vulnerabilities and therefore is likely to have a better explanatory power for potential

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[1] See Annex of SM/07/252 for definitions of these variability measures and discussion of their implications.

[2] See *Quotas—Updated Calculations and Quota Variables* (8/28/09).

[3] See *Quota Formula Review—Initial Considerations* (2/10/12).

[4] See *Quota Formula Review—Initial Considerations* (2/10/12) and Supplement 1.

[5] See Annex I in *Quota Formula Review—Data Update and Issues* (8/17/11) and *Quota Formula Review—Data Update and Further Considerations* (6/28/12).

need than a measure based on a single variable. However, the results did not appear sufficiently robust to incorporate in the quota formula.[6]

B.   Scaled Variability

Another approach that has been considered in the past is to utilize a measure of scaled volatility. A number of approaches have been considered that estimate variability of either balance of payment flows or GDP independently of size. These measures lead to the most radical shifts in global shares relative to the current measure, but past work has found little evidence that the results have a bearing on potential need for Fund resources and small countries tend to have very large shares.[7] To address the latter problem, the G24 suggested to cap the size of the variable for individual countries as a multiple (say 500 percent) of quota shares.[8]

To illustrate the impact of this approach, staff has calculated two versions of scaled variability using GDP and the average current receipts and net capital flows as scaling factors (see Table AI.2 and Appendix Table A7). In line with the G-24 approach, a cap of 500 percent of actual quota shares was applied,[9] which aims to moderate some of the extreme changes in CQS that result from scaling.[10] The choice of the cap, however, is arbitrary and is binding for a very substantial part of membership, indicating the variability measure would be essentially determined as a multiple of actual quota share rather than as an independent measure. For instance, using a cap of 500 percent of actual quota shares, when variability is scaled to the mean of current receipts and net capital flows, the cap is binding for 130 members (127 members when variability is scaled to GDP).

EMDCs would gain a substantial share in variability relative to the current measure when scaling is applied. The gains would be even larger if the volatility of real GDP growth is used, with over 90 percent of the variability share allocated to EMDCs and the share of LICs rising to 37.5 percent (compared to 2.6 percent under the current measure).

Importantly, the new measures do not lead to any improvement in terms of an indicator for potential balance of payments need. As Figure AI.1 shows, the correlations between

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[6] *Quota Formula Review—Data Update and Further Considerations* (6/28/12).

[7] See *Quotas—Updated Calculations and Quota Variables* (08/28/09), paragraph 30.

[8] See "*A Comprehensive Review of the IMF Quota Formula: What Should It Entail?",* G-24 Secretariat, May 31, 2012.

[9] The original G-24 approach discussed during the 2008 reform used pre-Singapore actual quotas. For this analysis staff have used 14th Review quotas.

[10] For example, using GDP as a scaling factor without capping, the CQS of Tuvalu is more than 1,700 times higher than its current one and is higher than the CQS of Greece and Portugal.

the different variability indicators and a binary variable for approval of a Fund arrangement are essentially zero. These results remain unchanged if only the subset of low-income countries is considered (Panel B). There is no evidence that the higher shares in variability for this group of countries are correlated with the use of Fund financing based on data for the last twenty years.[11]

They also do not improve on the measure's stability. Stability considerations may appear less relevant for the scaled and capped measures given that the cap is binding for a large part of membership. Data updates from year to year will have little effect on the shares in most of these cases (unless the ratio falls below the cap) which would make the variable appear rather stable. However, changes in the actual quota shares, on which capping is based (e.g., after a general quota increase or with a new member joining), may still lead to significant reshuffling even without any change in the underlying data.

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[11] Data cover the period 1990-2010. For the scaled and capped versions of variability of current receipts and net capital flows, caps are based on the actual quota shares as of the respective year.

Table AI.1 Alternative Measures of Variability Considered in Staff Papers 1/

Variable	Description
1. Scaled Variability	Variability of current receipts and net capital flows, divided by the country's GDP or the average of current receipts and net capital flows.
2. Scaled Variability with a cap	Scaled variability as defined above expressed as a share and capped at 500 percent of the country's actual quota share.
3. Variability Scaled by GDP per capita	Variability of current receipts and net capital flows divided by per capita GDP and expressed as a share.
4. Variability with 5-year trend	Variability of current receipts and net capital flows calculated as the root square deviation from a 5-year centered moving average over a recent 13-year period.
5. Downside variability	Square root of the sum of squared deviations from below-trend (measured as a 3-year moving average) current receipts and net capital flows.
6. Extreme variability	Similar to downside variability but takes into account only observations that are one standard deviation below the trend (3-year moving average). 2/
7. Variability of current receipts plus variability of capital flows	Sum of variability of current receipts and variability of net capital flows calculated separately.
8. Volatility of GDP growth (un-scaled)	Standard deviation of real GDP growth calculated over a recent 13-year period.
9. Volatility of GDP growth scaled up by GDP	Volatility of GDP growth as defined above multiplied by a recent 3-year average of nominal GDP.
10. Volatility of consumption growth(un-scaled)	Standard deviation of real consumption growth calculated over a recent 13-year period.
11. Volatility of consumption growth scaled up by consumption	Volatility of consumption growth as defined above multiplied by a recent 3-year average nominal consumption.
12. Consumption risk sharing (un-scaled)	Volatility of consumption growth relative to the volatility of income growth.
13. Consumption risk sharing scaled up by consumption	Consumption risk sharing as defined above scaled up using a recent 3-year average of nominal consumption.
14. Variability based on 13-year average absolute deviation	Average absolute deviation from a 3-year centered moving average of current receipts and net capital flows, calculated over a recent 13-year period.
15. Variability based on 5-year standard deviation	Standard deviation from the sample mean of current receipts and net capital flows, calculated over a recent 5-year period.
16. Variability based on 5-year average absolute deviation	Average absolute deviation from the sample mean of current receipts and net capital flows calculated over a recent 5-year period.

17. Variability based on 5-year median absolute deviation	Median absolute deviation from the sample median of current receipts and net capital flows, calculated over a recent 5-year period.
18. Variability based on 5-year maximum deviation from the mean	Maximum absolute deviation from the sample mean of current receipts and net capital flows, calculated over a recent 5-year period.
19. Instability index	Average absolute deviation of the change in current receipts and net capital flows relative to the slope of a linear regression of current receipts and net capital flows on a time variable, including a constant.
20. Composite variability	A composite vulnerability score is calculated as a linear combination of the current account to GDP ratio, reserve cover ratio, per capita GDP and real GDP growth with weights equal to the inverse of the cross-sectional standard deviation of the variables. The raw composite vulnerability score is transformed into a non-negative variable, which is then scaled up with the country's share in GDP and rebased.

1/ Definitions and illustrative calculations for measures 1-13, except measure 2, can be found in SM/07/252. Updated calculations are also available in SM/09/227 where measure 2 is also discussed. Measures 14-20 are considered in SM/12/163.

2/ A version based on a 5-year moving average was considered as well.

**Table AI. 2. Shares in Variability under Alternative Measures**

	Current Variability	Variability Scaled to GDP and Capped at 500% of 14th Review Quota Share	Variability Scaled to Series Mean and Capped at 500% of 14th Review Quota Share	Volatility of GDP Growth (Unscaled)
Advanced economies	57.90	24.12	20.37	9.49
Major advanced economies	38.68	4.22	5.15	2.42
United States	15.49	0.48	0.91	0.34
Japan	5.18	0.45	1.01	0.41
Germany	6.05	0.79	0.71	0.38
France	2.34	0.39	0.45	0.26
United Kingdom	4.53	0.85	0.67	0.36
Italy	2.96	0.61	0.73	0.34
Canada	2.12	0.64	0.67	0.33
Other advanced economies	19.22	19.90	15.22	7.07
Spain	2.14	0.64	0.74	0.38
Netherlands	2.86	1.56	0.83	0.34
Australia	1.47	0.60	1.04	0.14
Belgium	1.82	1.68	0.75	0.27
Switzerland	0.87	0.76	0.44	0.26
Sweden	1.50	1.49	1.06	0.46
Austria	0.90	1.02	0.71	0.32
Norway	1.34	1.43	1.59	0.23
Ireland	1.47	2.82	0.90	0.75
Denmark	0.74	1.02	0.72	0.37
Emerging Market and Developing Countries 1/	42.10	75.88	79.63	90.51
Africa	3.58	16.93	18.10	28.16
South Africa	0.34	0.50	0.64	0.30
Nigeria	0.55	1.28	1.59	0.75
Asia	14.90	15.30	12.00	14.65
China 2/	5.60	0.46	0.68	0.30
India	1.60	0.51	1.01	0.31
Korea	1.29	0.62	0.51	0.44
Indonesia	0.79	0.60	1.03	0.23
Singapore	2.23	4.08	1.05	0.70
Malaysia	0.95	1.94	0.86	0.44
Thailand	1.21	1.89	1.21	0.41
Middle East, Malta & Turkey	7.49	13.43	15.79	8.89
Saudi Arabia	2.77	2.84	2.29	0.41
Turkey	1.30	0.83	1.43	0.84
Iran, Islamic Republic of	0.31	0.37	0.74	0.42
Western Hemisphere	6.53	11.43	15.50	17.65
Brazil	1.60	0.39	1.32	0.39
Mexico	1.63	0.72	0.84	0.52
Venezuela, República Bolivariana de	0.62	0.81	2.01	1.28
Argentina	0.54	0.72	1.39	1.06
Transition economies	9.60	18.79	18.25	21.17
Russian Federation	2.91	0.89	1.53	0.69
Poland	1.05	0.98	1.02	0.28
Total	100.00	100.00	100.00	100.00
Memorandum Items:				
EU 27	34.68	27.24	21.08	13.92
LICs 3/	2.62	16.95	17.80	37.50

Source: Finance Department.

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
2/ Including China, P.R., Hong Kong SAR, and Macao SAR.
3/ PRGT-eligible countries.

Figure AI.1 Correlation between Variability and Need for Fund Resources

All Members

Low-Income Countries
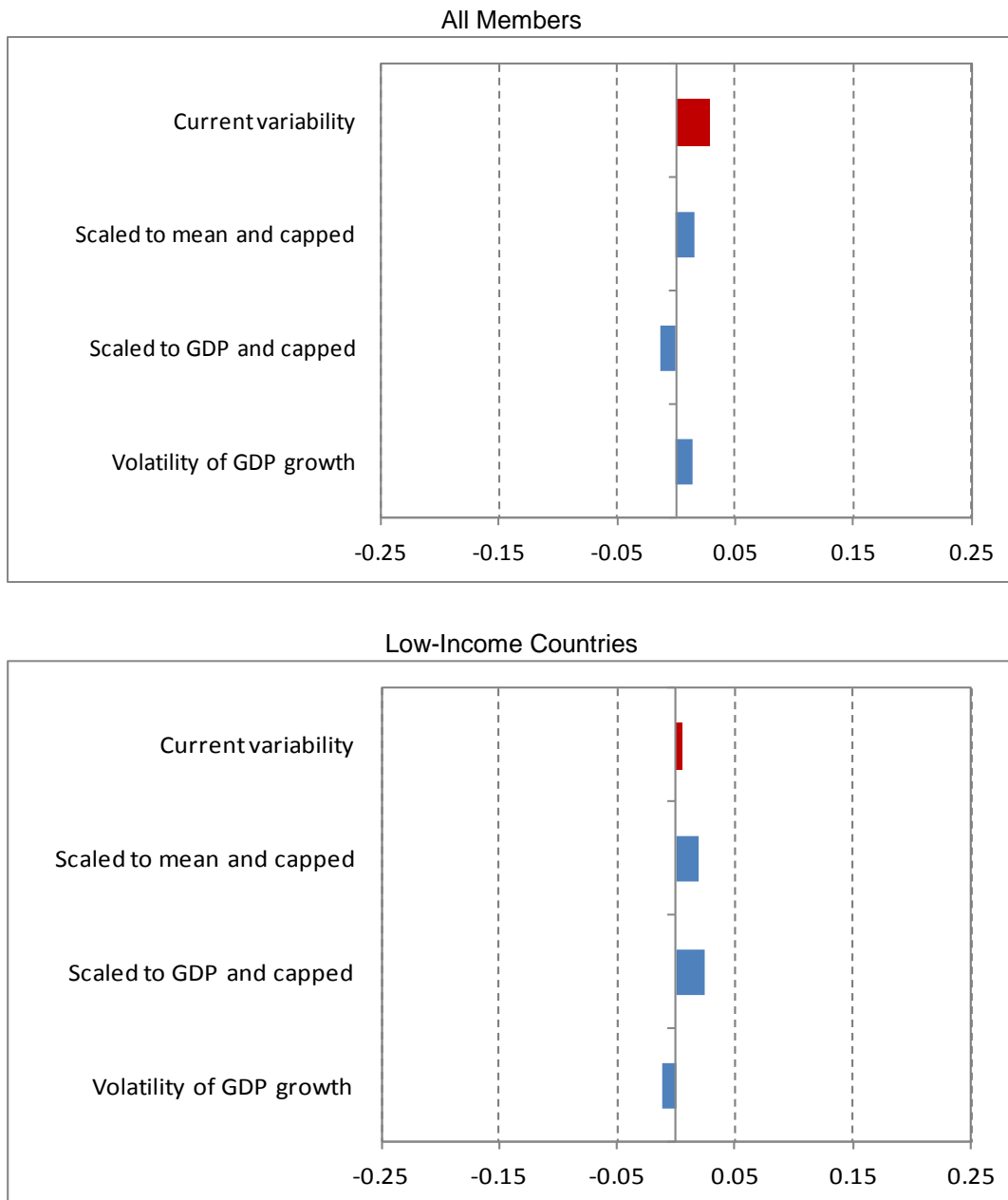
Source: IMF Finance Department

ANNEX II. MEASURING TRADE ON A VALUE ADDED BASIS[12]

This annex provides background on measuring trade on a value added basis and the efforts underway by international organizations in this regard. It suggests that despite some encouraging developments, there are important conceptual and methodological challenges which are likely to impede rapid progress. It concludes with a brief discussion on the treatment on goods for processing under the newly implemented sixth edition of the Balance of Payments and International Investment Position Manual (BPM6).

There is no internationally agreed methodological framework for measuring value added in trade and these data are not available on a consistent basis. International guidelines on measuring trade focus on gross values of goods and services, and it is not possible to measure value added in trade directly using official trade statistics. Since official national macroeconomic statistics are predicated on the concept of residence, the statistics cover the activities of resident units (the national economy) with other resident units and/or between resident units and units in the rest of the world. For trade on a value added basis, the official statistics may provide some information on the domestic or import content of its exports. However, measuring value added for goods imports, or measuring the domestic content of imports, can be problematic even with data from trading partners or third economies.

Much of the work on developing measures of trade on a value added basis has therefore focused on the use of international input-output tables. These global input-output tables have been constructed by putting together the national input-output tables available from national statistical agencies. These have been developed to serve various statistical and analytical purposes. But as a number of recent studies note,[13] there are various technical challenges to the use of national input-output tables as part of a global framework: national input-output tables vary widely in terms of the level of detail and scope, and are therefore not consistent; some countries compile "industry-by-industry" input-output tables while others focus on "product-by-industry" supply and use tables; national input-output tables are not available for a wide cross-section of economies (particularly developing and emerging market economies); and input–output tables may not be available on a timely basis.

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[12] Prepared by the Statistics and Finance Departments.

[13] See, for example, Koopman, William Powers, Zhi Wang, and Shang-Jin Wei (2010), "Give Credit Where Credit Is Due: Tracing Value Added in Global Production Chains" NBER Working Paper No. 16426, September 2010, and Johnson, Robert C. and Guillermo Noguera (2012) "Accounting for Intermediates: Production Sharing and Trade in Value Added", Journal of International Economics. These studies also detail the sources of data for calculating value added for gross exports, including components of domestic value-added in previously imported goods. The decomposition of value-added exports examines both exports that are absorbed by the direct importer and those that are processed and subsequently exported to other countries. However, it should be noted that the studies are conducted for one year (2004) and for a limited number of countries and regions (countries for which data were not available were grouped as "rest of the world")

With the heightened interest of policy-makers, international agencies engaged in trade policy are attempting to take this work into the mainstream of official statistics. The OECD and World Trade Organization (WTO) are promoting a number of initiatives to support the development of measures of trade on a value added basis and promote coordination among international agencies, national agencies, and research bodies. The agencies have embarked on an exercise to regularly produce estimates of trade on a value-added basis to complement the statistics on gross trade being compiled by economies. The exercise is based on the OECD database of harmonized national input-output tables, which covers 48 countries (33 OECD and 15 non-OECD) and is available for 1995, 2000, and 2005. These would be used to obtain estimates of value added in trade. However, given the methodological and data challenges noted above, it is unlikely that the value added in trade data will be available for the bulk of the membership in the near-term.

The international statistical standards for recording international transactions have been updated to take account of developments in globalization, including changes in global production chains. The change in the recording of goods for processing is a major methodological change that will have a significant impact on the measurement and interpretation of this activity. The *BPM6* is consistent with the *System of National Accounts, 2008 (2008 SNA).*[14] The *BPM6* now includes the item, *manufacturing services on physical inputs owned by others*, which records the value of the processing activity undertaken by nonresidents that do not own the goods being processed.[15] Thus, for goods that are processed for a fee by a nonresident, the value of processing is recorded separately in the accounts as a provision of services to the economy of the owner, and the gross values of the goods entering and leaving the processing economy are excluded from goods trade. However, if there is a change of ownership where the entity that is undertaking the processing takes ownership of the goods being processed, then the value of the processing is not recorded separately, and imports and exports of goods are measured at the full amounts paid and received. Thus BPM6 treatment of goods for processing provides a very partial indication of value added in trade.

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[14] As background, the *BPM5* reflected a recording of goods for processing that was aligned with the recording of the movement of goods presented in international merchandise trade statistics. There is no such imputation of a change of ownership in the *BPM6* and the *BPM5* exception to the change of ownership principle for goods for processing is eliminated.

[15] A number of countries have still not adopted this framework. However, starting with the August issue of *IFS*, the online *Balance of Payments Statistics* database in the IMF eLibrary, and the BOPS CD ROM, data for all countries are presented on a *BPM6* basis.

ANNEX III. EXCLUDING INTRA-CURRENCY UNION TRADE FLOWS

This annex updates the previous calculations of the impact of excluding intra-currency union trade on the openness variable.[16] Data on intra-currency union trade flows are excluded for the euro area alone and for all 4 currency unions (including the euro area, Eastern Caribbean Currency Union (ECCU), Central African Economic and Monetary Union (CEMAC), and West African Economic and Monetary Union (WAEMU)). The update shows that for euro area countries, the exclusion of such trade substantially reduces its share in openness, leading to a decline in its aggregate CQS of nearly 3 percentage points.

The openness variable treats intra-currency union transactions in the same way as all other current external transactions. In the July 2012 discussion, many Directors viewed the current openness measure as flawed, and noted in particular the challenges posed by intra-currency union flows. Several Directors requested staff to update earlier calculations of openness excluding intra-currency union trade.

In response to these requests, staff has updated the previous calculations of the impact of excluding intra-currency union trade from the openness variable (Tables AIII.1 and AIII.2). Data on intra-currency union flows are excluded for the euro area alone and for the 4 currency unions which are formally recognized in the Fund's regional surveillance work: euro area, ECCU, CEMAC, and WAEMU. Only data on merchandise trade are excluded as data on services are not available from IFS.[17]

The main impact of such an adjustment is a decrease in the share of euro area members (Table AIII.1 and Appendix Table A8).[18] The combined openness share of the euro area declines by about 7 percentage points (pps), which leads to a decline in the combined CQS of euro area members of 2.9 pps (Table AIII.2 and Appendix Table A9). The combined CQS of CEMAC, ECCU, and WAEMU increase marginally, by 0.01 pps. This reflects the fact that almost all of total intra-currency union trade (about 9.5 percent of global openness) is among the euro area (EU-17), whereas the share of WAEMU, CEMAC, and ECCU accounts for only 0.01 percent of global openness.

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[16] For previous calculations see *Quotas—Updated Calculations and Quota Variables* (08/28/2009).

[17] Data for intra-currency union trade in services for most euro area members are available starting in 2008 from Eurostat but are incomplete.

[18] Variability is also affected with the exclusion of intra-currency union trade but its impact on CQS is ambiguous. For example, in the case of euro area countries, variability shares increase in the cases of Cyprus, Greece, Ireland, Luxembourg, and Malta, but decline in the remaining euro area members (Austria, Belgium, Estonia, Finland, France, Germany, Italy, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain).

Table AIII.1. Excluding Intra-Currency Union Trade – Openness and Variability Shares
(In percent)

	14th General Review Quotas	Openness Shares			Variability Shares		
		Including All Currency Unions Trade	Excluding All Currency Unions Trade	Excluding Intra Euro Area Trade	Including All Currency Unions Trade	Excluding All Currency Unions Trade	Excluding Intra Euro Area Trade
Advanced economies	57.6	62.2	58.5	58.5	57.9	55.1	55.1
Major advanced economies	43.4	41.8	40.8	40.8	38.7	37.8	37.8
United States	17.4	13.1	14.4	14.4	15.5	16.6	16.6
Japan	6.5	4.3	4.8	4.8	5.2	5.5	5.5
Germany	5.6	8.2	6.4	6.4	6.1	4.5	4.5
France	4.2	4.6	3.4	3.4	2.3	1.6	1.6
United Kingdom	4.2	5.6	6.2	6.2	4.5	4.9	4.9
Italy	3.2	3.4	2.6	2.6	3.0	2.4	2.4
Canada	2.3	2.6	2.9	2.9	2.1	2.3	2.3
Other advanced economies	14.3	20.4	17.8	17.8	19.2	17.4	17.4
Spain	2.0	2.5	1.9	1.9	2.1	1.9	1.9
Netherlands	1.8	3.2	2.2	2.2	2.9	1.7	1.7
Australia	1.4	1.3	1.4	1.4	1.5	1.6	1.6
Belgium	1.3	2.2	1.1	1.1	1.8	1.1	1.1
Switzerland	1.2	1.9	2.1	2.1	0.9	0.9	0.9
Sweden	0.9	1.3	1.4	1.4	1.5	1.6	1.6
Austria	0.8	1.2	0.8	0.8	0.9	0.6	0.6
Norway	0.8	0.9	1.0	1.0	1.3	1.4	1.4
Ireland	0.7	1.5	1.5	1.5	1.5	1.6	1.6
Denmark	0.7	0.9	1.0	1.0	0.7	0.8	0.8
Emerging Market and Developing Countries 1/	42.4	37.8	41.5	41.5	42.1	44.9	44.9
Africa	4.4	2.6	2.9	2.9	3.6	3.8	3.8
South Africa	0.6	0.5	0.5	0.5	0.3	0.4	0.4
Nigeria	0.5	0.4	0.4	0.4	0.5	0.6	0.6
Asia	16.0	17.9	19.8	19.8	14.9	16.0	16.0
China 2/	6.4	7.9	8.7	8.7	5.6	6.0	6.0
India	2.7	1.6	1.8	1.8	1.6	1.7	1.7
Korea	1.8	2.4	2.6	2.6	1.3	1.4	1.4
Indonesia	1.0	0.7	0.8	0.8	0.8	0.8	0.8
Singapore	0.8	2.1	2.3	2.3	2.2	2.4	2.4
Malaysia	0.8	1.0	1.1	1.1	0.9	1.0	1.0
Thailand	0.7	0.9	1.0	1.0	1.2	1.3	1.3
Middle East, Malta and Turkey	6.7	5.2	5.8	5.8	7.5	8.0	8.0
Saudi Arabia	2.1	1.1	1.2	1.2	2.8	3.0	3.0
Turkey	1.0	0.8	0.9	0.9	1.3	1.4	1.4
Iran, Islamic Republic of	0.7	0.4	0.5	0.5	0.3	0.3	0.3
Western Hemisphere	7.9	4.9	5.4	5.4	6.5	7.0	7.0
Brazil	2.3	1.1	1.2	1.2	1.6	1.7	1.7
Mexico	1.9	1.5	1.7	1.7	1.6	1.7	1.7
Venezuela, República Bolivariana de	0.8	0.3	0.4	0.4	0.6	0.7	0.7
Argentina	0.7	0.4	0.4	0.4	0.5	0.6	0.6
Transition economies	7.2	7.1	7.6	7.6	9.6	10.1	10.1
Russian Federation	2.7	2.0	2.2	2.2	2.9	3.1	3.1
Poland	0.9	1.0	1.1	1.1	1.0	1.1	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:							
EU27	30.22	41.08	34.89	34.88	34.68	30.05	30.05
Euro Area 3/	21.90	30.29	22.96	22.96	24.36	19.00	19.00
CEMAC 4/	0.22	0.18	0.20	0.20	0.30	0.32	0.32
WAEMU 5/	0.36	0.13	0.14	0.15	0.20	0.21	0.21
ECCU 6/	0.02	0.01	0.01	0.02	0.01	0.01	0.01
LICs 7/	4.05	2.12	2.33	2.35	2.62	2.80	2.81

Source: Finance Department

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
2/ Including China, P.R., Hong Kong SAR, and Macao SAR.
3/ Including Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain.
4/ Including Cameroon, Central Africa Republic, Chad, Congo Republic of, Equatorial Guinea, and Gabon.
5/ Including Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo.
6/ Including Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia ,and St. Vincent and the Grenadines.
7/ PRGT-eligible countries.

Table AIII.2. Excluding Intra-Currency Union Trade – Calculated Quota Shares
(In percent)

	14th General Review Quotas	Calculated Quota Shares	CQS Excluding All Currency Unions	CQS Excluding Intra Euro Area Trade
Advanced economies	57.6	56.1	54.5	54.5
Major advanced economies	43.4	40.6	40.2	40.2
United States	17.4	15.8	16.3	16.3
Japan	6.5	6.2	6.3	6.3
Germany	5.6	5.7	5.0	5.0
France	4.2	3.6	3.2	3.2
United Kingdom	4.2	4.1	4.3	4.3
Italy	3.2	3.0	2.7	2.7
Canada	2.3	2.3	2.4	2.4
Other advanced economies	14.3	15.4	14.4	14.4
Spain	2.0	2.2	2.0	2.0
Netherlands	1.8	2.0	1.6	1.6
Australia	1.4	1.4	1.5	1.5
Belgium	1.3	1.3	0.9	0.9
Switzerland	1.2	1.2	1.3	1.3
Sweden	0.9	1.0	1.1	1.1
Austria	0.8	0.8	0.7	0.7
Norway	0.8	0.8	0.9	0.9
Ireland	0.7	0.9	0.9	0.9
Denmark	0.7	0.7	0.7	0.7
Emerging Market and Developing Countries 1/	42.4	43.9	45.5	45.5
Africa	4.4	3.3	3.4	3.4
South Africa	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.5	0.5
Asia	16.0	19.6	20.3	20.3
China 2/	6.4	9.4	9.7	9.7
India	2.7	2.6	2.7	2.7
Korea	1.8	2.0	2.0	2.0
Indonesia	1.0	1.0	1.0	1.0
Singapore	0.8	1.3	1.4	1.4
Malaysia	0.8	0.8	0.8	0.8
Thailand	0.7	0.9	0.9	0.9
Middle East, Malta and Turkey	6.7	6.2	6.5	6.5
Saudi Arabia	2.1	1.4	1.5	1.5
Turkey	1.0	1.1	1.2	1.2
Iran, Islamic Republic of	0.7	0.7	0.7	0.7
Western Hemisphere	7.9	7.1	7.4	7.4
Brazil	2.3	2.2	2.3	2.3
Mexico	1.9	1.7	1.8	1.8
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6
Transition economies	7.2	7.7	7.9	7.9
Russian Federation	2.7	2.6	2.7	2.7
Poland	0.9	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0
Memorandum items:				
EU27	30.22	30.90	28.47	28.46
Euro Area 3/	21.90	22.32	19.45	19.45
CEMAC 4/	0.22	0.22	0.23	0.23
WAEMU 5/	0.36	0.19	0.19	0.19
ECCU 6/	0.02	0.02	0.02	0.02
LICs 7/	4.05	2.69	2.80	2.80

Source: IMF Finance Department.

1/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
2/ Including China, P.R., Hong Kong SAR, and Macao SAR.
3/ Including Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain.
4/ Including Cameroon, Central Africa Republic, Chad, Congo Republic of, Equatorial Guinea, and Gabon.
5/ Including Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo.
6/ Including Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia ,and St. Vincent and the Grenadines.
7/ PRGT-eligible countries.

ANNEX IV. OPENNESS SHARES: CAPPING AND COMPRESSED OPTIONS

This annex provides a technical description of the possible approaches to limiting the boost individual members can receive from the openness variable as discussed in the main paper.

Staff has explored possible approaches that would limit the additional boost that members receive from openness relative to that from GDP. Under such an approach, all members with relatively open economies would still benefit from the inclusion of openness in the formula but the extent of the gain would be constrained for members with very high ratios. One option is to use the absolute ratio of openness to GDP as a threshold. The upper threshold for the ratio could be set at, say, the 85th or 95th percentile of the distribution for the membership as a whole[19] (see Table AIV.1 and Appendix Table A10). An alternative is to limit the extent to which members' shares in openness can exceed their share in the GDP blend to say 50 percent or a doubling, i.e. ratios of 1.5 and 2. Another option is to use a form of compression on openness similar to that used for the formula as a whole.

Capping the Openness to GDP ratio

This approach builds on the one used in the July paper to cap the IIP shares whereby ratios of nominal values are capped and new shares are then calculated. Following this approach, first the ratio of openness to GDP is calculated using the average of current receipts plus current payments in SDRs over 2006-10 relative to the average of GDP in SDRs at market exchange rates (MER). For countries where this ratio exceeds a particular threshold, a new nominal value of openness is calculated by multiplying the threshold value by the corresponding MER GDP in SDRs. The nominal value of openness remains the same for the remaining countries. Countries' openness shares are then recalculated using the new nominal value for global openness, which is lower due to the cap. As a result, the shares of members which are not capped will increase while those that are capped will generally fall.[20]

For illustrative purposes, staff explored caps on the ratio of openness to GDP at the 85th and 95th percentiles of the overall distribution of members' openness to GDP ratios. The 85th percentile corresponds to a ratio of 1.5, which affects 29 countries. Among these 29 capped members, 5 countries with the lowest openness to MER GDP ratio record a marginal increase in their openness shares. The 95th percentile corresponds to a ratio of around 2.5 and impacts 10 countries, resulting in a decrease of their openness shares.

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[19] This is akin to the option considered in the July paper for addressing the situation of international financial centers in the context of giving a higher weight to financial openness.

[20] Recalculated openness shares of some capped members could increase, since the drop in the global total of openness may exceed the negative effect of capping on the nominal value of individual member's openness.

Capping Openness to GDP using Shares

Given that quota formula variables are expressed in shares, an alternative approach is to use the ratio of shares. Under this approach, first members' openness shares are divided by their GDP blend shares and then these ratios are capped at a certain level to limit the impact of openness on CQS. For illustrative purposes, caps of 2 and 1.5 are shown. For countries, which are subject to the cap, new openness shares are calculated by multiplying their blend GDP shares by the cap, e.g., 2 or 1.5. As the openness shares of capped countries are reduced, the total shares will no longer sum to 100, and therefore need to be rebased. Since some members may exceed the cap as a result of the rebasing, an iterative process is required to ensure that all members are below the cap.[21] Using these thresholds, the openness shares of 28 and 64 members, respectively, are reduced. The impact on openness shares is more significant than using the ratio of the nominal values of openness and MER GDP since this is effectively a lower cap than in absolute terms.[22] Because more members are affected, there is also a higher re-distribution of openness shares.

Compression

Compression maintains the original ranking of the series and narrows its dispersion. This approach uses the ratio of openness to GDP in nominal terms as noted above: once the ratios are compressed, new nominal openness values are calculated by multiplying by MER GDP in nominal terms. These nominal openness values are then converted to shares. Staff explored two compression factors: 0.95, which is used in the current formula, and 0.7. The latter factor reduces the mean of the modified openness to GDP ratio from 1.2 to 1.1, which is roughly equal to the average of the original series excluding the five members with the largest openness to GDP ratio. Applying the compression reduces the wide dispersion of the series, by increasing shares that are below 1 and decreasing those that are above 1. Using a compression factor of 0.95 has only a modest impact on the dispersion of the series. With the 0.7 factor, there is thus a more pronounced effect for the top ranking members, though they still have significantly higher ratios than the membership as a whole.

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[21] When the cap is imposed and implemented, some borderline cases (i.e., those whose ratio of openness shares to GDP blend shares are just slightly below the threshold) will exceed the cap after the "first" rebasing. An iterative process is implemented until the cap effectively holds for the entire membership in the final outcome. This means that, say, using a cap of 1.5, 64 members will have their openness share decline.

[22] The cap is effectively lower given that 1.5 corresponds to the 66th percentile of the overall distribution of members' openness to blend GDP ratios in shares, while it corresponds to the 85th percentile of the overall distribution of openness to MER GDP ratio.

Table AIV.1. Openness Measures - Capped and Compressed
(In percent)

	Openness Shares	Capped Openness (absolutes) 1/		Capped Openness (shares) 2/		Compressed Openness (absolutes) 1/	
		at 85th percentile	at 95th percentile	at 2	at 1.5	at .95	at .70
Advanced economies	62.2	62.4	62.4	61.7	60.6	62.3	62.7
Major advanced economies	41.8	43.6	42.6	44.9	45.9	42.4	45.2
United States	13.1	13.6	13.3	14.0	15.4	13.6	16.1
Japan	4.3	4.5	4.4	4.7	5.1	4.5	5.5
Germany	8.2	8.6	8.4	8.8	7.5	8.1	7.6
France	4.6	4.7	4.6	4.9	5.4	4.6	4.7
United Kingdom	5.6	5.8	5.7	6.0	5.3	5.5	5.2
Italy	3.4	3.6	3.5	3.7	4.0	3.4	3.6
Canada	2.6	2.7	2.7	2.8	3.1	2.6	2.6
Other advanced economies	20.4	18.8	19.8	16.8	14.8	19.9	17.5
Spain	2.5	2.6	2.6	2.7	3.0	2.5	2.6
Netherlands	3.2	3.1	3.3	2.4	1.8	3.1	2.6
Australia	1.3	1.3	1.3	1.4	1.5	1.3	1.5
Belgium	2.2	1.8	2.2	1.4	1.0	2.1	1.7
Switzerland	1.9	1.9	1.9	1.4	1.0	1.8	1.5
Sweden	1.3	1.3	1.3	1.3	1.0	1.3	1.1
Austria	1.2	1.2	1.2	1.1	0.9	1.1	1.0
Norway	0.9	0.9	0.9	1.0	0.8	0.9	0.8
Ireland	1.5	0.9	1.3	0.7	0.5	1.4	1.0
Denmark	0.9	1.0	0.9	0.9	0.6	0.9	0.8
Emerging Market and Developing Countries 3/	37.8	37.6	37.6	38.3	39.4	37.7	37.3
Africa	2.6	2.7	2.6	2.8	2.9	2.6	2.5
South Africa	0.5	0.5	0.5	0.5	0.6	0.5	0.5
Nigeria	0.4	0.4	0.4	0.4	0.5	0.4	0.4
Asia	17.9	17.1	17.3	17.6	18.2	17.8	17.3
China 4/	7.9	8.3	8.1	8.5	9.3	8.0	8.5
India	1.6	1.7	1.7	1.8	1.9	1.7	1.9
Korea	2.4	2.5	2.4	2.5	2.6	2.3	2.1
Indonesia	0.7	0.7	0.7	0.8	0.8	0.7	0.8
Singapore	2.1	0.8	1.2	0.7	0.5	1.9	1.2
Malaysia	1.0	0.8	1.0	0.9	0.7	0.9	0.7
Thailand	0.9	1.0	1.0	1.0	0.9	0.9	0.8
Middle East, Malta and Turkey	5.2	5.4	5.3	5.4	5.2	5.2	5.1
Saudi Arabia	1.1	1.1	1.1	1.2	1.2	1.1	1.0
Turkey	0.8	0.9	0.8	0.9	1.0	0.9	0.9
Iran, Islamic Republic of	0.4	0.4	0.4	0.5	0.5	0.4	0.5
Western Hemisphere	4.9	5.1	5.0	5.3	5.7	5.0	5.6
Brazil	1.1	1.1	1.1	1.1	1.2	1.1	1.5
Mexico	1.5	1.6	1.6	1.6	1.8	1.6	1.6
Venezuela, República Bolivariana de	0.3	0.3	0.3	0.4	0.4	0.3	0.4
Argentina	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Transition economies	7.1	7.3	7.3	7.4	7.4	7.1	6.7
Russian Federation	2.0	2.1	2.1	2.2	2.4	2.1	2.2
Poland	1.0	1.1	1.0	1.1	1.2	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:							
EU27	41.1	40.3	40.9	39.4	36.1	40.4	37.1
LICs 5/	2.1	2.2	2.2	2.3	2.3	2.1	2.0

Source: Finance Department.

1/ The ratio of openness to market GDP in nominal terms is capped at 85th and 95th percentile, and compressed at 0.95 and 0.70, respectively.
2/ The ratio of the openness share to the GDP Blend share is capped at 2 and 1.5.
3/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
4/ Including China, P.R., Hong Kong SAR, and Macao SAR.
5/ PRGT-eligible countries.

ANNEX V. DIFFERENT GDP BLENDS

At the July Board meeting, a few Directors requested an assessment of GDP blend based on a broader range of weights for market and PPP-based GDP than included in the Board paper. This broader range is shown below in the Table AV.1 for a blend of market and PPP of 70/30, 50/50, 40/60, and 30/70 respectively.[23] The Table also shows the 60/40 blend in the current formula. Compared to the current blend, the share of AEs declines and that of EMDCs and LICs increases as the ratio of PPP to market GDP increases.

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[23] See Appendix Table A11 for by-member results.

Table AV.1. GDP Variable – Different Blends 1/
(In percent)

	60/40 /2	70/30	50/50	40/60	30/70
Advanced economies	58.2	59.7	56.7	55.2	53.7
Major advanced economies	47.4	48.6	46.3	45.2	44.1
United States	22.2	22.5	21.8	21.5	21.2
Japan	7.5	7.7	7.2	7.0	6.8
Germany	5.0	5.2	4.9	4.7	4.5
France	3.8	4.0	3.7	3.6	3.4
United Kingdom	3.6	3.6	3.5	3.4	3.3
Italy	3.1	3.3	3.0	2.9	2.8
Canada	2.2	2.3	2.1	2.1	2.0
Other advanced economies	10.8	11.2	10.4	10.1	9.7
Spain	2.2	2.3	2.2	2.1	2.1
Netherlands	1.2	1.2	1.1	1.1	1.1
Australia	1.6	1.6	1.5	1.4	1.4
Belgium	0.7	0.7	0.7	0.6	0.6
Switzerland	0.7	0.7	0.6	0.6	0.6
Sweden	0.6	0.7	0.6	0.6	0.6
Austria	0.6	0.6	0.6	0.5	0.5
Norway	0.6	0.6	0.5	0.5	0.5
Ireland	0.3	0.3	0.3	0.3	0.3
Denmark	0.4	0.5	0.4	0.4	0.4
Emerging Market and Developing Countries 3/	41.8	40.3	43.3	44.8	46.3
Africa	2.6	2.5	2.7	2.9	3.0
South Africa	0.6	0.6	0.6	0.6	0.7
Nigeria	0.4	0.4	0.4	0.4	0.4
Asia	20.0	19.0	21.0	22.0	23.0
China 4/	10.7	10.2	11.1	11.6	12.0
India	3.5	3.2	3.8	4.1	4.3
Korea	1.7	1.7	1.8	1.8	1.8
Indonesia	1.1	1.1	1.2	1.2	1.2
Singapore	0.3	0.3	0.4	0.4	0.4
Malaysia	0.4	0.4	0.5	0.5	0.5
Thailand	0.6	0.6	0.6	0.7	0.7
Middle East, Malta and Turkey	5.0	5.0	5.1	5.2	5.3
Saudi Arabia	0.8	0.8	0.8	0.8	0.8
Turkey	1.2	1.2	1.2	1.2	1.3
Iran, Islamic Republic of	0.8	0.8	0.9	1.0	1.0
Western Hemisphere	7.9	7.7	8.0	8.1	8.3
Brazil	3.0	3.0	2.9	2.9	2.9
Mexico	1.9	1.8	1.9	2.0	2.0
Venezuela, República Bolivariana de	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.7	0.7	0.8
Transition economies	6.2	6.1	6.4	6.6	6.8
Russian Federation	2.7	2.6	2.8	2.8	2.9
Poland	0.9	0.8	0.9	0.9	0.9
Total	100.0	100.0	100.0	100.0	100.0
Memorandum items:					
EU27	25.3	26.0	24.6	24.0	23.3
LICs 5/	2.2	2.1	2.4	2.5	2.6

Source: Finance Department

1/ Blend of market and PPP GDP, respectively.
2/ This is the blend in the current formula.
3/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
4/ Including China, P.R., Hong Kong SAR, and Macao SAR.
5/ PRGT-eligible countries.

ANNEX VI. FINANCIAL CONTRIBUTIONS

This annex illustrates an approach to constructing a financial contributions (FCS) measure that would protect the share of EMDCs, building on a proposal made by one Executive Director at the July Board meeting.

As discussed in SM/12/163, measures of members' financial contributions to the Fund tend to result in very large shares for advanced economies. This reflects the fact that advanced economies have generally been by far the largest contributors to the Fund's finances in the past. While this is changing gradually over time, it is also generally to be expected as advanced economies have much higher per capita incomes and are therefore often in a stronger position to support the Fund's finances. This can be seen in Table AVI.1 which compares members' quota shares with their shares in two of the measures of financial contributions considered in the July paper.[24] For advanced economies, the ratio of their average share of financial contributions measure to quota share is about 1.5, compared with 0.4 for EMDCs and 0.1 for LICs.[25] As a result, EMDCs would tend to lose calculated quota share if a measure of financial contributions was included in the formula.

To address this concern, staff was asked to explore an approach that would protect the share of EMDCs. Under this approach, EMDCs would receive the higher of their financial contributions share or their actual 14th Review quota share. Shares would then be rebased across advanced economies to ensure that they add to 100. As a result, the shares of advanced economies would be generally lower than in the unadjusted financial contributions measures while still reflecting their relative contributions within the group of advanced economies (but not relative to EMDCs). Most EMDCs would simply receive their actual quota share.

This approach is illustrated in Table AVI.2 for two measures of financial contributions considered previously (FCS I and FCS III).[26, 27] The results are summarized in the last two columns of the table (FCS Ia and FCS IIIa, respectively). While this would reduce the impact on EMDCs, it would represent a significant departure from the traditional approach to quota variables, which apply equally across all members and have not been differentiated according to groups of countries.

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[24] See Appendix Table A12 for by-member results.

[25] For some individual LICs, the ratio can be quite high reflecting their contributions to the Fund's technical assistance activities, although the overall nominal amounts involved are small.

[26] FCS I—a straight average of the contribution shares in NAB with new pledges, PRGT-loans, PRGT-subsidies, and TA activities—and FCS III—a weighted average of NAB with new pledges (0.3), FTP participation based on resources (0.3), PRGT combined (0.2), and TA activities (0.2)—were taken by staff as the basis for formulating the new metric.

[27] See Appendix Table A13 for by-member results.

Table AVI.1 Ratio of FCS I and FCS III to 14th Review Quota Shares 1/

	14th General Review Quotas	FCS I 2/	FCS III 3/	FCS I / 14th General Review	FCS III / 14th General Review
	(In percent)				
Advanced economies	57.6	85.0	81.9	1.5	1.4
Major advanced economies	43.4	64.8	61.6	1.5	1.4
United States	17.4	3.9	10.0	0.2	0.6
Japan	6.5	27.7	21.8	4.3	3.4
Germany	5.6	7.1	7.5	1.3	1.3
France	4.2	9.2	7.4	2.2	1.7
United Kingdom	4.2	6.9	6.4	1.6	1.5
Italy	3.2	5.2	4.4	1.6	1.4
Canada	2.3	4.9	4.1	2.1	1.8
Other advanced economies	14.3	20.1	20.3	1.4	1.4
Spain	2.0	2.4	2.3	1.2	1.1
Netherlands	1.8	3.3	3.3	1.8	1.8
Australia	1.4	1.7	1.9	1.2	1.4
Belgium	1.3	2.1	2.4	1.5	1.8
Switzerland	1.2	3.9	3.3	3.2	2.7
Sweden	0.9	1.6	1.5	1.8	1.6
Austria	0.8	0.7	0.9	0.9	1.1
Norway	0.8	1.7	1.5	2.2	1.9
Ireland	0.7	0.1	0.2	0.1	0.2
Denmark	0.7	1.3	1.2	1.7	1.6
Emerging Market and Developing Countries 4/	42.4	15.0	18.1	0.4	0.4
Africa	4.4	0.9	0.7	0.2	0.1
South Africa	0.6	0.2	0.2	0.4	0.3
Nigeria	0.5	0.1	0.0	0.1	0.1
Asia	16.0	6.9	8.4	0.4	0.5
China 5/	6.4	3.5	4.4	0.5	0.7
India	2.7	0.7	1.2	0.3	0.4
Korea	1.8	1.7	1.5	0.9	0.9
Indonesia	1.0	0.1	0.1	0.1	0.1
Singapore	0.8	0.3	0.4	0.4	0.5
Malaysia	0.8	0.3	0.3	0.3	0.5
Thailand	0.7	0.1	0.2	0.2	0.3
Middle East, Malta and Turkey	6.7	3.7	4.1	0.5	0.6
Saudi Arabia	2.1	1.9	2.3	0.9	1.1
Turkey	1.0	0.2	0.2	0.2	0.2
Iran, Islamic Republic of	0.7	0.0	0.0	0.0	0.0
Western Hemisphere	7.9	2.0	2.5	0.3	0.3
Brazil	2.3	0.7	0.9	0.3	0.4
Mexico	1.9	0.9	1.1	0.5	0.6
Venezuela, República Bolivariana de	0.8	0.0	0.0	0.0	0.0
Argentina	0.7	0.2	0.1	0.4	0.1
Transition economies	7.2	1.6	2.5	0.2	0.3
Russian Federation	2.7	0.8	1.2	0.3	0.5
Poland	0.9	0.4	0.6	0.5	0.7
Total	100.0	100.0	100.0	1.0	1.0
Memorandum items:					
EU27	30.2	41.7	40.1	1.4	1.3
LICs 6/	4.0	0.4	0.3	0.1	0.1

Source: Finance Department.

1/ Includes TA financing provided by recipients who have paid in to their Regional Technical Assistance Center (RTAC) to increase buy-in or to compensate for limited donor support.

2/ FCS I is defined as an average of contribution shares in NAB with new pledges, PRGT-loans, PRGT-subsidies, and TA activities.

3/ FCS III is defined a weighted average of NAB with new pledges (0.3), FTP participation based on resources (0.3), PRGT combined (0.2), and TA activities (0.2).

4/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.

5/ Including China, P.R., Hong Kong SAR, and Macao SAR.

6/ PRGT-eligible countries.

Table AVI.2. Financial Contributions—Aggregate Measures
(In percent)

	14th Review Quota Share	Calculated Quota Share (CQS)	FCS I 1/	FCS III 2/	FCS Ia 3/	FCS IIIa 4/
Advanced Economies	57.6	56.1	85.0	81.9	57.1	57.6
Major advanced economies	43.4	40.6	64.8	61.6	43.6	43.4
United States	17.4	15.8	3.9	10.0	2.6	7.0
Japan	6.5	6.2	27.7	21.8	18.6	15.3
Germany	5.6	5.7	7.1	7.5	4.8	5.3
France	4.2	3.6	9.2	7.4	6.2	5.2
United Kingdom	4.2	4.1	6.9	6.4	4.6	4.5
Italy	3.2	3.0	5.2	4.4	3.5	3.1
Canada	2.3	2.3	4.9	4.1	3.3	2.9
Other advanced economies	14.3	15.4	20.1	20.3	13.5	14.3
Spain	2.0	2.2	2.4	2.3	1.6	1.6
Netherlands	1.8	2.0	3.3	3.3	2.2	2.3
Australia	1.4	1.4	1.7	1.9	1.1	1.3
Belgium	1.3	1.3	2.1	2.4	1.4	1.7
Switzerland	1.2	1.2	3.9	3.3	2.6	2.3
Sweden	0.9	1.0	1.6	1.5	1.1	1.1
Austria	0.8	0.8	0.7	0.9	0.5	0.7
Norway	0.8	0.8	1.7	1.5	1.2	1.1
Ireland	0.7	0.9	0.1	0.2	0.0	0.1
Denmark	0.7	0.7	1.3	1.2	0.8	0.8
Emerging Market and Developing Countries 5/	42.4	43.9	15.0	18.1	42.9	42.4
Africa	4.4	3.3	0.9	0.7	4.6	4.4
South Africa	0.6	0.6	0.2	0.2	0.6	0.6
Nigeria	0.5	0.5	0.1	0.0	0.5	0.5
Asia	16.0	19.6	6.9	8.4	16.0	16.0
China 6/	6.4	9.4	3.5	4.4	6.4	6.4
India	2.7	2.6	0.7	1.2	2.7	2.7
Korea	1.8	2.0	1.7	1.5	1.8	1.8
Indonesia	1.0	1.0	0.1	0.1	1.0	1.0
Singapore	0.8	1.3	0.3	0.4	0.8	0.8
Malaysia	0.8	0.8	0.3	0.3	0.8	0.8
Thailand	0.7	0.9	0.1	0.2	0.7	0.7
Middle East, Malta, and Turkey	6.7	6.2	3.7	4.1	7.0	6.7
Saudi Arabia	2.1	1.4	1.9	2.3	2.1	2.1
Turkey	1.0	1.1	0.2	0.2	1.0	1.0
Iran, Islamic Republic of	0.7	0.7	0.0	0.0	0.7	0.7
Western Hemisphere	7.9	7.1	2.0	2.5	7.9	7.9
Brazil	2.3	2.2	0.7	0.9	2.3	2.3
Mexico	1.9	1.7	0.9	1.1	1.9	1.9
Venezuela, Republica Bolivariana de	0.8	0.5	0.0	0.0	0.8	0.8
Argentina	0.7	0.6	0.2	0.1	0.7	0.7
Transition economies	7.2	7.7	1.6	2.5	7.2	7.2
Russian Federation	2.7	2.6	0.8	1.2	2.7	2.7
Poland	0.9	1.0	0.4	0.6	0.9	0.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum Items:						
EU27	30.2	30.9	41.7	40.1	30.4	30.2
LICs 7/	4.0	2.6	0.4	0.3	4.1	4.0

1/ Average of contribution shares in NAB with new pledges, PRGT-loans, PRGT-subsidies, and TA activities.
2/ Weighted average of NAB with new pledges (0.3), FTP participation based on resources (0.3), PRGT combined (0.2), and TA activities (0.2).
3/ FCS I for AEs and the greater of FCS I and AQS for EMDCs; then rescaled for AEs to ensure that shares sum to 100.
4/ FCS III for AEs and the greater of FCS III and AQS for EMDCs; then rescaled for AEs to ensure that shares sum to 100.
5/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic, and Slovenia.
6/ Includes China, P.R., Hong Kong SAR, and Macao SAR.
7/ PRGT-eligible countries.

ANNEX VII. DIFFERENT LEVELS OF COMPRESSION

As requested at the July meeting, this annex presents calculated quota shares with different levels of compression. The current formula includes a compression factor of 0.95 applied to a linear combination of the four variables. This reduces the dispersion of calculated quotas, moderating to some extent the role of size in the formula. Recognizing that the inclusion of this element was one of the most difficult aspects of the 2008 deliberations, the Executive Board decided to include it in the formula for a period of 20 years.[28]

A compression factor was introduced in 2008 to adjust for the high correlation of size-related variables that tend to favor large economies. Compression does not affect the relative ranking of members. However, the lower the compression factor, the more compressed the distribution becomes with a proportionately larger decrease for the largest economies and a proportionately larger increase for the smallest members. Based on the current data set, the 9 largest members have a lower share as a result of a moderate degree of compression, while 179 members receive a larger share. In the current review, many Directors have supported retaining the compression factor, recognizing the difficult compromise in 2008. A number of Directors saw scope for increasing its role, while a view was expressed that compression distorts countries' economic weight and thus should be eliminated.[29]

Table AVII.1 shows the impact on calculated quota shares of different levels of compression.[30] The relatively narrow range of factors considered, 0.975-0.90, reflects the need for a broad consensus on any change in the factor. As shown in the table, raising the compression factor to 0.975 raises the aggregate share of advanced countries by about 0.8 percentage points. If the compression factor was lowered to 0.925 on the other hand (more compression), EMDCs as a group would gain share by about the same amount.

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[28] *Reform of Quota and Voice in the International Monetary Fund—Report of the Executive Board to the Board of Governors* (Sup. 1, 4/2/08).

[29] The *Chairman's Summing Up, Quota Formula Review—Initial Considerations* (3/20/12).

[30] See Appendix Table A14 for by-member results.

Table AVII.1. Calculated Quota Shares – Different Levels of Compression
(In percent)

	14th General Review Quotas	Calculated Quota Shares 1/	Modified CQS Based on Different Compression Factors		
			0.975	0.925	0.900
Advanced economies	57.6	56.1	56.9	55.2	54.4
Major advanced economies	43.4	40.6	41.8	39.5	38.3
United States	17.4	15.8	16.6	15.1	14.3
Japan	6.5	6.2	6.3	6.0	5.8
Germany	5.6	5.7	5.8	5.5	5.4
France	4.2	3.6	3.6	3.6	3.5
United Kingdom	4.2	4.1	4.1	4.0	4.0
Italy	3.2	3.0	3.1	3.0	3.0
Canada	2.3	2.3	2.2	2.3	2.3
Other advanced economies	14.3	15.4	15.1	15.7	16.1
Spain	2.0	2.2	2.2	2.2	2.2
Netherlands	1.8	2.0	2.0	2.0	2.0
Australia	1.4	1.4	1.4	1.5	1.5
Belgium	1.3	1.3	1.3	1.4	1.4
Switzerland	1.2	1.2	1.2	1.2	1.2
Sweden	0.9	1.0	1.0	1.0	1.1
Austria	0.8	0.8	0.8	0.8	0.9
Norway	0.8	0.8	0.8	0.8	0.9
Ireland	0.7	0.9	0.9	0.9	0.9
Denmark	0.7	0.7	0.7	0.7	0.7
Emerging Market and Developing Countries 2/	42.4	43.9	43.1	44.8	45.6
Africa	4.4	3.3	3.0	3.5	3.8
South Africa	0.6	0.6	0.5	0.6	0.6
Nigeria	0.5	0.5	0.4	0.5	0.5
Asia	16.0	19.6	19.7	19.5	19.3
China 3/	6.4	9.4	9.7	9.1	8.7
India	2.7	2.6	2.6	2.6	2.6
Korea	1.8	2.0	1.9	2.0	2.0
Indonesia	1.0	1.0	1.0	1.0	1.0
Singapore	0.8	1.3	1.3	1.3	1.3
Malaysia	0.8	0.8	0.7	0.8	0.8
Thailand	0.7	0.9	0.9	0.9	0.9
Middle East, Malta and Turkey	6.7	6.2	6.0	6.4	6.7
Saudi Arabia	2.1	1.4	1.4	1.4	1.5
Turkey	1.0	1.1	1.1	1.2	1.2
Iran, Islamic Republic of	0.7	0.7	0.7	0.7	0.7
Western Hemisphere	7.9	7.1	6.9	7.4	7.6
Brazil	2.3	2.2	2.2	2.2	2.2
Mexico	1.9	1.7	1.7	1.7	1.8
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.6
Argentina	0.7	0.6	0.6	0.6	0.6
Transition economies	7.2	7.7	7.4	8.0	8.3
Russian Federation	2.7	2.6	2.6	2.6	2.6
Poland	0.9	1.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0
Memorandum items:					
EU27	30.2	30.9	30.8	31.0	31.1
LICs 4/	4.0	2.7	2.5	2.9	3.2
Coefficients for quota variables					
GDP		0.30	0.30	0.30	0.30
PPP GDP		0.20	0.20	0.20	0.20
Openness		0.30	0.30	0.30	0.30
Variability		0.15	0.15	0.15	0.15
Reserves		0.05	0.05	0.05	0.05
Compression Factor		0.950	0.975	0.925	0.900

Source: Finance Department.

1/ Includes a compression factor of 0.95.
2/ Including Czech Republic, Estonia, Korea, Malta, Singapore, Slovak Republic and Slovenia.
3/ Including China, P.R., Hong Kong SAR, and Macao SAR.
4/ PRGT-eligible countries.

ANNEX VIII. MECHANISMS TO PROTECT THE SMALLEST MEMBERS

This annex responds to a request at the July meeting to explore alternative approaches to protect the quota shares of the smallest members, in particular by introducing a floor on calculated quota share (CQS) in the quota formula. The analysis suggests that even a relatively moderate floor could result in substantial increases in the CQS of the smallest members, which would tend to distort their quotas with respect to their relative economic positions. It also examines the impact of greater compression on the smallest members, which raises their shares, but substantially reduces the shares of the largest members.

In the past, mechanisms have been implemented outside the formula to protect the quota shares of the smallest members. For instance, the "Small Quota Policy,"[31] which was formulated as far back as in early 1956 provided for quota increases for members with relatively small initial quotas, upon their request.[32] More recently, in the 2008 reform, there was a tripling of basic votes, with its share in total votes fixed to prevent erosion over time from quota increases. In the 14th General Review, the "poorest" members' quota shares were protected through an ad hoc increase,[33] and many of these members were smaller members.[34]

In the July discussion on the quota formula, a few Directors asked staff to consider options to protect the smallest members. In particular, a Director encouraged staff to consider whether it would be possible to introduce a floor of 0.01 percent on calculated quota shares in the quota formula, which staff has explored below.[35]

Two ways to implement a floor are explored: (i) setting a minimum CQS; (ii) including a constant term in the formula. Under the first approach, members would receive the maximum of either their CQS from the formula or the floor. This approach would not change the relative ranking of the other members. However, it would not capture the

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[31] *Adjustment of Small Quotas*, November 20th, 1958.

[32] Specifically, quotas below US$5 million could be increased to US$7.5 million, quotas between US$5 million and US$8 million could be increased to US$10 million, quotas of US$10 million could be increased to US$15 million, quotas of US$15 million could be increased to US$20 million. This resulted in increases during 1956/57 for 8 members.

[33] The poorest members individually maintained at least their post second round quota share. The "poorest members" were defined in the 14th review as those PRGT-eligible countries with annual per capita income below the prevailing operational IDA cut-off in 2008 (US$1,135) or below twice IDA's cut-off for countries meeting the definition of a "small country" under the PRGT eligibility criteria.

[34] The calculated quota shares of the 50 "poorest" members were all below 0.535%, the average for the membership at that time, and 12 of the 33 smallest countries, i.e., with calculated quota shares below 0.01%, were protected.

[35] See *Statement by Mr. Hockin and Mr. Brunelle-Cote on Quota Formula Review—Data Update and Further Considerations,* GRAY/12/2511.

differences in relative economic positions of the smallest countries, since all of the smallest countries below the threshold would receive the same calculated quota share.

The second approach incorporates a floor directly into the formula by including a constant term:[36]

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

An advantage of this approach is that it still reflects to some extent the differences in economic positions among the smallest members, and it does not change the members' CQS ranking.

Using a floor of 0.01 percent would have a large impact on the CQS of the smallest members. In particular, the total CQS of the 34 members impacted by setting a minimum floor of .01% would rise from 0.13% to 0.34%, while there would be only a very small change for the main groups. Including the same floor as a constant term (i.e., 0.01) in the formula would have a larger impact.[37] It would result in gains for 149 countries with the 34 smallest members gaining 0.42 pp. It would also have a significant impact on aggregate groups (e.g., EMDCs would gain about 0.9 pp). In both cases, the impact would be the greatest for the very smallest members. For example, the CQS of Tuvalu, with a calculated quota share of only 0.00035%, would increase more than 27 times with a minimum CQS of 0.01% and 36 times with a constant of 0.01% (Figure AVIII.1, Table AVIII.1 and Appendix Table A15).

Such an approach could result in very large quota increases for the smallest countries. Since calculated quota shares are used as a guide in determining actual quotas, there could be a significant impact on members' actual quotas. A floor of 0.01% would represent a minimum quota of SDR 47.7 million based on total quotas under the 14th General Review, which is nearly twenty times the current smallest quota (SDR 2.5 million). This could therefore entail large increases in the quotas of small members when the formula is used as a distribution key, with attendant implications for their access to Fund resources.

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[36] Alternatively, a constant term could also be included in the formula before compression: $CQS=constant+ (0.5*Y + 0.3*O + 0.15*V + 0.05*R)^k$. Considering the constant term is very small, the calculation results of the two equations are similar.

[37] Including a constant would add this amount to the calculated quota shares of all members, but relatively more to the smallest members. Its effect would also be increased by compression.

Figure AVIII.1 Modified CQS Relative to Current CQS
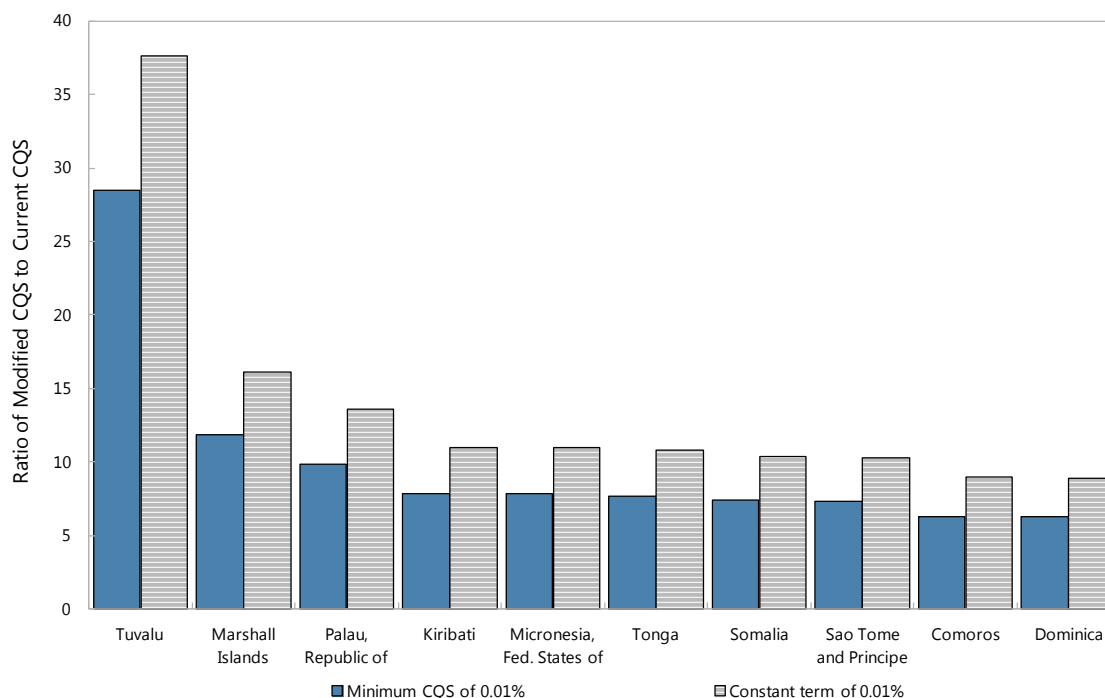
Source: IMF Finance Department

To limit a distortionary impact on these members' quotas relative to their economic positions, one would need to set the minimum CQS or constant term at a very low level. One possibility would be to use the smallest current actual quota share, 0.0005%, which could ensure the future calculated quota shares of the smallest members would not fall below the current lowest quota share. However, setting such a low floor would have an impact for only a few of the smallest countries.

Compression also increases the CQS of the smallest countries. As discussed in Annex VII, compression does not alter the ranking of members but does narrow the dispersion of calculated quota shares between large and smaller countries. The smaller the compression factor, the flatter the distribution with a proportionately larger reduction for large economies and a proportionally larger increase for the smallest members. Table AVIII.2 and Appendix Table A14 show the simulation results of applying a compression factor of 0.925 and 0.90. While a lower compression factor boosts the CQS of the smallest countries, it would lead to a large reduction of quota shares for the largest economies. For example, applying a compression factor of 0.9 would increase the 10 smallest members' CQS by 0.006 pp, but will reduce the quota shares of the U.S. and China by 1.52pp and 0.67pp, respectively.

Table AVIII.1 Impact of Introducing a Floor on the 34 Smallest Members
(In percent)

Country 1/	14th Review Quota Share	Calculated Quota Share	Minimum CQS 2/ 0.01	Constant term 3/ 0.01
Togo	0.03077	0.00999	0.01	0.02194
Lesotho	0.01463	0.00942	0.01	0.02141
Guyana	0.03811	0.00761	0.01	0.01972
Timor-Leste	0.00537	0.00636	0.01	0.01856
Burundi	0.03228	0.00630	0.01	0.01850
Sierra Leone	0.04348	0.00619	0.01	0.01840
Maldives	0.00444	0.00593	0.01	0.01816
Cape Verde	0.00497	0.00548	0.01	0.01775
Seychelles	0.00480	0.00543	0.01	0.01770
Guinea-Bissau	0.00595	0.00536	0.01	0.01764
Bhutan	0.00428	0.00535	0.01	0.01763
Belize	0.00560	0.00501	0.01	0.01732
Central African Republic	0.02335	0.00473	0.01	0.01706
Eritrea	0.00767	0.00448	0.01	0.01683
Djibouti	0.00667	0.00400	0.01	0.01640
Antigua and Barbuda	0.00419	0.00393	0.01	0.01633
St. Lucia	0.00449	0.00373	0.01	0.01615
Gambia, The	0.01304	0.00351	0.01	0.01595
Solomon Islands	0.00436	0.00260	0.01	0.01514
Grenada	0.00344	0.00230	0.01	0.01487
St. Vincent and the Grenadines	0.00245	0.00217	0.01	0.01476
Vanuatu	0.00499	0.00207	0.01	0.01466
Samoa	0.00340	0.00202	0.01	0.01462
St. Kitts and Nevis	0.00262	0.00202	0.01	0.01462
Dominica	0.00241	0.00161	0.01	0.01426
Comoros	0.00373	0.00159	0.01	0.01424
São Tomé and Príncipe	0.00310	0.00137	0.01	0.01405
Somalia	0.03425	0.00136	0.01	0.01404
Tonga	0.00289	0.00130	0.01	0.01399
Micronesia, Federated States of	0.00151	0.00128	0.01	0.01398
Kiribati	0.00235	0.00128	0.01	0.01397
Palau	0.00103	0.00101	0.01	0.01375
Marshall Islands	0.00103	0.00084	0.01	0.01360
Tuvalu	0.00052	0.00035	0.01	0.01319
Total	0.328	0.128	0.340	0.551
Memorandum items:				
Advanced Economies	57.6	56.1	55.9	55.1
Major Advanced Economies	43.4	40.6	40.5	39.8
EMDCs	42.4	43.9	44.1	44.9
LICs	4.0	2.7	2.8	3.5

Source: Finance Department

1/ 34 smallest members, ranked in terms of calculated quota share.

2/Appliyng a minimum quota share for members whose calculated quota share are below the minimum. The quota share of other countries will be rescaled to ensure the sum of all members' quota shares is 1.

3/Including a constant term in the quota formula using the following equation:

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

Table AVIII.2 Impact of More Compression on the 10 Smallest Members
(In percent)

Country 1/	14th Review Quota Share	Calculated Quota Share	Compression	
			0.925	0.9
Dominica	0.00241	0.00161	0.00195	0.00235
Comoros	0.00373	0.00159	0.00192	0.00233
São Tomé and Príncipe	0.00310	0.00137	0.00167	0.00203
Somalia	0.03425	0.00136	0.00165	0.00201
Tonga	0.00289	0.00130	0.00158	0.00193
Micronesia, Federated States of	0.00151	0.00128	0.00156	0.00190
Kiribati	0.00235	0.00128	0.00156	0.00190
Palau	0.00103	0.00101	0.00124	0.00152
Marshall Islands	0.00103	0.00084	0.00104	0.00128
Tuvalu	0.00052	0.00035	0.00044	0.00056
Total	0.053	0.012	0.015	0.018
Memorandum items:				
Advanced Economies	57.6	56.1	55.2	54.4
Major Advanced Economies	43.4	40.6	39.5	38.3
EMDCs	42.4	43.9	44.8	45.6
LICs	4.0	2.7	2.9	3.2

Source: Finance Department

1/ 10 smallest members, ranked in terms of calculated quota share.