

INTERNATIONAL MONETARY FUND

**Quota Formula Review—Further Considerations**

Prepared by the Finance Department

In consultation with other Departments

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## I. INTRODUCTION<sup>1</sup>

1. The Executive Board has held three formal meetings on the quota formula review, and discussions have also taken place in other fora including the IMFC Deputies work stream and the G-20 IFA Working Group.<sup>2</sup> Considerable progress has been made in terms of identifying areas of common ground as well as those areas where views differ. At their most recent meeting in late September, Directors reaffirmed their commitment to completing the review by January 2013, and stressed that **achieving this goal will require constructive engagement and a spirit of flexibility and compromise from all sides.**<sup>3</sup> At its subsequent meeting in Tokyo, the IMFC called on the membership to develop the consensus needed through further engagement of the Executive Board, with input from the IMFC Deputies, to complete the review by January 2013.<sup>4,5</sup>

2. **This paper explores the scope for further narrowing differences ahead of the January deadline.** Given the relatively short time remaining for completing the review, it focuses on a narrower range of reform options than considered in previous papers, concentrating on those areas that have generated the most support in the discussions to date. In this context, it must be recognized that a broad consensus is needed for the formula to play its intended role as the key indicator of members' relative economic positions used in allocating quota increases. Otherwise, there is a risk that a formula that does not command broad support will be less widely used.<sup>6</sup> While views clearly differ on the extent to which the formula needs to be reformed, the need for compromise should not be viewed as a call for only limited change, and most Directors have considered that the formula can and should be further improved. This said, while this paper concentrates on the implications of a relatively narrow range of options, it is recognized that other more far-reaching reforms have been

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<sup>1</sup> Prepared by a staff team led by M.S. Kumar and S. Bassett, and comprising H. Treichel, C. Janada, R. Rozenov, R. Zhang, A. Buzaushina, J. Wong, S. Khan, F. Bacall, and A. Perez.

<sup>2</sup> There were, in addition, two informal Board meetings on September 6, 2011 and June 13, 2012.

<sup>3</sup> *Quota Formula Review—Additional Considerations* (9/4/12) <http://www.imf.org/external/np/pp/eng/2012/090412.pdf> and *The Chairman's Summing Up—Quota Formula Review—Additional Considerations—Executive Board Meeting 12/95* (10/4/12) <http://www.imf.org/external/np/pp/eng/2012/092812.pdf>.

<sup>4</sup> *Communiqué of the Twenty-Sixth Meeting of the International Monetary and Financial Committee*, October 2012.

<sup>5</sup> At their meeting in Mexico City on 4-5 November, 2012, G-20 Finance Ministers reiterated their commitment to completing the comprehensive review of the quota formula, to address deficiencies and weaknesses in the current quota formula, by January 2013 (<http://www.g20.org/en>).

<sup>6</sup> In the 14<sup>th</sup> Review, the formula was used to allocate 60 percent of the overall increase; it also played a limited role in the allocation of the remaining 40 percent distributed as ad hoc increases.

discussed as part of the review and continue to be favored by significant parts of the membership.

## II. TOWARDS CONSENSUS—KEY ISSUES

### Taking Stock of the Discussions

3. **Considerable agreement exists already on a number of issues.** First, there is agreement that the principles that underpinned the 2008 reform should continue to guide the current review. Thus, the formula should be simple and transparent, consistent with the multiple roles of quotas,<sup>7</sup> result in calculated quota shares that are broadly acceptable to the membership, and be feasible to implement statistically based on timely, high quality, and widely available data. These principles already provide significant guidance as to the direction of the review. In particular, proposals that are either not well anchored in the roles of quotas, add substantial new complexity, rely heavily on estimated data, or result in calculated quota shares that are not broadly acceptable to the membership would seem inconsistent with this guidance.

4. **There is also considerable common ground on specific aspects of the formula.** In this context, it is recognized that a number of Directors have indicated that agreement on further reforms requires a package approach that involves consideration of all relevant issues together. Thus, these Directors have been reluctant to signal agreement in some areas while others remain unresolved. With this important caveat, it nonetheless appears possible to identify certain areas where considerable common ground has emerged. These include:

- **Dropping variability:** Staff technical work has highlighted the shortcomings with the current variability measure as an indicator of potential need for Fund resources, and the difficulties of developing a superior measure. Many Directors have indicated they could support dropping variability from the formula in view of these considerations. Others either believe it is too early to reach such a conclusion pending agreement on other issues, including how its weight would be reallocated, or see a continued role for variability, possibly with a reduced weight.<sup>8</sup>
- **Maintaining GDP as the most important variable:** GDP is currently the most important quota variable, and it is agreed that it should continue to have the largest

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<sup>7</sup> 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 (see *Quota Formula Review—Initial Considerations*, page 4) <http://www.imf.org/external/np/pp/eng/2012/021012.pdf>.

<sup>8</sup> In September, several Directors asked staff to consider whether there are other measures that might better capture potential need. Annex I discusses the possible use of per capita income for this purpose, highlighting a number of drawbacks that would complicate its use in the formula.

weight going forward. One outstanding issue is whether its weight should be increased, which many Directors favor, and if so by how much? A second issue is whether the composition of the GDP blend variable should be changed. On the latter issue, many Directors could support retaining the current blend (with its 60/40 percent shares of market/PPP GDP), while a number of Directors argue that the weight of PPP GDP should be increased. Some others continue to see methodological and data problems with PPP GDP and have called for eliminating it or reducing its share in the blend, particularly if the overall weight of GDP in the formula is increased.<sup>9</sup>

- **Retaining reserves:** While views have been expressed in favor of both raising the weight on reserves and eliminating it, most Directors have indicated that they could support retaining reserves in the formula with its current small weight.
- **Protecting the poorest members:** There is agreement that measures should be taken to protect the voice and representation of the poorest members. Most consider that this should be addressed outside of the quota formula as part of the 15<sup>th</sup> General Review.

5. **Views on openness continue to diverge.** Most Directors favor retaining openness in the formula, with a number calling for giving it a higher weight, possibly in the context of eliminating or reducing the role of variability. These Directors have noted that openness captures members' integration into the global economy, and helps to maintain a balance between the multiple roles of quotas and avoids an undue concentration of quota shares.<sup>10</sup> A number of others have argued that the current openness measure is seriously flawed, reflecting both conceptual and measurement issues, including with respect to intra-currency union trade, and called for its elimination. In September, Directors also considered possible reforms that sought to bridge these differences by limiting members' share of openness relative to that of GDP. While a number who favored retaining openness were open to such approaches, others either did not see their rationale or opposed them on the grounds that they were arbitrary and would add complexity.

6. **Differences of view also remain over the merits of introducing new variables.** One such area is on the possible role for a measure of financial contributions in the formula. While many Directors favor, or are open to, adding financial contributions to the formula, many others oppose such a reform on the grounds that it is inconsistent with the Fund's role as a quota-based institution. A few of these Directors have, nonetheless, indicated that they

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<sup>9</sup> Annex II discusses the quality of the current data on PPP GDP, noting that substantial improvements were made with the 2005 International Comparison Program (ICP) and the data are now judged to be of high quality. Further improvements are expected in the forthcoming 2011 ICP round, the results of which will be available at end-2013.

<sup>10</sup> Annex III further explores the inverse relationship between the degree of openness and economic size.

are open to recognizing particularly generous contributions outside of the formula. With respect to financial openness a number of Directors favor increasing its weight, but many others oppose such a reform. A few Directors have also called for the introduction of a population variable to protect the poorest members (Annex IV summarizes previous work on this issue and includes some illustrative simulations).

7. **Some differences remain also over the role of compression.**<sup>11</sup> While there is broad support for retaining compression as part of the formula, a number of Directors favor a higher degree of compression, which would benefit smaller economies as well as EMDCs as a group. However, many others note that the current level of compression was a difficult compromise and the view has also been expressed that compression disproportionately benefits small advanced economies and should be eliminated.

### Possible Ways Forward

8. **A question going forward is whether it is possible to build a broader consensus by focusing on those areas that have so far generated the most common ground.** To help address this question, the remainder of this paper illustrates the effects of a narrower range of reforms than considered in previous papers. For this purpose, some more far-reaching reforms (such as moving to a GDP-only formula) that have not so far generated broad support are not repeated below.<sup>12</sup> It is not intended to exclude such options, as discussions to date have not progressed to the point where any reforms can be taken off the table. It is also recognized that a willingness to join a consensus for a narrower set of reforms would represent a significant compromise by some members.

9. **The simulations below illustrate the possible impact of alternative reform packages that build on those areas highlighted above where there has been relatively broad support to date.** Some of the simulations combine these elements with others that have so far attracted less support to examine whether such approaches could help broaden the consensus. By clarifying the likely effects of alternative combinations, it is hoped that these simulations can help to build a broader consensus on key elements of a possible reform,

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<sup>11</sup> A compression factor of 0.95 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.

<sup>12</sup> Previous papers have included simulations that illustrate the impact of moving to a GDP-only formula or one based on GDP and reserves (i.e., dropping both openness and variability). These approaches result in relatively large shifts of shares towards large economies, except for those that have very high openness shares (see, for example, Table 1 of *Quota Formula Review—Additional Considerations*) <http://www.imf.org/external/np/pp/eng/2012/090412.pdf>.

including whether some combination of these options could provide a basis for eventual agreement or alternatively whether there is sufficient support for more far-reaching reform.

10. **In this context, staff has reflected further on possible options to bridge the divergent views on openness.** As discussed in the September paper, a fundamental change in the way openness is currently measured from a gross to a value added basis is not feasible to implement statistically at present given that data on value added flows in the balance of payments remain very partial. Staff has examined recent outside work on estimating value added trade flows (see Annex V). This work points to significant differences in the relative magnitudes of trade flows for some members when measured on a value added rather than a gross basis. In particular, available estimates of value added in goods and services exports (excluding investment income) relative to gross exports are relatively low for some countries with very high gross openness shares (while other countries have higher shares of value added relative to gross trade). These estimates are not available on a timely basis and are too partial to allow the development of an alternative openness measure for the quota formula at this time. However, they do lend support to the view that a purely gross measure may overstate the importance of external flows for measuring relative economic positions in some cases.

11. **Against this background, the simulations below include an illustration of an openness cap.** As noted, a cap on openness was explored in the September paper as one possible means of addressing a concern some have raised about the current measure—that it may give an excessive boost to some small highly open economies—at least until value added balance of payments data become more widely available. Under such a cap, relatively open economies would still benefit from openness in the formula but the extent of the boost they receive relative to GDP would be subject to an upper limit. The potential benefits of such an approach would need to be balanced against the concerns that the decision on where to set the cap is inevitably somewhat arbitrary and that it would add some complexity to the formula.

### III. POSSIBLE REFORM OF THE QUOTA FORMULA—ILLUSTRATIVE SIMULATIONS

12. **This section illustrates the impact of possible reform packages involving elements that have been discussed in the review to date.** No proposal is included at this stage but the simulations include several common elements where support has been relatively broad, recognizing that there are still diverging views regarding many elements. In particular:

- All the simulations drop variability from the formula and maintain reserves with its current 5 percent weight. Also, GDP continues to have the largest weight and openness is retained with at least its current weight. Simulations involving a higher weight on financial openness are not presented given the limited support received in the discussions to date. The simulations all include a compression factor.

- Two options are considered for reallocating the weight freed up by dropping variability: (i) all of the weight is allocated to GDP; or (ii) the weight is allocated between GDP and openness with two-thirds of the available weight going to GDP, thereby broadly maintaining the current proportions. This approach recognizes that views remain strongly divided on the role of openness in the formula.
- The September paper illustrated two options for the GDP blend variable: (i) maintaining the current 60/40 split; and (ii) a higher share for PPP GDP at 50/50. Given the diverging views on the role of PPP GDP, the simulations below also illustrate the implications of two additional options: (iii) a modestly higher share for market GDP at 65/35; and (iv) a modestly higher share for PPP GDP (55/45).

13. **The above combinations are presented in the first set of simulations.** The remaining simulations present possible packages that combine the above elements with other potential reforms that have been discussed as part of the review but have so far attracted more limited support, to assess whether they could help build a broader consensus.

14. **The second set of simulations illustrates the potential impact of adding a cap on openness.** The simulations follow the approach illustrated in the September paper of setting an upper limit on the extent to which a member's share in openness can exceed its share in the GDP blend.<sup>13</sup> A cap on the ratio of openness to GDP shares of 1.5 is used here. This compares with the cap of 2 illustrated in the simulations in the September paper, which some argued did not have a meaningful impact.

15. **The third set illustrates the impact of higher compression.** As discussed, there is broad but not uniform support for retaining compression as part of the formula. Using higher compression (i.e., reducing the compression factor) could provide one possible means of balancing the impact of a higher weight for GDP in the formula, which tends to favor large economies. However, as noted, many Directors have stressed that the current level of compression was a difficult compromise, and there has not so far been sufficient support for such a change. Against this background, the simulation illustrates the impact of a reduction in the compression factor from 0.95 to 0.925.

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<sup>13</sup> As discussed in Supplement 1 of *Quota Formula Review—Additional Considerations*, Annex IV, a variety of approaches can be considered, including caps based on the statistical distribution of the absolute ratio of openness to GDP (say at the 85<sup>th</sup> or 95<sup>th</sup> percentile) or a compression approach. A cap could also be considered for reserves, though the concerns with this variable are partly addressed by its small weight in the formula. Between 54 and 67 countries lose calculated quota share as a result of capping openness shares at 1.5 though for roughly half of those members, the changes would be small in absolute terms.

16. **The fourth set illustrates the impact of combining the above approaches with a measure of financial contributions.**<sup>14</sup> As discussed in previous papers, including a measure of financial contributions in the formula tends to heavily favor advanced economies.<sup>15</sup> This set of simulations illustrates that it is possible to combine inclusion of a measure of financial contributions with other elements that would tend to offset its impact on overall group shares.

17. **The results of the above simulations are summarized on page 11.** More detailed results for the largest 35 members are shown in Tables 1–4, and individual country results are presented in Statistical Appendix Tables A1–A4. It should be stressed that the results are only indicative as they reflect the current database and could change with the updated data expected to become available in mid-2013. The following points may be noted:

- Most of the simulations presented in this paper result in an overall increase in the aggregate share of EMDCs relative to the results under the current formula. While this has not been agreed as an explicit goal of the formula review, there is an expectation that future quota realignments based on the formula will lead to a further increase in the share of EMDCs as a group.
- Reducing the share of PPP GDP in the blend variable tends to lower the aggregate share of EMDCs unless offset by other changes, e.g., more compression.
- The changes in shares at the aggregate level in all the simulations are relatively moderate, ranging from -0.3 to +0.8 for EMDCs based on the current GDP blend and +0.6 to +1.7 with a higher weight on PPP GDP (50/50). Larger increases in share for EMDCs as a group would require reforms considered in previous papers that have not so far generated sufficiently broad support (e.g., dropping openness or reducing its weight, significantly higher compression).<sup>16</sup>

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<sup>14</sup> A portion of the variability weight (0.05) is allocated to financial contributions, the remaining 0.10 is allocated as indicated. For illustrative purposes, financial contributions are measured here as the weighted average of a member's share in NAB contributions including new pledges (0.3), FTP participation based on resources (0.3), PRGT loans and subsidies (0.2) and TA activities (0.2) (see FCS III in *Quota Formula Review—Additional Considerations—Annexes* (9/5/12)). <http://www.imf.org/external/np/pp/eng/2012/090412a.pdf>.

<sup>15</sup> This could potentially be avoided if the share of EMDCs was explicitly protected, as illustrated in Annex VI of Supplement 1 to the September paper. However, this would represent a significant departure from the traditional approach to quota variables, which have not been differentiated according to groups of countries.

<sup>16</sup> Dropping openness and variability (but retaining reserves) results in a higher CQS for EMDCs as a group. However, the gains are concentrated in a relatively small number of larger EMDCs and others would be negatively affected (see *Quota Formula Review—Additional Considerations*) <http://www.imf.org/external/np/pp/eng/2012/090412.pdf>. Compression, on the other hand, increases the CQS of a large number of countries, including smaller EMDCs. The number of countries that gain relative to CQS under the current formula also increases with higher compression.

- The share of LICs as a group increases with higher compression and, to a lesser extent, a higher share of PPP GDP and an openness cap.
- While the aggregate changes are moderate, the changes for individual members can be sizeable. This is clearly the case with the openness cap, which results in large declines in share for some highly open economies.<sup>17</sup> More generally, some 53-61 countries gain when variability is dropped (with an unchanged GDP blend), of which 45-50 are EMDCs. This number rises to 80-88 with the openness cap used in set 2 (71-77 EMDCs) and to about 110-120 members with the higher compression factor used in set 3 and set 4 (over 100 EMDCs). While some members gain, others clearly stand to lose as a result of the reforms.
- While introducing financial contributions into the formula tends of itself to reduce the share of EMDCs, it is possible that other elements could outweigh this effect, e.g., if financial contributions were included as part of a package with, say, a higher share for PPP GDP, an openness cap, and higher compression (set 4).

#### IV. ISSUES FOR DISCUSSION

18. **This paper has examined the implications of a range of possible reforms to the quota formula.** Given the relatively short time available for completing the formula review, the focus is on common elements where support in previous discussions has been relatively broad. Some simulations illustrate the impact of combining these elements with others to explore if such combinations could help build a broader consensus. The illustrative simulations include dropping variability from the formula and allocating the freed-up weight to GDP only, or to a combination of GDP and openness. The paper also explores the use of different GDP blends, a cap on openness, different compression factors, and a measure of financial contributions. Given the need for broad consensus, the simulations focus on a narrower range of reform options than previous papers. It is not intended to preclude such more far-reaching options, but to explore whether it is possible to build on those areas that have generally received the broadest support to date.

19. **Directors may wish to comment on the following issues:**

- Could Directors support dropping variability from the formula, recognizing that for some this support may be conditioned on other reform elements?

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<sup>17</sup> About half of the 15 most open economies identified in the *Quota Formula Review—Additional Considerations* (9/4/12) lose more than 0.05 percentage points in their CQS. <http://www.imf.org/external/np/pp/eng/2012/090412.pdf>.

- Directors previously agreed that GDP should remain the most important variable in the formula. Given this, and the diverging views on openness, what are Directors' views on how the weight of variability could be reallocated?
- Would Directors be willing to consider a higher weight of PPP GDP in the context of building a broader consensus for reform?
- Do Directors support further consideration of an openness cap in the context of efforts to address the diverging views on this variable, and given the current absence of reliable and comprehensive balance of payments data on value added in trade?
- What are Directors' views on adding new variables to the formula (e.g., a measure of financial contributions, a higher weight for financial openness, a measure of population)? Do they agree that the scope for recognizing particularly generous financial contributions to the Fund should be one of the issues considered as part of the 15<sup>th</sup> General Review?
- Do Directors see any scope for a higher compression factor as part of a reform package, for example, one that includes a higher weight on GDP?
- Given where positions are at this stage, what next steps would Directors consider useful to meet the goal of concluding the review by January 2013?

### Summary Table of Illustrative Calculations

	Change in CQS 1/				Number of Gainers	
	Major Advanced	Other Advanced	EMDC	LIC	Total	EMDCs
<b>Set 1. Simplification of the Current Formula--Dropping Variability</b>						
65/35 GDP blend						
(a) All to GDP Blend	1.6	-1.1	-0.5	-0.1	48	40
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.3	-0.6	-0.7	-0.1	51	40
60/40 GDP blend						
(a) All to GDP Blend	1.3	-1.2	-0.1	-0.1	53	45
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.0	-0.8	-0.3	-0.1	61	50
55/45 GDP blend						
(a) All to GDP Blend	1.0	-1.3	0.4	0.0	55	50
(b) Split b/w GDP blend (2/3) and Openness (1/3)	0.7	-0.9	0.2	0.0	67	58
50/50 GDP blend						
(a) All to GDP Blend	0.6	-1.5	0.9	0.0	67	64
(b) Split b/w GDP blend (2/3) and Openness (1/3)	0.4	-1.0	0.6	0.0	75	68
<b>Set 2. Same as Set 1 with Openness Shares Capped at 1.5</b>						
65/35 GDP blend						
(a) All to GDP Blend	2.8	-2.8	-0.1	0.0	75	66
(b) Split b/w GDP blend (2/3) and Openness (1/3)	2.8	-2.6	-0.2	0.0	83	72
60/40 GDP blend						
(a) All to GDP Blend	2.5	-2.9	0.4	0.0	80	71
(b) Split b/w GDP blend (2/3) and Openness (1/3)	2.4	-2.7	0.3	0.0	88	77
55/45 GDP blend						
(a) All to GDP Blend	2.1	-3.1	1.0	0.1	87	78
(b) Split b/w GDP blend (2/3) and Openness (1/3)	2.1	-2.9	0.8	0.1	95	85
50/50 GDP blend						
(a) All to GDP Blend	1.8	-3.3	1.5	0.1	97	88
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.7	-3.1	1.3	0.1	97	88
<b>Set 3. Same as Set 1 with Higher Compression (k = 0.925)</b>						
65/35 GDP blend						
(a) All to GDP Blend	0.4	-0.8	0.3	0.1	118	106
(b) Split b/w GDP blend (2/3) and Openness (1/3)	0.2	-0.3	0.1	0.1	121	107
60/40 GDP blend						
(a) All to GDP Blend	0.1	-0.9	0.8	0.2	121	109
(b) Split b/w GDP blend (2/3) and Openness (1/3)	-0.1	-0.4	0.6	0.2	122	108
55/45 GDP blend						
(a) All to GDP Blend	-0.2	-1.0	1.2	0.2	123	113
(b) Split b/w GDP blend (2/3) and Openness (1/3)	-0.4	-0.5	1.0	0.2	123	112
50/50 GDP blend						
(a) All to GDP Blend	-0.5	-1.1	1.7	0.3	122	115
(b) Split b/w GDP blend (2/3) and Openness (1/3)	-0.7	-0.6	1.4	0.3	127	118
<b>Set 4. Combination: Dropping Variability, Openness Capped at 1.5, Fin. Contributions and Higher Compression (k = 0.925) 2/</b>						
65/35 GDP blend						
(a) All to GDP Blend	2.3	-1.9	-0.4	0.1	104	93
(b) Split b/w GDP blend (2/3) and Openness (1/3)	2.2	-1.8	-0.4	0.1	111	98
60/40 GDP blend						
(a) All to GDP Blend	2.0	-2.1	0.1	0.2	114	103
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.9	-2.0	0.1	0.2	115	103
55/45 GDP blend						
(a) All to GDP Blend	1.7	-2.3	0.6	0.2	119	108
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.6	-2.1	0.5	0.2	117	107
50/50 GDP blend						
(a) All to GDP Blend	1.3	-2.4	1.1	0.3	119	109
(b) Split b/w GDP blend (2/3) and Openness (1/3)	1.3	-2.3	1.0	0.3	119	109

Source: Finance Department.

1/ Percentage point change in the calculated quota share (CQS) relative to the CQS under the current formula.

2/ A portion of the variability weight (0.05) is allocated to financial contributions; the remaining 0.10 is allocated as indicated.

**Table 1. Simplification of the Current Formula—Dropping Variability  
(In percent)**

	14th General Review Quotas	65/35 GDP blend		60/40 GDP blend		55/45 GDP blend		50/50 GDP blend		
		Calculated Quota Shares	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)
Advanced economies	57.6	56.1	56.6	56.8	56.1	56.3	55.7	55.9	55.2	55.5
Major advanced economies	43.4	40.6	42.3	42.0	41.9	41.7	41.6	41.3	41.2	41.0
United States	17.4	15.8	16.9	16.4	16.8	16.3	16.7	16.3	16.6	16.2
Japan	6.5	6.2	6.6	6.4	6.5	6.3	6.4	6.3	6.3	6.2
Germany	5.6	5.7	5.6	5.7	5.6	5.7	5.5	5.7	5.5	5.6
France	4.2	3.6	3.9	3.9	3.8	3.9	3.8	3.8	3.7	3.8
United Kingdom	4.2	4.1	4.0	4.1	4.0	4.0	3.9	4.0	3.9	4.0
Italy	3.2	3.0	3.1	3.1	3.1	3.1	3.0	3.1	3.0	3.0
Canada	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3
Other advanced economies	14.3	15.4	14.3	14.8	14.2	14.7	14.1	14.6	14.0	14.4
Spain	2.0	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2
Netherlands	1.8	2.0	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9
Australia	1.4	1.4	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4
Belgium	1.3	1.3	1.2	1.3	1.2	1.3	1.2	1.2	1.2	1.2
Switzerland	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Sweden	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Austria	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Norway	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Ireland	0.7	0.9	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.8
Denmark	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.6	0.7
Emerging Market and Developing Countries 1/	42.4	43.9	43.4	43.2	43.9	43.7	44.3	44.1	44.8	44.5
Africa	4.4	3.3	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.2
South Africa	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Asia	16.0	19.6	20.0	20.0	20.3	20.2	20.6	20.5	20.9	20.8
China 2/	6.4	9.4	10.0	9.9	10.1	10.0	10.3	10.1	10.4	10.2
India	2.7	2.6	2.8	2.7	2.9	2.8	3.0	2.9	3.1	3.0
Korea	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
Indonesia	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.0
Singapore	0.8	1.3	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1
Malaysia	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Thailand	0.7	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Middle East, Malta and Turkey	6.7	6.2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9
Saudi Arabia	2.1	1.4	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2
Turkey	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Iran, Islamic Republic of	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8
Western Hemisphere	7.9	7.1	7.3	7.2	7.4	7.2	7.4	7.2	7.4	7.3
Brazil	2.3	2.2	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3
Mexico	1.9	1.7	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Transition economies	7.2	7.7	7.1	7.2	7.2	7.2	7.3	7.3	7.3	7.4
Russian Federation	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.6
Poland	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:										
EU27	30.2	30.9	29.8	30.5	29.6	30.3	29.4	30.1	29.2	29.9
LICs 3/	4.0	2.7	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7
Coefficients for quota variables										
GDP		0.30	0.42	0.39	0.39	0.36	0.36	0.33	0.33	0.30
PPP GDP		0.20	0.23	0.21	0.26	0.24	0.29	0.27	0.33	0.30
Openness		0.30	0.30	0.35	0.30	0.35	0.30	0.35	0.30	0.35
Variability		0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserves		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Compression Factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95

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.

**Table 2. Simplification of the Current Formula—Dropping Variability with Openness Capped at 1.5 (In percent)**

	14th General Review Quotas	Calculated Quota Shares	65/35 GDP blend		60/40 GDP blend		55/45 GDP blend		50/50 GDP blend	
			Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)
Advanced economies	57.6	56.1	56.1	56.2	55.6	55.7	55.1	55.2	54.5	54.7
Major advanced economies	43.4	40.6	43.5	43.4	43.1	43.0	42.8	42.7	42.4	42.4
United States	17.4	15.8	17.5	17.2	17.4	17.1	17.3	17.0	17.2	17.0
Japan	6.5	6.2	6.8	6.7	6.7	6.6	6.6	6.5	6.6	6.5
Germany	5.6	5.7	5.4	5.6	5.4	5.5	5.3	5.4	5.2	5.3
France	4.2	3.6	4.1	4.2	4.1	4.1	4.0	4.1	4.0	4.1
United Kingdom	4.2	4.1	3.9	4.0	3.9	4.0	3.9	3.9	3.8	3.9
Italy	3.2	3.0	3.3	3.3	3.3	3.3	3.2	3.3	3.2	3.2
Canada	2.3	2.3	2.4	2.5	2.4	2.5	2.4	2.4	2.4	2.4
Other advanced economies	14.3	15.4	12.7	12.9	12.5	12.7	12.3	12.5	12.1	12.3
Spain	2.0	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Netherlands	1.8	2.0	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.4
Australia	1.4	1.4	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Belgium	1.3	1.3	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8
Switzerland	1.2	1.2	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9
Sweden	0.9	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Austria	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Norway	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Ireland	0.7	0.9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Denmark	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5
Emerging Market and Developing Countries 1/	42.4	43.9	43.9	43.8	44.4	44.3	44.9	44.8	45.5	45.3
Africa	4.4	3.3	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.3
South Africa	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Asia	16.0	19.6	20.1	20.0	20.4	20.3	20.7	20.6	21.1	21.0
China 2/	6.4	9.4	10.4	10.3	10.5	10.5	10.7	10.6	10.8	10.7
India	2.7	2.6	2.9	2.8	3.0	2.9	3.1	3.0	3.2	3.1
Korea	1.8	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
Indonesia	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Singapore	0.8	1.3	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6
Malaysia	0.8	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Thailand	0.7	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9
Middle East, Malta and Turkey	6.7	6.2	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9
Saudi Arabia	2.1	1.4	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Turkey	1.0	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Iran, Islamic Republic of	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Western Hemisphere	7.9	7.1	7.6	7.5	7.6	7.5	7.7	7.6	7.7	7.6
Brazil	2.3	2.2	2.5	2.4	2.5	2.4	2.5	2.4	2.5	2.4
Mexico	1.9	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6
Transition economies	7.2	7.7	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.5
Russian Federation	2.7	2.6	2.7	2.7	2.7	2.7	2.8	2.7	2.8	2.8
Poland	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:										
EU27	30.2	30.9	28.4	28.9	28.1	28.6	27.8	28.3	27.5	28.1
LICs 3/	4.0	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8
Coefficients for quota variables										
GDP		0.30	0.42	0.39	0.39	0.36	0.36	0.33	0.33	0.30
PPP GDP		0.20	0.23	0.21	0.26	0.24	0.29	0.27	0.33	0.30
Openness		0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variability		0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserves		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Openness capped at 1.5 (65/35 blend)		0.00	0.30	0.35	0.00	0.00	0.00	0.00	0.00	0.00
Openness capped at 1.5 (60/40 blend)		0.00	0.00	0.00	0.30	0.35	0.00	0.00	0.00	0.00
Openness capped at 1.5 (55/45 blend)		0.00	0.00	0.00	0.00	0.00	0.30	0.35	0.00	0.00
Compression Factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95

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.

**Table 3. Simplification of the Current Formula—Dropping Variability with Higher Compression ( $k = 0.925$ )**  
(In percent)

	14th General Review Quotas	65/35 GDP blend			60/40 GDP blend		55/45 GDP blend		50/50 GDP blend	
		Calculated Quota Shares	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness
Advanced economies	57.6	56.1	55.7	55.9	55.3	55.5	54.8	55.1	54.4	54.7
Major advanced economies	43.4	40.6	41.1	40.8	40.7	40.5	40.4	40.2	40.1	39.9
United States	17.4	15.8	16.0	15.6	15.9	15.6	15.9	15.5	15.8	15.4
Japan	6.5	6.2	6.4	6.3	6.3	6.2	6.3	6.1	6.2	6.1
Germany	5.6	5.7	5.5	5.6	5.4	5.6	5.4	5.5	5.3	5.5
France	4.2	3.6	3.8	3.9	3.8	3.8	3.7	3.8	3.7	3.7
United Kingdom	4.2	4.1	3.9	4.0	3.9	4.0	3.9	4.0	3.9	3.9
Italy	3.2	3.0	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.0
Canada	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3
Other advanced economies	14.3	15.4	14.7	15.1	14.5	15.0	14.4	14.9	14.3	14.8
Spain	2.0	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2
Netherlands	1.8	2.0	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.9
Australia	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4
Belgium	1.3	1.3	1.2	1.3	1.2	1.3	1.2	1.3	1.2	1.3
Switzerland	1.2	1.2	1.2	1.3	1.2	1.3	1.2	1.2	1.2	1.2
Sweden	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Austria	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Norway	0.8	0.8	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7
Ireland	0.7	0.9	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.8
Denmark	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Emerging Market and Developing Countries 1/	42.4	43.9	44.3	44.1	44.7	44.5	45.2	44.9	45.6	45.3
Africa	4.4	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4
South Africa	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Asia	16.0	19.6	19.9	19.8	20.2	20.1	20.5	20.4	20.8	20.6
China 2/	6.4	9.4	9.6	9.5	9.8	9.6	9.9	9.7	10.0	9.9
India	2.7	2.6	2.8	2.7	2.9	2.8	3.0	2.9	3.1	3.0
Korea	1.8	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1
Indonesia	1.0	1.0	1.1	1.0	1.1	1.0	1.1	1.1	1.1	1.1
Singapore	0.8	1.3	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1
Malaysia	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Thailand	0.7	0.9	0.8	0.8	0.8	0.9	0.8	0.9	0.9	0.9
Middle East, Malta and Turkey	6.7	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.2
Saudi Arabia	2.1	1.4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Turkey	1.0	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.2	1.1
Iran, Islamic Republic of	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Western Hemisphere	7.9	7.1	7.5	7.4	7.6	7.4	7.6	7.5	7.7	7.5
Brazil	2.3	2.2	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3
Mexico	1.9	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6
Transition economies	7.2	7.7	7.4	7.5	7.5	7.5	7.5	7.6	7.6	7.6
Russian Federation	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.6
Poland	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:										
EU27	30.2	30.9	30.0	30.7	29.8	30.5	29.5	30.3	29.3	30.1
LICs 3/	4.0	2.7	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.0
Coefficients for quota variables										
GDP		0.30	0.42	0.39	0.39	0.36	0.36	0.33	0.33	0.30
PPP GDP		0.20	0.23	0.21	0.26	0.24	0.29	0.27	0.33	0.30
Openness		0.30	0.30	0.35	0.30	0.35	0.30	0.35	0.30	0.35
Variability		0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserves		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Compression Factor		0.95	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93

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.

**Table 4. Simplification of the Current Formula—Dropping Variability, Openness Capped at 1.5, Including Financial Contributions and Higher Compression 1/ (In percent)**

	14th General Review Quotas	Calculated Quota Shares	65/35 GDP blend		60/40 GDP blend		55/45 GDP blend		50/50 GDP blend	
			Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)	Drop VAR, all to GDP	Drop Var, weight split b/w GDP (2/3) and Openness (1/3)
Advanced economies	57.6	56.1	56.4	56.5	55.9	56.0	55.4	55.5	54.9	55.1
Major advanced economies	43.4	40.6	42.9	42.9	42.6	42.6	42.3	42.3	42.0	41.9
United States	17.4	15.8	16.2	16.0	16.1	15.9	16.0	15.8	15.9	15.8
Japan	6.5	6.2	7.2	7.2	7.2	7.1	7.1	7.0	7.1	7.0
Germany	5.6	5.7	5.5	5.5	5.4	5.4	5.3	5.4	5.2	5.3
France	4.2	3.6	4.2	4.3	4.2	4.2	4.1	4.2	4.1	4.2
United Kingdom	4.2	4.1	4.0	4.1	4.0	4.0	3.9	4.0	3.9	4.0
Italy	3.2	3.0	3.3	3.4	3.3	3.3	3.3	3.3	3.2	3.3
Canada	2.3	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Other advanced economies	14.3	15.4	13.5	13.6	13.3	13.4	13.2	13.3	13.0	13.1
Spain	2.0	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Netherlands	1.8	2.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Australia	1.4	1.4	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5
Belgium	1.3	1.3	1.0	1.0	0.9	1.0	0.9	0.9	0.9	0.9
Switzerland	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
Sweden	0.9	1.0	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.8
Austria	0.8	0.8	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7
Norway	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.7
Ireland	0.7	0.9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Denmark	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Emerging Market and Developing Countries 2/	42.4	43.9	43.6	43.5	44.1	44.0	44.6	44.5	45.1	44.9
Africa	4.4	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.5	3.5
South Africa	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Asia	16.0	19.6	19.4	19.4	19.7	19.7	20.0	20.0	20.3	20.3
China 3/	6.4	9.4	9.8	9.7	9.9	9.8	10.0	10.0	10.1	10.1
India	2.7	2.6	2.8	2.7	2.9	2.8	3.0	2.9	3.0	3.0
Korea	1.8	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
Indonesia	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.1	1.1	1.1
Singapore	0.8	1.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Malaysia	0.8	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Thailand	0.7	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9
Middle East, Malta and Turkey	6.7	6.2	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Saudi Arabia	2.1	1.4	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Turkey	1.0	1.1	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.2
Iran, Islamic Republic of	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Western Hemisphere	7.9	7.1	7.5	7.5	7.6	7.5	7.6	7.5	7.7	7.6
Brazil	2.3	2.2	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3
Mexico	1.9	1.7	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6
Transition economies	7.2	7.7	7.3	7.3	7.4	7.4	7.4	7.5	7.5	7.5
Russian Federation	2.7	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7
Poland	0.9	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.1	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:										
EU27	30.2	30.9	29.2	29.6	29.0	29.3	28.7	29.0	28.5	28.8
LICs 4/	4.0	2.7	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.0
Coefficients for quota variables										
GDP		0.30	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.28
PPP GDP		0.20	0.21	0.20	0.24	0.23	0.27	0.26	0.30	0.28
Openness		0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variability		0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reserves		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Openness capped at 1.5 (65/35 blend)		0.00	0.30	0.33	0.00	0.00	0.00	0.00	0.00	0.00
Openness capped at 1.5 (60/40 blend)		0.00	0.00	0.00	0.30	0.33	0.00	0.00	0.00	0.00
Openness capped at 1.5 (55/45 blend)		0.00	0.00	0.00	0.00	0.00	0.30	0.33	0.00	0.00
Openness capped at 1.5 (50/50 blend)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.33
Financial contributions (FCS III)		0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Compression Factor		0.95	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93

Source: Finance Department.

1/ A portion of the variability weight (0.05) is allocated to financial contributions, the remaining 0.10 is allocated as indicated.

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 I. GDP Per Capita as a Measure of Vulnerability

*In response to several Directors' requests at the September Board meeting to explore further ways to improve on the current measure of variability in the formula, this annex considers the possible use of per capita income as a measure of vulnerability. The analysis highlights important conceptual and practical issues and does not suggest a strong basis for including this measure in the formula.*

**At the September Board meeting, several Directors suggested that staff continue their efforts to find a better measure of variability to be included in the quota formula.** In Annex I of *Quota Formula Review—Additional Considerations*, staff provided a summary of recent work on variability, including a brief description of the many alternatives explored so far; none of which clearly improves on the current measure.

**In further exploring measures that may better capture members' vulnerability, staff examined the possible use of per capita income in the quota formula.** As shown in Annex II of *Quota Formula Review—Data Update and Further Considerations* (Figure A2.2), among the macroeconomic variables most frequently shown in the literature as determinants of the use of Fund resources, GDP per capita exhibits the highest correlation with the approval of an IMF arrangement.<sup>1</sup> Historically, the majority of members with IMF arrangements are clustered in the low end of the per capita income distribution. Figure A1.1 illustrates this point: in 92 percent of the cases, the country seeking financial assistance from the IMF had per capita GDP below the average and in 81 percent of the cases its per capita GDP was less than 50 percent of the average.<sup>2</sup>

**Past proposals to consider per capita income in the quota formula have not received sufficient support.** Per capita income has been considered as a potential candidate for inclusion in the quota formula in the past. In *Economic Criteria Entering Quota Calculations*, for example, staff noted that “consideration could be given to the possibility of including some form of “poverty index” in the formula”. It was also considered by the external Quota Formula Review Group (QFRG) “on the grounds that IMF quotas provide a contingent substitute for holding international reserves, and the opportunity cost of holding reserves is (very roughly) inversely proportional to per capita income”.<sup>3</sup> Low-income

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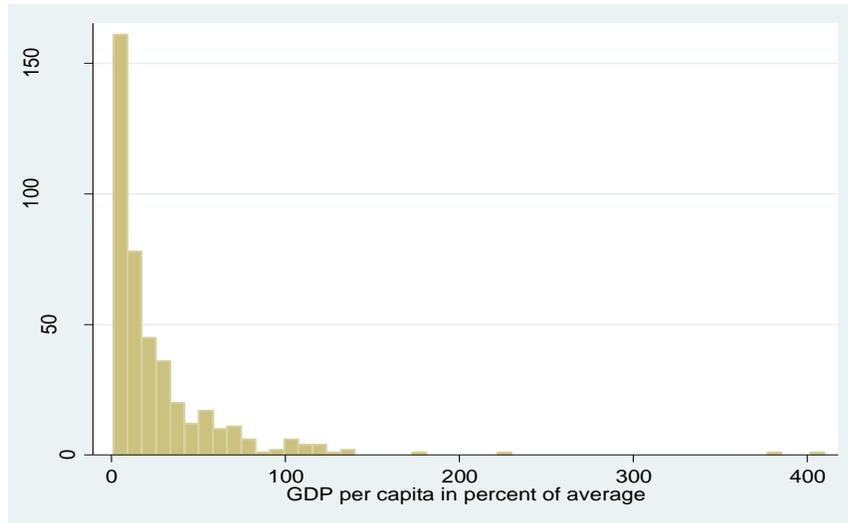
<sup>1</sup> Using binary variable taking the value of one if an arrangement is approved for a member in a given year and zero otherwise, the correlation between the approval of a Fund arrangement and per capita GDP is estimated at -0.16 for the period 1990-2010 and is statistically significant at the 1% level. For LICs only, the correlation coefficient is lower (-0.07) but it remains significant.

<sup>2</sup> Using median per capita GDP for scaling instead of the average does not change qualitatively the results.

<sup>3</sup> See External Review of the Quota Formula (5/1/00), p.61 <http://www.imf.org/external/np/tre/quota/2000/eng/qfrg/report>. In the context of work on the 2008 Reform, per capita GDP was used to scale variability rather than as a stand-alone variable (See *Quota and Voice Reform – Stocktaking and Further Considerations* (7/11/07 )) <http://www.imf.org/external/np/pp/2007/eng/071107a.pdf>.

countries are also likely to be more vulnerable since they generally have less diverse economic structures and lower capacity to cope with the consequences of shocks. These proposals have, however, not received sufficient support in the past, reflecting both conceptual and practical problems.

**Figure A1.1. Distribution of Countries with IMF Arrangements in the Period 1990-2010 According to their GDP per Capita 1/**



1/ GDP per capita is measured in percent of average GDP per capita for the entire membership in the respective year. Includes members with GRA or PRGT arrangements (drawing and precautionary).

Source: Finance Department

**Incorporating GDP per capita in the quota formula as an indicator of economic vulnerability raises important conceptual and practical issues.** First, as indicated in staff's earlier analysis, no single variable (including per capita income) is a strong proxy for the use of Fund financing (see Annex II of *Quota Formula Review—Data Update and Further Considerations*). While the correlation between per capita income and Fund financing is stronger than for the quota formula's variability measure, the correlation remains low (-0.16 for all Fund members). Second, it is not straightforward to include a measure of per capita income in the current quota formula. Since countries with lower per capita income tend to be more vulnerable and more likely to have balance of payments need, this should be reflected in an inverse relationship in the formula. A negative coefficient, as suggested by the QFRG, could result in negative calculated quota shares for some members with the current formula.<sup>4</sup>

<sup>4</sup> Since all variables in the formula are expressed as shares in global totals, calculated quota shares could become negative for some small members if their share in GDP per capita is substantially higher than their shares in the other variables.

## Annex II. PPP GDP<sup>1</sup>

*In response to queries from a number of Directors, this Annex discusses a number of issues relating to the compilation of PPP GDP data and its quality. Directors noted in particular the issue of producing PPP GDP data that are comparable across regions with very different living standards, types of products, and the quality of services. While there have been indeed a variety of measurement challenges, the World Bank's International Comparison Program, which has been working on the methodology for estimating PPPs for over four decades, has vastly improved the PPP GDP data. These data are now of high quality and many major international organizations, governments and private sector organizations use them as benchmarks for a variety of purposes.*

### A. PPP GDP Measure

**Purchasing Power Parity (PPP) refers to the purchasing power to buy a given amount of goods and services in a given country (compared with the numéraire country).**<sup>2</sup> While it has the same unit of measure as a market exchange rate it is conceptually quite different, since the market exchange rate only measures the current exchange of a unit of currency of the country in question per unit of numeraire currency.<sup>3</sup> PPP GDP is obtained by deflating the GDP of a country measured in its national currency by the associated PPP relative to the United States. It therefore measures the relative volume of goods and services between two countries. PPP-adjusted GDP data thus are used to assess countries' relative importance in world production of goods and services for final uses. PPPs also are produced for the final consumption sub-aggregate of GDP; PPP-adjusted final consumption data measure the relative volume of final consumption and thus are used to assess and compare the relative living standards of countries.

**Differences in GDP on a PPP basis and using market exchange rates reflect a variety of factors.** GDP conversions into a common unit using market exchange rates are generally regarded as producing measures of countries' *ability to pay* in a common currency of conversion. Market exchange rates are somewhat more applicable to internationally traded goods and services price comparisons, because the price of an internationally traded product measured in given currency units tends toward the same level from country to country. On the other hand, items that are only domestically consumed, particularly services, may have persistently differing prices from country to country when measured in a given currency. Empirically, applying market exchange rates tends to underestimate the purchasing power of

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<sup>1</sup> Prepared by the Statistics Department, in cooperation with the Finance Department.

<sup>2</sup> The numéraire country for the PPP estimates is the United States.

<sup>3</sup> Technically then, the PPP should not be referred to as an exchange rate, but rather a goods and services price index.

money in the developing countries and, thereby, the purchasing power of their economies relative to the more advanced economies. PPPs also are more stable than currency exchange rates. A wide variety of temporary factors influence currency exchange rates including the stance of monetary policy, currency speculation, temporary changes in the current and capital accounts, and official exchange market interventions. PPPs on the other hand provide more stable underlying valuations.

**In addition to being included in the IMF's quota formula, PPP data are widely used.**

These data are used, and have been used for quite some time, by academic and policy researchers throughout the world 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 capita expenditures in education (UNESCO). In short, these data are used very widely, reflect a significant amount of interest among policy makers, private sector and international organizations, and therefore have been subject to extensive scrutiny.

## **B. Data Quality**

**The quota data for PPP GDP are obtained from the World Economic Outlook (WEO) database.** The WEO uses these data to compute weights to produce aggregate ratios and growth rates for country groups. The WEO PPP price indices are based on the International Comparison Program (ICP) survey.<sup>4</sup>

**The work of the International Comparison Program (ICP) extends back over 40 years.** It began in 1968 as a 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. 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 last round of the ICP was the 2005 comparison, but work on a 2011 round is near completion. The IMF Statistics Department contributes to this work by building capacity in the Asia-Pacific on GDP estimates, used for ICP weights, under a three-year project funded by the Japan Government. This is in addition to Fund technical assistance on real sector statistics and Fund staff serving on the ICP Technical Advisory Committee.

**PPP data are as reliable as the national GDP and price statistics from which they are constructed, and are broadly comparable in quality to the other data used in the quota**

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<sup>4</sup> Comprehensive information on the ICP can be found at the following website:  
<http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/ICPEXT/0..contentMDK:22377119~menuPK:6782247~pagePK:60002244~piPK:62002388~theSitePK:270065.00.html>.

**formula.** The 2005 ICP round on which the current PPP estimates are based was an unprecedented global statistical effort and represented a further major overhaul of methods used. Data collection was overseen by regional coordinating agencies, which compiled the results and produced regional estimates of PPPs. The strong partnership with Eurostat and the OECD and their parallel programs for their members made it possible to combine the results from the two efforts with the worldwide effort, thereby producing coverage for 146 economies, far exceeding the number of participants in 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. The 2005 survey introduced the technique known as “ring comparison,” whereby regional estimates of PPPs were linked into a global data set so that economic activity and price levels could be compared directly and accurately between economies in different regions. This was a major innovation and it allayed any issues regarding the validity of comparisons across countries with differing standards of living. 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. This will update the underlying price surveys from 2005 to 2011 and further broaden the coverage to at least 154 countries. The quality of the price surveys has been enhanced by improving the survey frameworks, designating homogenous set of products to be surveyed, and coverage has been expanded to better include rural areas.

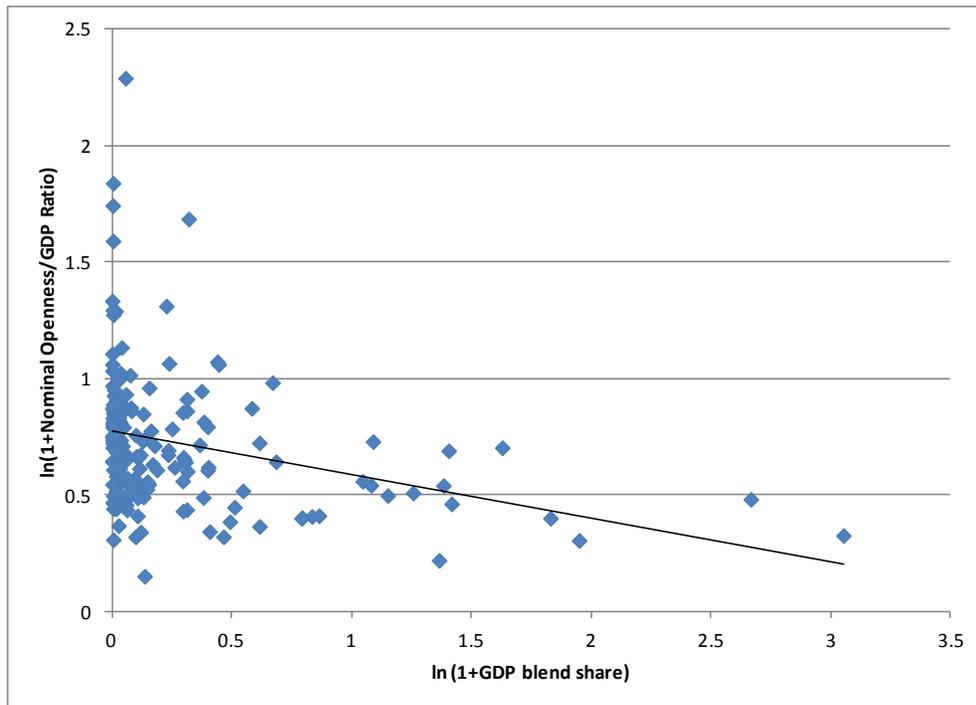
**Nonetheless, as for any set of economic statistics, the implementation of PPPs confronts certain measurement challenges.** The most difficult components of GDP by expenditure to measure at *both* current (national) prices *and* at purchasing power parity, are (i) those resulting from nonmarket production, such as general government services (e.g., education, health, and public administration), (ii) the value of housing services yielded from rented and, especially, owned dwellings, and (iii) the value of work in progress, construction, and fixed capital formation in the form of structures. In (i), final expenditures are measured as a sum of costs of production, and it is necessary to establish how productively inputs are used to generate the nonmarket public service outputs on which final expenditures are made. The level of GDP arising from nonmarket production is affected by productivity of inputs, and the productivity of inputs is notably affected by capital intensity, and differing productivities between countries compared should be accounted for in factoring the price and volume components of a nominal GDP ratio. In (ii), housing characteristics vary around the world and should be adjusted for in comparing rentals and, for owner occupied dwellings, imputed rentals. The latter affects both the imputed level and price of owner-occupied housing, as well as the price of rental housing. Different housing characteristics are part of the relative volume (PPP GDP) rather than price (PPP) component of the above factorization of a nominal GDP ratio between countries. Similar considerations apply to comparing fixed capital formation between countries in (iii). Although addressing each of these issues is conceptually reasonably well understood, the data for implementing methodologies to address them are not always readily available.

### Annex III. Openness and Economic Size

*This annex provides evidence on the relationship between the degree of openness and economic size. It shows an inverse relationship between the two, and that relatively small countries tend to benefit from including openness in the formula compared to larger countries.*

**There is an inverse relationship between a country's size as measured by GDP blend share, and its openness to market GDP ratio.<sup>1</sup>** Although the negative correlation between the GDP share and openness-to-GDP ratio (-0.14) is not very large in absolute value, it is statistically significant, indicating that relatively large economic size is associated with relatively less economic openness. (Figure A3.1).

**Figure A3.1: Nominal Openness-to-GDP Ratios and GDP Blend Shares**



<sup>1</sup> To be consistent with the variables used in the quota formula, openness is defined as the annual average of the sum of current payments and current receipts (goods, services, income, and transfers) over the period 2006-2010; market GDP and GDP blend are averaged over 2008-2010.

**The inverse relationship between size and openness is also evident when members are grouped by size** (Table A3.1).<sup>2</sup> In particular, for the 10 largest countries, the openness-to-GDP ratios are all below 1.0 (with the exception of Germany that is slightly above 1.0) with an average ratio of 0.61; while the group of the smallest economies has the highest average openness to GDP ratio at 1.52.

	Number of Countries	Average Nominal Openness/GDP Ratio
Large Countries	10	0.61
Medium Countries	8	0.80
Small Countries	127	1.13
Very Small Countries	43	1.52
<b>Total</b>	<b>188</b>	<b>1.17</b>

**Staff also explored whether smaller members benefit more from openness than larger members in the quota formula.** To examine this, the difference between a country's openness share and its "uncompressed" CQS (CQS\*) is used to determine if it "gains" from openness.<sup>3</sup> A positive difference between openness and CQS\* implies that a country gains from the inclusion of the openness variable. As shown in Table A3.2, smaller countries tend to gain more than larger countries from including openness in the quota formula, with about 74 percent of the smallest members gaining, compared to about 40 percent of the largest ones.

**Table A3.2. Countries Gaining from Openness in the Quota Formula**

	Number of Countries	GDP Blend Share <sup>1/</sup>	Openness Share > CQS* <sup>2/</sup>	Openness Share < CQS* <sup>2/</sup>	Percentage of Countries Gaining from Openness
Large Countries GDP blend share > 2.5%	10	65.0%	4	6	40%
Medium Countries 2.5% > GDP blend share > 1%	8	13.1%	4	4	50%
Small Countries 1% > GDP blend share > 0.01%	127	21.8%	70	57	55%
Very Small Countries GDP blend share < 0.01%	43	0.1%	32	11	74%
<b>Total</b>	<b>188</b>	<b>100%</b>	<b>110</b>	<b>78</b>	<b>59%</b>

<sup>1/</sup>Percentage of group in global GDP blend.

<sup>2/</sup>CQS\* is defined as the uncompressed calculated quota share. Column shows the number of countries that meet the criteria.

<sup>2</sup> Given that the GDP blend distribution is highly skewed, a threshold approach is used to divide countries into 4 groups: large countries are those with GDP blend shares larger than 2.5%; medium countries with GDP blend shares between 1% and 2.5%; small countries with GDP blend shares between 0.01% and 1%; very small countries with GDP blend shares smaller than 0.01%.

<sup>3</sup> "Uncompressed" CQS is used to distinguish between the impact of openness on CQS and compression, which tends to favor small countries and substantially raises their CQS.

#### **Annex IV. Adding a Compressed Population Variable to the Formula?**

*At the September Board meeting, a few Directors suggested that the quota shares of the poorest countries could be protected by including a compressed population variable in the formula. The Annex reviews past discussions on this issue, where adding population to the quota formula did not gain broad support on the ground that the Fund is a monetary institution and that population does not bear directly on international monetary issues. It also shows that EMDCs and LICs account for a large share of the world's population, and presents some illustrative simulations of including a compressed population variable with a small weight.*

**Inclusion of population in the quota formula has been discussed in the past.** In the 10<sup>th</sup> Quota Review, the Executive Board reflected on the use of population in the quota formulas and agreed to continue this work as part of the Eleventh Quota Review.<sup>1</sup> In the report to the Executive Board, the Quota Formula Review Group (QFRG) listed population as one of the variables that could be considered in the quota formula.<sup>2</sup> Apart from including a population variable in the formula, in the Twelfth Review, some proposals were made to base voting power on a weighted average of quotas, population and basic votes to enhance the voice of developing countries.<sup>3</sup> In the 2008 reform, this issue was raised again and population was discussed specifically as a possible new variable in staff papers.<sup>4</sup>

**There has not been, however, sufficiently broad support for including population in the formula.** Proponents for including population have noted that global decision-making affects the economic welfare of all individuals and the inclusion of population would capture members' relative stakes in the international public goods provided by the Fund. A member of the QFRG also stressed that a population variable would give poor countries a larger voice. However, inclusion of a population variable has not received broad support, neither at the Executive Board nor in the QFRG. Past discussions have highlighted that the Fund is essentially a monetary institution and population does not bear directly on international monetary issues. It was also recognized that quota formula should not be overloaded with too

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<sup>1</sup> *IMF Board of Governors Vote to Complete 10<sup>th</sup> Quota Review; Request Executive Board to Continue Work Under the 11<sup>th</sup> Review*, Press Release No. 95/4, January 23, 1995.

<sup>2</sup> *External Review of the Quota Formulas* (05/01/2000)  
<http://www.imf.org/external/np/tre/quota/2000/eng/qfrg/report>.

<sup>3</sup> *Alternative Quota Formulas—Further Considerations* (06/06/2002)  
<http://www.imf.org/external/np/tre/quota/2002/eng/050302.htm>; *Quota Distribution—Selected Issues* (07/17/2003) <http://www.imf.org/external/np/fin/2003/quota/eng/071703.htm>.

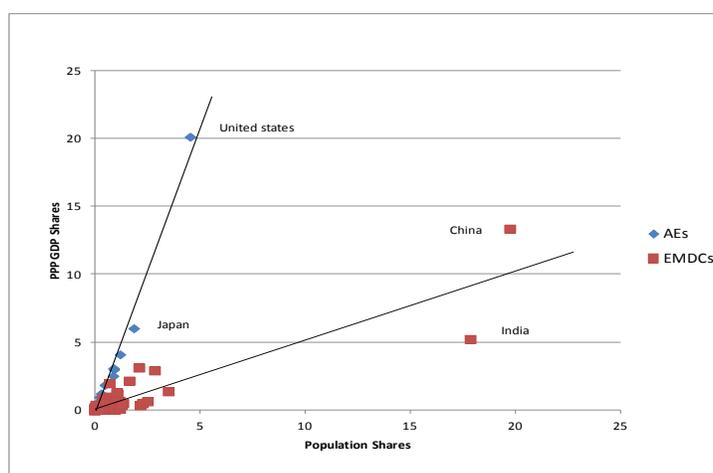
<sup>4</sup> *Quotas—Further Thoughts on a New Quota Formula, and Statistical Appendices I and II* (11/22/2006)  
<http://www.imf.org/external/np/pp/eng/2006/112206.pdf>; *A New Quota Formula—Additional Considerations* (03/14/2007) <http://www.imf.org/external/np/pp/2007/eng/031407.pdf>.

many objectives. Moreover, it is argued that this case is similar to that for PPP GDP, and the two variables have a relatively high correlation.

**The distributions of population<sup>5</sup> among major country groups differ substantially from other current variables.** For EMDCs, the shares of population are much higher than for the current variables, especially the shares of the GDP Blend, openness and variability. As shown in Table A4.1, EMDCs account for 86.5 percent of the world's population and advanced economies (AEs) for the remaining 13.5 percent. This suggests that including population, even with a small weight, would significantly increase calculated quota shares for EMDCs. Compression, unless very large, would not change much the population shares of AEs and EMDCs but would change the distribution within EMDCs and shift shares from Asia to other groups. The population shares of LICs are also much larger than other variables. Moreover, using compression for the population variable would tend to further increase the population shares of LICs (at the expense of other EMDCs; see Table A4.1).

**PPP GDP captures some aspects of a population variable.** Population is highly correlated with PPP GDP: the correlation coefficient is 0.64 for the whole membership, and even substantially higher when calculated separately for AEs and EMDCs (0.99 and 0.91, respectively). The difference in the relationship within AEs and EMDCs can also be seen in Figure A4.1, which plots the PPP GDP shares against population shares separately for AEs and EMDCs. The slope of trend line for AEs is much higher than that for EMDCs. Other things equal, including population would therefore have a larger effect on the calculated quota shares of EMDCs.

**Figure A4.1. Population and PPP GDP: Comparison of AEs and EMDCs (In percent)**



<sup>5</sup> IFS data as of end 2010, except for Kosovo, Marshall Islands, and Uzbekistan (data from staff reports) and for South Sudan (World Bank data as of 2011).

**For illustrative purposes, different options of including a compressed population variable in the formula with a small weight (5%) were examined.** The chosen weight is largely arbitrary and corresponds to the smallest weight of variables in the existing formula (i.e., the weight of reserves). The simulations include: (i) dropping variability and redistributing 5 percent to population and 10 percent to GDP; (ii) dropping variability, giving 5 percent to population and splitting the remaining 10 percent between GDP (2/3) and openness (1/3). Compression factors of 0.95 and 0.90 on population shares are illustrated. The inclusion of population would result in a redistribution of calculated quota shares (CQS) from advanced economies to EMDCs, particularly those countries with large populations. For example, if the first approach is applied with a compression factor of 0.95 on population shares, the CQS of EMDCs would increase by 2.1 percentage points. Including population would also increase the CQS of LICs by about 1 percentage point (Table A4.2).

**Table A4.1. Quota Formula Variables—Shares in Global Totals  
(In percent)**

	14th General Review Quotas	Calculated Quota Shares	GDP	PPP GDP	Openness	Variability	Reserves	Population	Compressed Population 0.95	Compressed Population 0.9	Compressed Population 0.85
Advanced economies	57.6	56.1	64.2	49.3	62.2	57.9	23.9	13.5	14.0	14.4	14.8
Major advanced economies	43.4	40.6	51.9	40.7	41.8	38.7	17.3	10.9	11.0	11.1	11.1
Other advanced economies	14.3	15.4	12.3	8.6	20.4	19.2	6.7	2.6	2.9	3.3	3.7
Emerging Market and Developing Countries 1/	42.4	43.9	35.8	50.7	37.8	42.1	76.1	86.5	86.0	85.6	85.2
Africa	4.4	3.3	2.2	3.3	2.6	3.6	4.0	13.7	14.8	16.0	17.2
Asia	16.0	19.6	16.0	26.0	17.9	14.9	44.5	53.1	50.0	47.0	43.9
Middle East, Malta and Turkey	6.7	6.2	4.7	5.5	5.2	7.5	10.9	5.3	5.7	6.1	6.5
Western Hemisphere	7.9	7.1	7.3	8.7	4.9	6.5	6.8	8.4	8.9	9.4	9.8
Transition economies	7.2	7.7	5.5	7.3	7.1	9.6	9.8	6.1	6.6	7.2	7.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:											
EU27	30.2	30.9	28.0	21.3	41.1	34.7	8.1	7.4	8.0	8.7	9.3
LICs 2/	4.0	2.7	1.7	3.0	2.1	2.6	2.1	18.3	19.8	21.2	22.7

Source: Finance Department.

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

2/ PRGT-eligible countries.

**Table A4.2. Illustrative Calculations: Formula including Population  
(In percent)**

	14th General Review Quotas	Calculated Quota Shares	Drop Var, 5% to Population, 10% to GDP	Drop Var, 5% to Population, 10% split b/w GDP(2/3) and Openness(1/3)	Drop Var, 5% to Population, 10% to GDP	Drop Var, 5% to Population, 10% split b/w GDP(2/3) and Openness(1/3)
			Compression on population: 0.95		Compression on population: 0.9	
Advanced economies	57.6	56.1	54.0	54.1	54.0	54.1
Major advanced economies	43.4	40.6	40.2	40.0	40.2	40.0
United States	17.4	15.8	15.9	15.7	15.9	15.7
Japan	6.5	6.2	6.2	6.1	6.2	6.1
Germany	5.6	5.7	5.4	5.5	5.4	5.5
France	4.2	3.6	3.7	3.7	3.7	3.7
United Kingdom	4.2	4.1	3.8	3.9	3.8	3.9
Italy	3.2	3.0	3.0	3.0	3.0	3.0
Canada	2.3	2.3	2.2	2.2	2.2	2.2
Other advanced economies	14.3	15.4	13.8	14.1	13.8	14.1
Spain	2.0	2.2	2.2	2.2	2.2	2.2
Netherlands	1.8	2.0	1.7	1.8	1.7	1.8
Australia	1.4	1.4	1.4	1.4	1.4	1.4
Belgium	1.3	1.3	1.1	1.2	1.1	1.2
Switzerland	1.2	1.2	1.1	1.2	1.1	1.2
Sweden	0.9	1.0	0.9	0.9	0.9	0.9
Austria	0.8	0.8	0.8	0.8	0.8	0.8
Norway	0.8	0.8	0.7	0.7	0.7	0.7
Ireland	0.7	0.9	0.7	0.7	0.7	0.7
Denmark	0.7	0.7	0.6	0.6	0.6	0.6
Emerging Market and Developing Countries 1/	42.4	43.9	46.0	45.9	46.0	45.9
Africa	4.4	3.3	3.8	3.8	3.9	3.9
South Africa	0.6	0.6	0.6	0.6	0.6	0.6
Nigeria	0.5	0.5	0.5	0.5	0.5	0.5
Asia	16.0	19.6	21.7	21.7	21.6	21.5
China 2/	6.4	9.4	10.4	10.3	10.3	10.2
India	2.7	2.6	3.5	3.4	3.4	3.4
Korea	1.8	2.0	2.0	2.0	2.0	2.0
Indonesia	1.0	1.0	1.2	1.1	1.2	1.1
Singapore	0.8	1.3	1.0	1.1	1.0	1.1
Malaysia	0.8	0.8	0.7	0.7	0.7	0.7
Thailand	0.7	0.9	0.8	0.8	0.8	0.8
Middle East, Malta and Turkey	6.7	6.2	5.9	5.9	5.9	5.9
Saudi Arabia	2.1	1.4	1.1	1.1	1.1	1.1
Turkey	1.0	1.1	1.1	1.1	1.1	1.1
Iran, Islamic Republic of	0.7	0.7	0.8	0.8	0.8	0.8
Western Hemisphere	7.9	7.1	7.4	7.3	7.4	7.3
Brazil	2.3	2.2	2.4	2.3	2.4	2.3
Mexico	1.9	1.7	1.8	1.7	1.8	1.7
Venezuela, República Bolivariana de	0.8	0.5	0.5	0.5	0.5	0.5
Argentina	0.7	0.6	0.6	0.6	0.6	0.6
Transition economies	7.2	7.7	7.2	7.2	7.2	7.3
Russian Federation	2.7	2.6	2.6	2.6	2.6	2.6
Poland	0.9	1.0	1.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum items:						
EU27	30.2	30.9	28.7	29.2	28.7	29.2
LICs 3/	4.0	2.7	3.6	3.6	3.7	3.7

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.

## Annex V. Value Added Trade Data

*Based on recent academic studies, this Annex provides an overview of the data availability regarding value added in trade, challenges with their usage, and some stylized facts. The analysis confirms earlier staff work that a robust adjustment of the openness measure for value added is not feasible at this stage.*

**In the September Board meeting, a number of Directors reiterated their view that the current openness measure is flawed.** In particular, they noted one of the long-standing concerns that export and import flows are measured on a gross rather than a value added basis, which potentially leads to significant double counting. Given the increase in international specialization of production and vertical integration, the degree of double counting is likely to have increased over time, exacerbating this issue.

**Official trade data for goods and services are measured on a gross basis.**<sup>1</sup> These include the data for exports and imports reported by member in the IFS and the bilateral merchandise trade data. The OECD and WTO 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 these input-output tables are available for 1995, 2000, and 2005. There are also other databases for subsamples of countries. For example, the World Input-Output Database (WIOD) uses national input-output tables and covers the period 1995-2009 but only for 39 countries. The Global Trade Analysis Project (GTAP) is a commercial database that covers 106 countries in its latest distribution but only for 2007; a distribution also exists for 2004, covering fewer countries. However, given the methodological and data challenges noted in this Annex, it is unlikely that value added trade data will be available for the bulk of the membership in the near-term. It should be noted that the sixth edition of the *Balance of Payments and International Investment Position Manual (BPM6)* introduces a new treatment of goods for processing (GFP), where the goods being processed do not change ownership. For economies where inward or outward processing is relevant, the treatment in *BPM6* reduces gross exports and imports of goods, and increases exports or imports of services. As a result, the distortion on the current openness measure would be reduced.

**While official data are not available, a number of studies have attempted to shed some light on the magnitude of the double counting by constructing estimates of trade in value-added terms.** Recent studies have provided estimates for value-added trade for several years and for various samples of countries, tracking the evolution of double-counting over time and across countries (see, for example, Stehrer et al.(2012); Koopman et al. (2012); and

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<sup>1</sup> For an extensive summary of official data sources, see Annex II in *Quota Formula Review—Additional Considerations--Annexes* (9/5/2012).

Johnson and Noguera (2012a, 2012b)).<sup>2</sup> One of the main measures computed by these studies is the VAX ratio, defined as the ratio of value added exports to gross exports for a given country or between a pair of trade partners (the bilateral VAX ratio).

**Based on estimates for value-added trade and VAX ratios, these studies highlight several interesting findings.** First, the VAX ratios from the study by Johnson and Noguera (2012a)<sup>3</sup> vary substantially across some individual countries. For example, for the limited sample of countries covered in their study, they range from 0.37 in the case of Singapore to 0.95 for Iran. More than half of the countries in the sample have VAX ratios between 0.65 and 0.80, resulting in a cross-country average of 0.73 (Table A5.1, first column). In addition, the overall VAX ratio (to world exports) exhibits a downward trend during the period 1970-2009 with the overall drop being around 13 percentage points.<sup>4</sup> For individual countries, VAX ratios decreased for most (with the exception of Norway), with magnitudes ranging from around zero to over 30 percentage points. The largest drops were reported in countries undergoing structural transformations (e.g., China, Korea, and Thailand).<sup>5,6</sup> Second, bilateral VAX ratios seem to be positively related to distance between trading partners. Nearby countries tend to have lower bilateral VAX ratios, and this relationship seems to be strengthening over time.

**Bilateral VAX ratios appear to be negatively related to the presence of a regional trade agreement (RTA).** The studies show that the VAX ratios tend to be lower for country pairs

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<sup>2</sup> Stehrer, Robert, Neil Foster, and Gaaitzen de Vries (2012), “Value-added and Factors in Trade: A Comprehensive Approach”, WIOD Working Paper 7, April 2012, report values for 1995, 2000, 2007, and 2009 for 39 countries. Koopman, Robert, Zhi Wang, and Shang-Jin Wei (2012), “The Value-added Structure of Gross Exports and Global Production Network”, mimeo, June 2012 report values for 17 countries in 2007. Johnson, Robert C. and Guillermo Noguera (2012a): “Accounting for Intermediates: Production Sharing and Trade in Value-added”, *Journal of International Economics* 86, pp. 224-236, report values for 91 countries in 2004. Johnson and Noguera (2012b), “Fragmentation and trade in value added over four decades,” NBER Working Paper 18186, report values for 42 countries in the period 1970-2009.

<sup>3</sup> While other sources exist for value-added exports in different years, these studies have substantially less coverage. This is a reflection of the fact that data on value-added trade which has wide coverage across both countries and time do not exist.

<sup>4</sup> This is largely due to the fact that while the global volume of gross exports has been increasing over this time period, the amount of value-added embodied in each transaction has been decreasing.

<sup>5</sup> The authors also find that VAX ratios decreased only in manufacturing, and thus a large portion of the observed overall decrease is due to sectoral shifts in the countries mentioned above.

<sup>6</sup> Although the world VAX ratio has in general declined over the last four decades, VAX ratios have not significantly changed over the last few years. Comparing the 2004 VAX ratios in the first column of Table A3.1 to analogous numbers from the same GTAP dataset in 2007 for the limited sample reported by Koopman et al.(2012), changes in VAX ratios for most countries are relatively small across these two years for most countries (Table A3.1). Although there are some noticeable increases and decreases across countries, in the aggregate, the world VAX ratio increased by only 2 pps from 2004 to 2007.

who participate in agreements for deeper international economic integration, such as currency unions, custom unions and common markets. According to regression evidence, the adoption of one of these modalities lowers the bilateral VAX ratio between members by 10-15 percent, whereas a free trade agreement is linked to a 6–7 percent decline. However, aggregate VAX ratios by country provide mixed support for a negative relationship between the share of value added in exports and RTAs. For example, while the average VAX ratio for the euro area countries in 2004 is 0.70, which is slightly below the sample average of 0.72, the average VAX ratio for NAFTA is 0.74, which is higher than the world average.

**It should be emphasized that the VAX estimates are based on some quite stringent assumptions.** Most of the studies mentioned above utilize national input-output tables<sup>7</sup> and bilateral trade data on a gross basis (available for merchandise trade only) to estimate a country's exports on a value added basis. For example, most studies employ the “proportionality assumption” whereupon bilateral trade data are split into final and intermediate consumption goods using overall shares of intermediate to final consumption goods at the sectoral level for each country, based on each country's input-output tables. In addition, due to the lack of data on bilateral services trade, synthetic bilateral services flows are constructed which mirror the proportions of those partners' trade in goods.

**In addition, a number of important issues arise concerning the import side and other components of the openness variable.** First, the estimates reported above cover only export data. For imports, one possibility discussed in the literature<sup>8</sup> approximates value-added imports for a country as gross imports minus the non-domestic (foreign) value-added portion of gross exports. Intuitively, this approach computes a country's value-added imports by taking into account only the proportion of gross imports which remains in the country and it has the advantage that intermediate goods are never double-counted in the production chain.<sup>9</sup> Although this method has the suitable implication that the balance of trade in value-added terms is the same as the balance of trade in gross terms, it is based on very strong assumptions that could affect the results significantly. Second, there are currently no data available for calculating the value-added in the other components of current receipts and payments, including for investment income. This data challenge is especially important for financial centers, where investment income can account for a large portion of their

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<sup>7</sup> The input-output tables report data at different levels of sectoral disaggregation, which can be combined into broader composite sectors, such as agriculture, manufacturing, and services.

<sup>8</sup> See e.g., Saito, Mika and Ranil Salgado (2011): “Measuring Value-Added Trade: Implications for Macroeconomic Policy”, note prepared for the World Bank Workshop on the Fragmentation of Global Production and Trade in Value-Added—Developing New Measures of Cross Border Trade, June 9-10, 2011 and Benedetto, John B. (2012), “Implications and Interpretations of Value-added trade balances”, *Journal of International Commerce and Economics*, July 2012.

<sup>9</sup> In practice,  $VA\ Imports = Gross\ Imports - (1 - VAX) * Gross\ Exports$ .

openness.<sup>10</sup> In addition, the data on value-added content of exports are available for less than half the membership, and only for a few years (see Table A5.2 for number of countries with VAX ratio).<sup>11</sup> Moreover, the data are not available on a timely basis, with input-output tables in particular being produced only every five years. Given these considerations, it is not feasible at this stage to provide a robust adjustment of the openness measure for value added.

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<sup>10</sup> Although there are no data available for calculating value-added in investment income, it may be possible to capture value added under *BPM6*, since actual interest transactions are separated into pure interest (which represents value added) and financial intermediation services.

<sup>11</sup> Moreover, in most cases the information is available to subscribers only.

**Table A5.1. VAX Ratios 1/**  
(value added exports to gross exports)

	2004 (1)	2007 (2)	Difference (2) - (1)
Advanced economies			
Major advanced economies			
United States	0.77	0.75	-0.02
Japan	0.85	0.80	-0.05
Germany	0.74		
France	0.73		
United Kingdom	0.79		
Italy	0.77		
Canada	0.70	0.74	0.04
Other advanced economies			
Spain	0.75		
Netherlands	0.69		
Australia	0.86	0.88	0.02
Belgium	0.48		
Switzerland	0.67		
Sweden	0.72		
Austria	0.67		
Norway	0.87		
Ireland	0.66		
Denmark	0.73		
Emerging Market and Developing Countries 2/			
Africa			
South Africa	0.80	0.78	-0.02
Nigeria	0.94		
Asia			
China 3/	0.70	0.66	-0.04
India	0.81	0.77	-0.04
Korea	0.63	0.64	0.01
Indonesia	0.79	0.82	0.03
Singapore	0.37	0.47	0.10
Malaysia	0.59	0.59	0.00
Thailand	0.60	0.63	0.03
Middle East, Malta and Turkey			
Turkey	0.76		
Iran, Islamic Republic of	0.95		
Western Hemisphere			
Brazil	0.86	0.87	0.01
Mexico	0.67	0.65	-0.02
Venezuela , República Bolivariana de	0.89		
Argentina	0.84		
Transition economies			
Russian Federation	0.87	0.91	0.04
Poland	0.70		
Total World	0.73	0.75	0.02

Source: IMF Finance Department.

1/ 2004 data is from Johnson and Noguera (2012a), and 2007 data is from Koopman, Wang and Wei (2012)

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

3/ The VAX ratio reported for China does not include data for Hong Kong and is not adjusted for processing trade

**Table A5.2. Number of Countries with VAX Ratio**

	188 members	With VAX ratios
Advanced economies	26	23
Major advanced economies	7	7
Other advanced economies	19	16
Emerging Market and Developing Countries 1/	162	68
Africa	52	15
Asia	32	14
Middle East, Malta and Turkey	16	4
Western Hemisphere	32	15
Transition Economies	30	20
Total	188	91

Source: IMF Finance Department.

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