INTERNATIONAL MONETARY FUND

Review of the Adequacy of the Fund's Precautionary Balances

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Contents

EXECUTIVE SUMMARY

The paper reviews the adequacy of the Fund's precautionary balances and proposes a more transparent and rules-based framework for adjusting the precautionary balance target through time. The framework seeks to provide sufficient flexibility to capture the main elements considered relevant by the Board in the past when setting the target and draws on approaches followed by other IFIs, adapted to the particular circumstances of the Fund.

Credit risks have increased sharply as the Fund has responded to the crisis. Overall, actual or potential credit exposures have doubled or, on some measures, almost quadrupled since the last review. Despite the return to positive net income, precautionary balances remain well below the SDR 10 billion target first established in 2002.

Under the proposed new framework, the target would be maintained within an initial range of 20–30 percent of credit outstanding. This relatively wide range in comparison with practices at other IFIs reflects the higher volatility of Fund lending. A three-year moving average is proposed for credit outstanding that would take account of the latest actual Fund lending, while placing heavy emphasis on expected future developments. Given the limited experience with new contingent financing instruments, it is not proposed to explicitly include commitments under precautionary arrangements in the new framework at this stage, but they would still be taken into account by the Board when adjusting the target.

The proposed framework also incorporates a minimum floor for the target. This would provide a necessary buffer given that Fund credit is highly volatile and can increase sharply, whereas it takes considerable time to rebuild precautionary balances. It would also take into account that precautionary balances represent an important source of Fund income. An initial floor of SDR 10 billion is proposed.

Based on the new framework, staff proposes that the precautionary balance target be increased to SDR 15 billion. This corresponds to the mid-point of the SDR 12–18 billion range under the proposed new framework and would reflect the sharp increase in Fund lending and commitments during the crisis.

Staff considers that the projected pace of reserve accumulation is adequate and no policy changes are needed at this stage. Precautionary balances remain comfortable relative to existing arrears and the pace of reserve accumulation is already expected to accelerate significantly. Current projections of reserve accumulation under existing policies indicate that the proposed SDR 15 billion target could be reached by FY 2016.

I. INTRODUCTION[1]

1. **This paper reviews the adequacy of the Fund's precautionary balances.** It also proposes a more transparent and rules-based framework for adjusting the precautionary balances target through time. Based on the proposed new framework and the increase in credit risks since the last review, the paper proposes to raise the current precautionary balance target of SDR 10 billion to SDR 15 billion.

2. **The paper is organized as follows.** Section II briefly recalls the role of precautionary balances in mitigating financial risks in the Fund and the background to the current SDR 10 billion target before taking stock of developments since the last review. Section III proposes a more transparent and rules-based framework for assessing the adequacy of precautionary balances and adjusting the target over time. Based on this new framework, Section IV proposes an increase in the target, assesses its adequacy under alternative scenarios, and discusses the pace of reserve accumulation. Section V concludes.

II. STOCKTAKING AND RECENT DEVELOPMENTS

Role of Precautionary Balances

3. **The Fund faces a range of financial risks in fulfilling its mandate** (Table 1):[2]

- *Credit risks* typically dominate, given the Fund's core role of providing financing in support of members' efforts to address their balance of payments problems when other financing sources may not be readily available. Because the Fund responds to members' needs, rather than targeting a particular level of lending or lending growth, credit risks can fluctuate widely over time.

- Related to credit risk is *liquidity risk*—the risk that the Fund's resources will be insufficient to meet members' needs. Five-yearly quota reviews are the key mitigating factor, and the Fund can also borrow temporarily to supplement its quota resources as in the current crisis. In this context, the Fund retains standing borrowing arrangements through the NAB—which are to be expanded ten-fold—and the GAB.

- The Fund also incurs *income risk*—the risk of shortfalls in annual income to expenses. These risks have been significant on occasions in the past, including recently when immediately prior to the crisis lending fell to low levels, as the Fund's

[1] The main contributors to this paper are H. Hatanpää, G. Kabwe, H. Lin, A. Ndiaye, S. Rodriguez, A. Dabney, and B. Wennerholm (all staff from FIN). A. Mirestean and Z. Tang (TGS), and L. Schumacher (MCM) provided guidance on applying Credit Risk+ to the Fund's credit portfolio.

[2] For a more comprehensive overview of the Fund's risk management framework, financial risks faced by the Fund, and measures used to mitigate them, see Note 4 in the Financial Statements of the IMF, http://www.imf.org/External/Pubs/FT/quart/2010fy/043010.pdf.

income model relied heavily on lending income to meet the expenses of the Fund. The Fund's new income model, which is in the process of being implemented, is intended to mitigate these risks.

- The Fund does not face significant *market* (exchange and interest rate) risks in its lending and funding operations with members. Market risks related to its investment portfolios are also relatively limited given the current instruments in which the Fund invests. The Fund also self-insures for certain risks (for example, to cover losses of a capital nature) and faces limited *operational* risks.

4. **Precautionary balances play an important role in mitigating these risks.** Comprising retained earnings held in the Fund's reserves and the Special Contingent Account (SCA-1) (Box 1), precautionary balances are one element of the broader framework for managing credit risks, which includes the Fund's lending policies (e.g. policies on conditionality, access limits and the exceptional access framework, charges and maturities, and safeguards assessments), the arrears strategy and burden-sharing mechanism, and the Fund's de facto preferred creditor status.[3] Precautionary balances are available to absorb financial losses,[4] thereby helping protect the value of reserve assets that members place with the Fund and underpinning the exchange of international reserve assets through which the Fund provides assistance to members with financing needs (Box 2).

5. **Precautionary balances also represent interest-free resources and are thus an important income source for the Fund**. Resources broadly equivalent to the Fund's reserves are currently held in the Investment Account, where they are invested with the aim of generating returns that exceed the SDR interest rate over time while minimizing negative returns and underperformance over a 12-month horizon. SCA-1 balances are held in the GRA and thus reduce members' reserve tranche positions, thereby lowering the Fund's remuneration expense. The implicit return on these latter resources is the SDR interest rate.

Precautionary Balances Target

6. **The existing SDR 10 billion target was adopted in 2002.** This represented a doubling of the previous target, in light of the increasing risks confronting the Fund associated with large financial arrangements for middle-income countries. The target reflected a number of considerations, including the need to cover the possibility that the Fund's credit portfolio could be put at risk in a relatively short period of time, to ensure that the Fund would remain in compliance with International Financial Reporting Standards

[3] Retained earnings are accumulated profits held in the Fund's Special and General Reserves. Precautionary balances, however, exclude accumulated profits from the current gold sales (see footnote 7).

[4] Most recently, the Fund drew on its precautionary balances during FY 2007-08 to cover income losses.

Table 1. Financial Risk Mitigation in the Fund

Financial Risk	Risk Mitigation Measures
Credit risk: The risk that a borrower could fail to meet its financial obligations to the Fund	• Lending policies (e.g., conditionality, access limits, charges and maturities, exceptional access framework) • Safeguards assessments • Arrears strategy • Burden-sharing mechanism • Precautionary balances
Liquidity risk: The risk that available resources will not be sufficient to meet financing needs of members and the Fund's own obligations	• Monitoring of Forward Commitment Capacity (continuous) • Financial Transactions Plans (quarterly) • Liquidity reviews (semi-annually) • General quota reviews (every five years) • Bilateral borrowing and note purchase agreements, and the NAB and GAB
Income risk: The risk that the Fund's annual income may not be sufficient to cover its annual expenditures.	• Margin on the basic rate of charge • Surcharges • Burden sharing mechanism • Gold endowment (following amendment of the Articles) • Precautionary balances
Interest rate risk: The risk that future cash flows will fluctuate because of changes in market interest rates	• The Fund does not incur interest rate risk on credit as it uses a floating market interest rate (SDR interest rate) to determine the rates of charge and remuneration. • The interest rate risk of the Fund's investment portfolio is reduced by limiting the duration of the portfolio to a weighted average of 1-3 years.
Exchange rate risk: The exposure to the effects of fluctuations in foreign currency exchange rates on the Fund financial position and cash flows	• Fund has no exposure on its holding of member currencies, Fund credit, or borrowings which are all denominated in SDRs, the Fund's unit of account. Members are required to maintain the SDR value of the Fund's holdings of their currencies. • Exchange rate risk on investments is managed by investing in financial instruments denominated in SDRs or in constituent currencies with a view to matching currency weights in the SDR basket.
Operational risk in financial matters: The risk of loss attributable to errors or omissions, process failures, inadequate controls, human factors, and/or failures in underlying support systems	• Internal control procedures and processes • Executive Board approved investment guidelines and benchmarks for external asset managers • Audit arrangements: independent external audit, oversight of controls and financial processes by an independent external audit committee, and an internal audit function

(IFRS), and to move the Fund's reserve ratio somewhat closer to the levels of other IFIs. The staff also noted that a doubling in precautionary balances to at least 6 percent of the Fund's credit capacity appeared reasonable. It was recognized that it could take 5–10 years to reach the SDR 10 billion target.

7. **The target was subsequently reaffirmed on three occasions:**

- At the time of the first review in 2004, credit outstanding had increased further to over SDR 60 billion and remained highly concentrated.

- By the time of the 2006 review, credit had fallen sharply to about SDR 22 billion while precautionary balances had reached about SDR 7½ billion. Directors observed that while reserve coverage relative to credit had increased, the Fund's loan portfolio remained highly concentrated, reserves were still below the largest individual country exposure, and the Fund needed to be prepared to lend again, possibly in significant volumes, in support of its global mandate.

- The most recent review in December 2008 took place just after the initial surge in lending associated with the global economic crisis. At that time, the stock of outstanding credit in the GRA had risen to SDR 17.2 billion, and was projected to peak at over SDR 30 billion. While retaining the SDR 10 billion target for the time being, Directors stressed that it should be kept under close review, and a number of Directors observed that the target may need to be raised if lending were to expand significantly.

Developments since the Last Review

8. **Credit risks have increased sharply as the Fund responded to members' financing needs in the crisis**. The Fund committed resources at a record pace, supported by the mobilization of borrowed resources through bilateral borrowing and note purchase agreements. Also, under the reformed GRA lending toolkit, new lending tools were created, existing ones modified and access limits doubled.[5] Overall, actual or potential credit exposures have doubled or almost quadrupled since the last review (Table 2). In particular:

- **Credit outstanding has nearly tripled** from SDR 17 billion at the last review to SDR 48.6 billion by end-July 2010 (Table 2 and Figure 1, Panel A). Based on scheduled purchases under existing non-precautionary arrangements, annual average credit outstanding is now projected to peak at over SDR 78 billion, compared with SDR 30 billion at the time of the last review.

[5] *GRA Lending Toolkit and Conditionality—Reform Proposals* (3/13/09), and *GRA Lending Toolkit and Conditionality—Reform Proposals—Revised Proposed Decisions* (3/19/09).

- **Total commitments under GRA arrangements reached record levels** and stood at SDR144 billion at end-July 2010, almost four times their level at the time of the last review (Table 2). Also, undrawn balances under GRA arrangements have reached unprecedented levels, illustrating the increased importance of contingent financing (Figure 1, Panel A).

Table 2. Current vs. 2008 Review

	Oct-08	Jul-10	Change
	(In billions of SDRs)		(In percent)
Precautionary balances	6.9	7.3 1/	5.3
Arrears 2/	1.1	1.1	-0.1
Largest individual exposure			
Actual	5.7	9.0	59.2
Projected 3/	11.0	26.4	140.3
Credit outstanding			
Actual	17.2	48.6	183.2
Projected peak	30.0	78.2	160.7
Total commitments 4/	36.5	144.0	294.4
Credit capacity	165.9	310.1 5/	86.9
Precautionary balances	(In percent of)		(Percentage points)
Credit outstanding	40.5	15.1	-25.4
Total commitments	19.0	5.1	-13.9
Credit capacity	4.2	2.4	-1.8

Source: IMF Finance Department

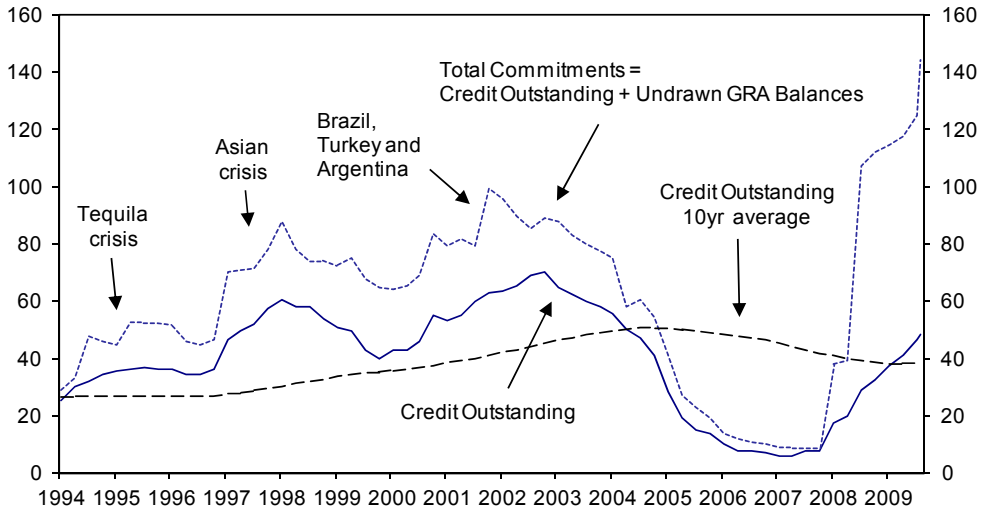
1/ As per audited financial statements as of end-April 2010, excluding gold sale profits.
2/ Obligations to the GRA that are overdue for six months or more.
3/ Assuming full drawings under the largest nonprecautionary arrangement.
4/ Total commitments equal credit outstanding plus undrawn GRA balances.
5/ As of August 1, 2010, after inclusion of the Philippines in the FTP.

- **Credit capacity has almost doubled**. The mobilization of substantial borrowed resources through bilateral agreements—as a bridge to an expanded and more flexible NAB—along with wider participation in the FTP increased the Fund's credit capacity from SDR 166 billion to over SDR 310 billion by end-July 2010.

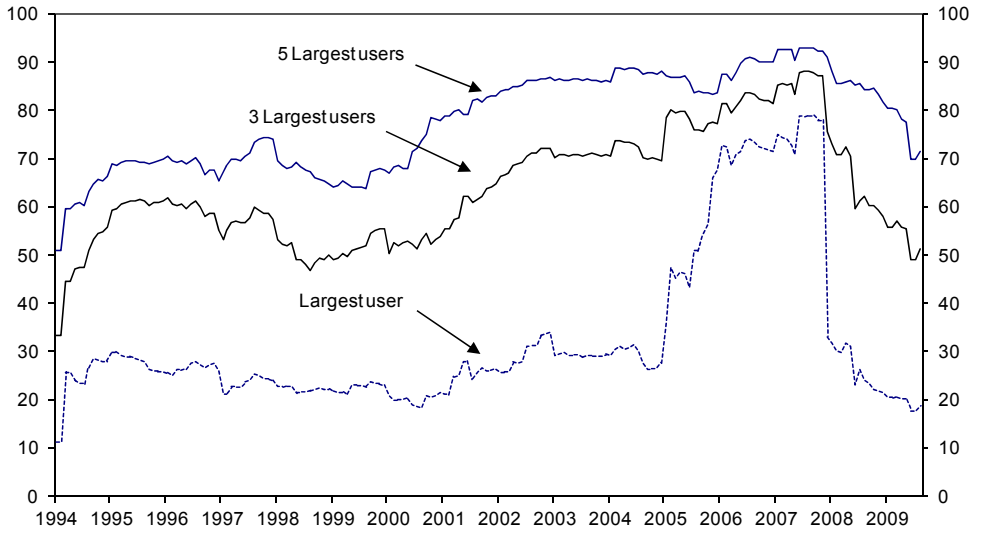
- **Credit concentration remains high, and the size of the individual largest exposures has increased sharply**. The five largest borrowers accounted for about 71 percent of the total credit at end-July 2010 (Figure 1, Panel B), down from 91 percent at the time of the last review. Precautionary balances no longer cover the largest individual exposure (Table 2), and the size of the largest projected individual exposure has more than doubled.

Figure 1. Total Commitments, Credit Outstanding, and Credit Concentration

A. GRA Total Commitments and Credit Outstanding, 1994 - July 2010 (in SDR billions)



B. Largest Borrowers, 1994 - July 2010 (in percent of credit outstanding)



Source: IMF Finance Department

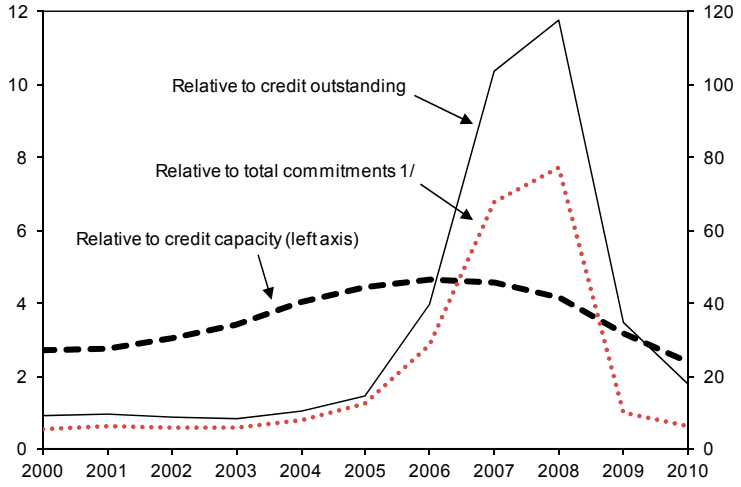
9. **While credit risks have increased, income risks have declined.** Primarily reflecting higher projected lending, the Fund's near-term income outlook has improved since the last review. The temporary increase in lending income will help build the Fund's precautionary balances, and thus mitigate future income risks. Further progress has also been made in implementing the new income model, with almost three-quarters of the limited gold sales

completed, although the proposed amendment to the Articles of Agreement to expand the Fund's investment authority is not yet effective.[6]

10. **Despite the return to positive net income, precautionary balances remain well below the SDR 10 billion target.** After losses in the two previous years, higher lending income contributed to a return to positive income in FY 2009 and 2010, which allowed a modest rise in precautionary balances. The total precautionary balances of about SDR 7.3 billion at end-FY 2010 comprised retained earnings of SDR 6.1 billion and SDR 1.2 billion in the SCA-1 (Table 3).[7]

11. **Higher lending has led to a steep decline in reserve coverage** (Figure 2). At the time of the last review, the Fund's precautionary balances were in excess of 40 percent of credit outstanding, but by end-July 2010 this ratio had fallen to 15 percent. Precautionary balances now equate to about 5 percent of total commitments, compared with almost 19 percent at the time of the last review and have fallen to 2.4 percent of credit capacity compared with over 4 percent at the last review. This said, precautionary balances remain comfortable relative to existing principal arrears of SDR 0.3 billion in the GRA.

Figure 2. Precautionary Balance Ratios, FY 2000-10
(In percent)



Source: IMF Finance Department.
1/ Total commitments equal credit outstanding plus undrawn balances under GRA arrangements.

[6] In addition, a new framework for setting the rate of charge has been implemented as part of the new income model.

[7] For policy and analytical purposes, precautionary balances exclude profits earned from the current gold sales and placed to the special reserves at end-FY 2010. These gold profits are intended to be transferred to a permanent endowment to generate long-term income for the Fund, and a portion will be used to facilitate increased concessional lending. Their role is therefore distinct from that of precautionary balances which provide a buffer against financial risks (see paragraph 15 in *Review of the Fund's Income Position for FY 2010 and FY 2011* (4/14/10)).

Table 3. Precautionary Balances in the GRA, 2002–2010
(In SDR billions)

	End of Financial Year								
	2002	2003	2004	2005	2006	2007	2008	2009	2010 1/
	(In billions of SDRs)								
Precautionary balances	4.6	5.4	6.4	7.2	7.6	7.6	6.9	7.1	7.3
Reserves	3.3	4.0	4.9	5.6	6.0	5.9	5.8	5.9	6.1
General	1.2	1.9	2.7	3.3	3.5	3.5	3.5	3.5	3.5
Special 2/	2.0	2.1	2.2	2.4	2.4	2.4	2.2	2.4	2.6
SCA-1	1.3	1.4	1.5	1.6	1.7	1.7	1.2	1.2	1.2
Free reserves 3/	3.7	4.7	5.6	6.5	7.0	7.0	6.6	6.8	7.0
Memorandum items:									
Credit capacity 4/	150.9	157.6	158.5	163.3	163.8	166.3	166.7	223.6	310.0
Total commitments 5/	79.0	89.6	82.0	57.8	26.8	11.2	9.0	72.2	117.5
Credit outstanding	52.1	66.0	62.2	49.9	19.2	7.3	5.9	20.4	41.2
Credit in good standing	51.2	65.3	61.4	49.1	18.6	6.8	5.6	20.1	40.9
Arrears 6/	1.9	1.7	1.7	1.7	1.6	1.6	1.1	1.1	1.1
Principal	0.9	0.7	0.7	0.7	0.6	0.6	0.3	0.3	0.3
Charges	1.0	1.0	1.0	1.0	1.0	1.1	0.8	0.8	0.8
	(In percent)								
Precautionary balances to									
Credit capacity	3.0	3.4	4.0	4.4	4.7	4.6	4.2	3.2	2.4
Total commitments 5/	5.8	6.0	7.8	12.5	28.6	67.5	77.3	9.8	6.2
Credit outstanding	8.8	8.2	10.2	14.5	39.7	103.5	117.7	34.7	17.8
Free reserves to									
Credit capacity	2.5	3.0	3.6	4.0	4.3	4.2	4.0	3.0	2.3
Credit in good standing	7.3	7.2	9.2	13.3	37.8	103.8	118.7	33.8	17.2

Source: IMF Finance Department

1/ Precautionary balances as of end-FY 2010 exclude gold profits from the limited sales.
2/ As per audited financial statements less an "earmarked" portion representing the windfall gain from the adoption of IAS 19 in FY00. Subsequently, the annual adjustment for IAS 19 expense was charged against this earmarked portion of the special reserve and it was fully utilized in FY06.
3/ Precautionary balances in excess of arrears on principal.
4/ The Fund's credit capacity is approximated by the quotas of members in the FTP plus resources made available under effective bilateral loan and note purchase agreements plus resources that could be made available by activating the NAB and GAB, excluding a prudential balance based on these combined resources.
5/ Total commitments equal credit outstanding plus undrawn balances under GRA arrangements.
6/ Obligations to the GRA that are overdue for six months or more, excludes arrears for SAF loans.

III. A New Framework For Assessing Reserve Adequacy

12. **At the last review in 2008, Directors endorsed the development of a more transparent and rules-based framework for reserve accumulation**. They noted that this framework should include how the reserves target would be set and adjusted over time, the modalities for accumulating reserves, and how reserves in excess of the target would be handled. Directors emphasized that credit risks should be the primary consideration in assessing reserve adequacy under the new income model, since this model is expected to significantly mitigate the Fund's overall income risks. They also supported use of a variety of forward-looking indicators, and further development of scenario analysis and stress tests.

13. **A proposed new framework for assessing reserve adequacy is outlined below**. The framework builds on the approach discussed in the context of the last review in 2008. It seeks to provide sufficient flexibility to capture the main elements considered relevant by the Board in the past when setting the precautionary balances target, while increasing the transparency of these decisions and providing greater guidance on how to adjust the target in the future. The proposal draws on approaches followed by other IFIs, adapted to the particular circumstances of the Fund.

14. **Specifically, it is proposed that the precautionary balances target be broadly maintained within a range linked to developments in total credit outstanding.** For simplicity and clarity, the target would continue to be expressed as a single figure. However, the framework would provide an indicative range that would serve as a guide to decisions on adjusting the target over time. The Board would retain flexibility to determine where the target should be set based on a comprehensive assessment of the risks facing the Fund. It is generally envisaged that the target would be maintained within the range, but there could be occasional circumstances where the Board would decide to set or maintain the target outside the range if this was considered warranted by a broader assessment of financial risks. In this regard, one additional consideration could be the desirability of avoiding frequent adjustments in the target that convey an unwarranted sense of precision.

15. **The proposed framework requires judgments on several elements.** These include: (i) the proposed level and width of the range; (ii) the relevant credit measure; (iii) the treatment of precautionary arrangements; and (iv) the minimum reserves needed to address income and credit risks. These issues are considered in turn below.

Reserve coverage ratio

16. **The Fund's past practices provide some guidance on the appropriate level of reserve coverage.** When the current SDR 10 billion target was initially adopted, it corresponded to about 16 percent of credit outstanding. The target was subsequently reaffirmed three times in varying circumstances, when it represented between 15.5 and 58 percent of credit outstanding. As noted, a variety of considerations underpinned these

decisions, including assessments of forward-looking risks and the desirability of ensuring that precautionary balances were sufficient to cover the largest single credit exposure.

17. **Practices at other IFIs also provide a useful reference point.** Other IFIs have adopted explicit reserve targets linked to credit outstanding (Table 4). The IBRD currently maintains a strategic target range for its equity-to-loan ratio of 23 to 27 percent. The ADB and the IDB have also maintained such targets in the past (a minimum of 35 percent and a range of 32–38 percent, respectively), though both recently adopted new frameworks in which the equity-to-loan ratio is no longer the main indicator of reserve adequacy.[8] In general, reserve coverage ratios at other IFIs have been relatively stable and, except in periods of low demand for Fund credit, higher than that for the Fund (Figure 3, Panel A).

Table 4. IMF and Other IFIs: Reserve Ratios 1/ (In percent)

	Target or Limit		Actual	Data as of:
IMF	N/A		17.8	End-FY 2010
ADB	*35*	2/	34.4	End-2009
IDB	*32-38*	3/	34.2	End-2009
IBRD	23-27		29.4	End-FY 2010

Source: IMF Finance Department

1/ The equity-to-loans ratio for the IBRD, ADB, and IDB are defined as the ratio of equity (the sum of paid-in capital, retained earnings, and other adjustments detailed in the respective annual reports) to outstanding loans and the value of guarantee exposures.

2/ The ADB has discontinued its previous policy of maintaining a minimum threshold of equity-to-loans ratio of 35 percent.

3/ The IDB adopted in February 2010 a new framework which uses a the capital utilization ratio as the main indicator of capital adequacy.

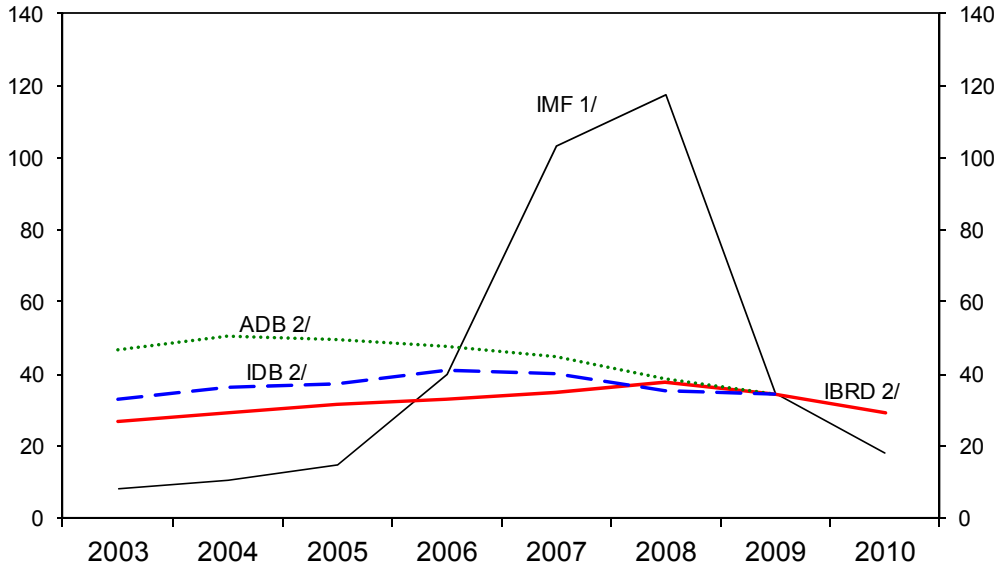
18. **While there are differences between the Fund and other IFIs, the considerations underlying reserve adequacy assessments are broadly similar.** The Fund's precautionary balances play a similar role to equity in other IFIs in providing a buffer to protect against financial losses.[9] One difference is that the Fund has not borrowed on private markets, and thus is not required to maintain a particular capital adequacy level to preserve a low cost of borrowing. However, the Fund's financial structure relies on the ability of its members to count their reserve positions in the Fund (as well as lending to the Fund and note purchases) as part of their international reserves. It is therefore important that the Fund maintains sufficient precautionary balances to help assure members that their reserve positions in the Fund are of high quality and readily available to meet their needs. The ratios applied by other IFIs—which reflect a market test—would appear a useful reference in this regard.

[8] In both cases, these changes were aimed at deepening the risk assessment rather than at achieving any particular change in the overall level of reserve coverage (see Annex 1).

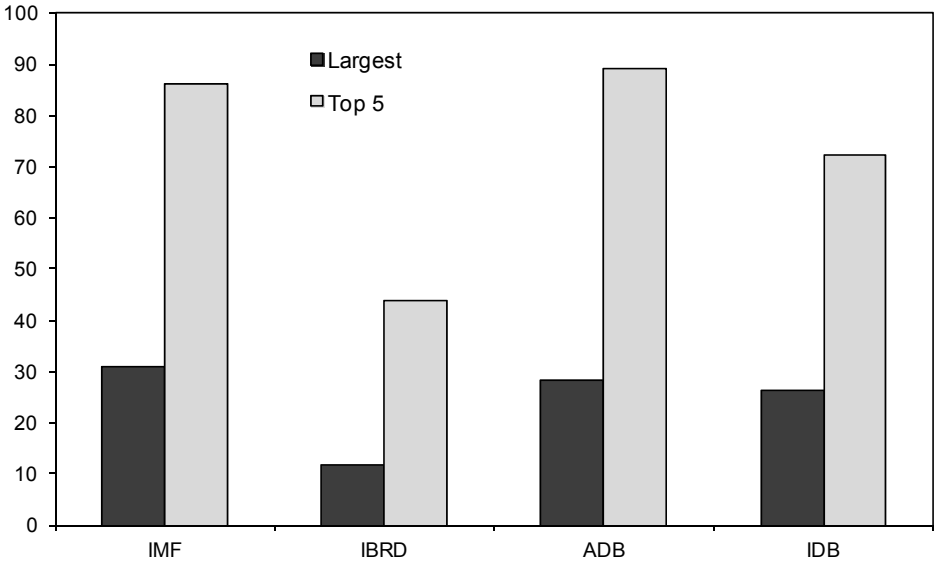
[9] IFIs equity generally comprises their paid-in capital, plus retained earnings (accumulated profits). The Fund has no paid-in capital. Under International Financial Reporting Standards (IFRS), quota resources are not considered as part of equity owing to characteristics such as payment of interest on reserve tranche positions.

Figure 3. IMF Relative to Other IFIs: Reserve Adequacy and Concentration

A. Precautionary Balances as a Percentage of Credit Outstanding
IMF and other IFIs, FY 2003 – FY 2010



B. Largest Borrowers (In percent of credit outstanding), FY 2009



Source: IMF Finance Department

1/ The Fund's precautionary balances include reserves and SCA-1 balances, and are exclusive of profits from the limited gold sales currently being conducted.
2/ The equity-to-loans ratio for the IBRD and ADB, and the IDB's Total Equity to Loan Ratio, are defined as the ratio of equity (the sum of paid-in capital, retained earnings, and other adjustments detailed in the respective annual reports) to outstanding loans and the value of guarantee exposures.

19. **Other comparisons between the Fund and other IFIs do not point uniformly to a significantly different assessment of reserve coverage needs** (see also Table 5).

- Given its unique mandate, Fund lending takes place predominantly during crises, and as such may entail higher risks than the longer term development lending at the core of the mandates of the MDBs. These risks are mitigated somewhat by the various other elements of the Fund's framework for managing credit risks discussed above.

- Also reflecting its mandate, the Fund does not apply exposure limits to individual borrowers, and the Fund's credit portfolio tends to be highly concentrated. In this respect, the Fund's portfolio resembles more those of the regional MDBs than of the IBRD, which uses borrower limits to manage credit concentration (Figure 3, Panel B).

- The Fund lends only to its sovereign members, whereas a small portion of the MDBs lending is typically extended to borrowers without sovereign guarantees.

- The MDBs' subscribed capital is considerably larger than their paid-in capital. The difference, callable capital (which is not included in calculation of equity-to-loan ratios), constitutes a form of guarantee by shareholders and provides further backing for MDBs' financial obligations. In the event of need for additional capital, the MDBs may also increase their regular paid-in capital. These options are not available to the Fund: it does not have callable capital, and can only accumulate reserves by retaining earnings (quota increases do not increase precautionary balances).

- The Fund's gold holdings lend strength to its balance sheet but are not considered part of precautionary balances given the various legal and other restrictions on their use.

20. **Applying quantitative methods used by the private sector sheds relatively limited light on this issue.** Illustrative calculations using Basel II based approaches were prepared for the last two reviews and are updated in Annex II. Applying these models yields a range of precautionary balances to credit for the most recent twelve year period of 14 to 48 percent (Table 5), but these approaches are designed to measure VaR in much more diversified portfolios (even methods used by the private sector to allow for portfolio concentration such as Credit Risk+), and are not readily applicable to the Fund.

21. **On balance, staff proposes an initial range of 20–30 percent for the desired ratio of precautionary balances to credit outstanding**. Such a range would be broadly in line with the Fund's past practices. Also, based on historical experience, it would provide a reasonable probability of ensuring that reserves exceed the Fund's individual credit exposure,

which has averaged about 27 percent of total credit outstanding over the last 25 years.[10] Relative to other IFIs, it would have the same mid-point as the current target range applied by the IBRD, while being somewhat below those of the other MDBs, which typically have more concentrated regional exposures than the Fund. It is proposed to target a wider range than the other IFIs given that demand for Fund lending is much more volatile. This would allow more scope for the Board to use its discretion in adjusting the precautionary balances target, whereas a narrow range would imply a need for more frequent adjustments to the target range.

Relevant measure of credit outstanding

22. **Judgment is also needed on the relevant credit measure to use as the base for these calculations.** Such a measure needs to take account of the volatility of Fund lending and the limitations on the Fund's ability to rapidly accumulate precautionary balances. It should also have a strong forward-looking element.

23. **Staff proposes to use a three-year moving average of credit outstanding.** This would comprise the average of credit outstanding during the preceding year and that projected for the next two years (Figure 4). Such an approach would ensure that the assessment takes into account the latest actual developments in Fund lending, while placing heavy emphasis on expected future developments. Given the inherent difficulty of forecasting future credit demand, the two-year projection would be based on scheduled disbursements under non-precautionary arrangements, and scheduled repurchases, i.e., similar to the methodology used in preparing the Fund's medium-term income projections.[11] However, new arrangements expected with a high degree of probability could also be taken into account.

24. **Figure 4 illustrates the properties of the proposed measure.** Compared with actual credit outstanding, the proposed measure would have provided an earlier and stronger signal on the need to increase the reserve target during the current crisis. When compared with a possible measure based solely on projections, the proposed measure would have suggested a more moderate increase in credit outstanding, though it would tend to work in the opposite

[10] From August 1985 to July 2010, the average share of the largest single credit exposure to credit outstanding has been below 30 percent during 248 months (83 percent of the time), below 25 percent during 184 months (61 percent of the time), and below 20 percent during 88 months (29 percent of the time). Excluding periods of low credit, e.g. considering periods when credit outstanding is greater than SDR 20 billion, the average share has been below 30, 25, and 20 percent some 94, 70, and 34 percent of the time, respectively.

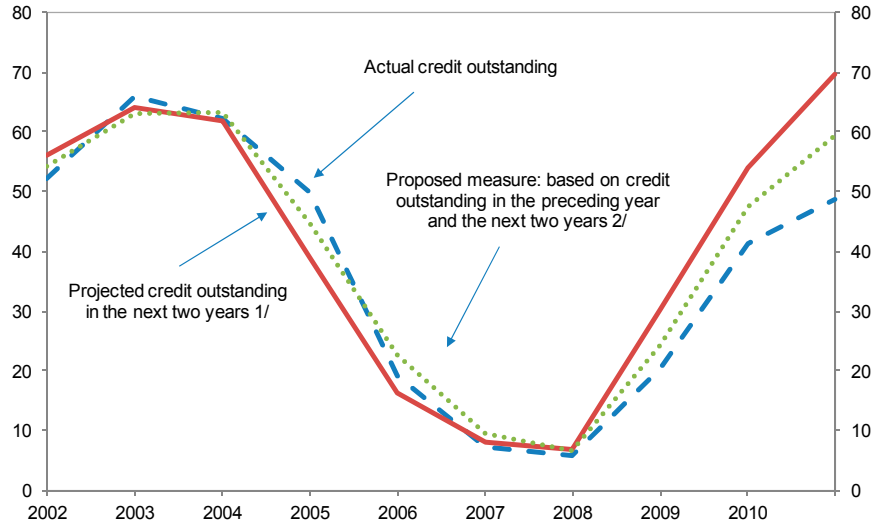
[11] A two-year projection horizon is also considered preferable to shorter or longer horizons. A shorter projection horizon would provide very limited forward looking element, while extending the projection horizon would introduce a systematic downward bias if no allowance is made for new arrangements approved during the projection horizon, while the existing stock continues to generate repurchases until it is exhausted.

Table 5. Considerations Bearing on the Fund's Need for Precautionary Balances

Factor of Method	Characteristics or Results	Implications for the Fund
Comparison with MDBs		
Credit concentration	Overall concentration similar to the regional MDBs, but higher geographic diversification	Precautionary balance needs between capital needs of regional MDBs and the IBRD
Core mandate	The Fund lends predominantly in crisis, while the MDBs lend to finance longer term development needs	Higher and more variable precautionary balance needs
Range of borrowers	The Fund lends only to its sovereign members, part of the MDBs' lending is not sovereign-guaranteed	Lower precautionary balance needs than MDBs' capital needs
Source of resources	All Fund financing comes from official sources, the MDBs also borrow from the markets	No clear implication for the level of required precautionary balances, but official creditors are likely to tolerate larger variability of precautionary balance adequacy, if this is needed for the Fund to perform its mandate
Volatility of demand	The demand for Fund resources is more volatile than demand for MDB loans	More variable precautionary balance needs in nominal terms
The Fund's past practices	Actual and targeted precautionary balances have on average been lower in relation to credit outstanding than corresponding measures for MDBs	Past precautionary balance needs below capital needs of the MDBs Precautionary balance target higher than 15 percent of credit outstanding Desirable to cover the largest single exposures which have averaged 27 percent of total credit outstanding over the past 25 years
The Fund's evolving financing role	Demand for Fund resources is likely to become even more volatile, increased importance of contingent financing	Variability of precautionary balance needs in nominal terms likely to increase further, while the means of building up reserves remains largely unchanged, consequent need to build reserves more proactively, higher reserves relative to a typical level of credit outstanding
Quantitative methods		
Basel II standard approach	Not well-suited for the Fund's volatile and concentrated portfolio	Implied average precautionary balances to credit during FY 1998 –FY 2010: 14 percent
Basel II internal-ratings-based approach	More applicable to the Fund but assumes infinite granularity and fails to account for credit concentration	Implied average precautionary balances to credit during FY 1998 –FY 2010: 22 percent
Credit Risk+	The Fund's very high credit concentration is likely to bias capital requirements upwards as the model is calibrated for less concentrated portfolios	Implied average precautionary balances to credit during FY 1998 –FY 2010 -the Bernoulli distribution: 39 percent -the Poisson approximation: 48 percent

direction when credit is declining. In general, and assuming no systematic bias in the projections, the proposed measure would have a smaller range of fluctuation than the two alternative measures shown in Figure 4.

Figure 4. Alternative Credit Measures, FY 2002-2010 1/
(In SDR billions)



Source: IMF Finance Department
1/ Data for projected credit outstanding for periods before FY 2010 was constructed using projected repurchases for the subsequent two financial years as of the end of each financial year, and assuming that disbursements of balances available under each non-precautionary arrangement would be phased evenly during the remainder of the arrangement. Forward-looking projections of average credit outstanding in FY 2011-12 are based on scheduled repurchases and scheduled purchases under non-precautionary arrangements. Latest data is for end-July 2010.

Undrawn balances under precautionary arrangements

25. **The increased importance of contingent financing raises the question of how to treat commitments under precautionary arrangements.**[12] Currently, about 36 percent of the Fund's total commitments to its members are under precautionary arrangements that are not expected to be drawn, mostly under the FCL. Reforms of the Fund's lending toolkit currently under discussion could further increase the role of such contingent financing in future. This raises the possibility that Fund disbursements could increase sharply, for example if contagion from a common shock resulted in simultaneous drawings under a number of precautionary arrangements. As a result, the reserve target could quickly become outdated.

[12] Precautionary arrangements in this paper refer to possible purchases under arrangements that are currently treated as precautionary, including FCL arrangements.

26. **Inclusion of precautionary arrangements in the calculation of the target range would require assigning a weight to the probability that they may be drawn.** However, as discussed in Box 3, the historical experience with drawings under precautionary arrangements is low, and applies to traditional Fund stand-by arrangements, with only very limited experience available to date on the potential for drawings under FCL arrangements (and none on behavior under potential new instruments like the "Precautionary Credit Line" that are currently being considered by the Executive Board). Using this experience to calculate a "credit equivalent" for commitments under precautionary arrangements would yield a relatively small number, and have only a modest impact on the target range, unless a higher probability was assigned to such drawings in future.

27. **Given the limited experience with new contingent financing instruments to date, it is not proposed to explicitly include them in the framework at this stage.** Rather, the extent of commitments under such arrangements would be one of the considerations taken into account by the Board when adjusting the precautionary balances target. For example, if Fund credit fell sharply but there were still substantial commitments under FCL arrangements, there may be a case for maintaining the target or not reducing it to the full extent indicated by the fall in credit. Similarly, if there were large unexpected drawings under FCL arrangements such that the target for precautionary balances was no longer adequate, the Board may wish to advance the next review and raise the target. As experience is gained with these types of precautionary instruments, staff may propose further modifications to the framework to set the precautionary balances target that more directly take into account the experience under such new instruments.

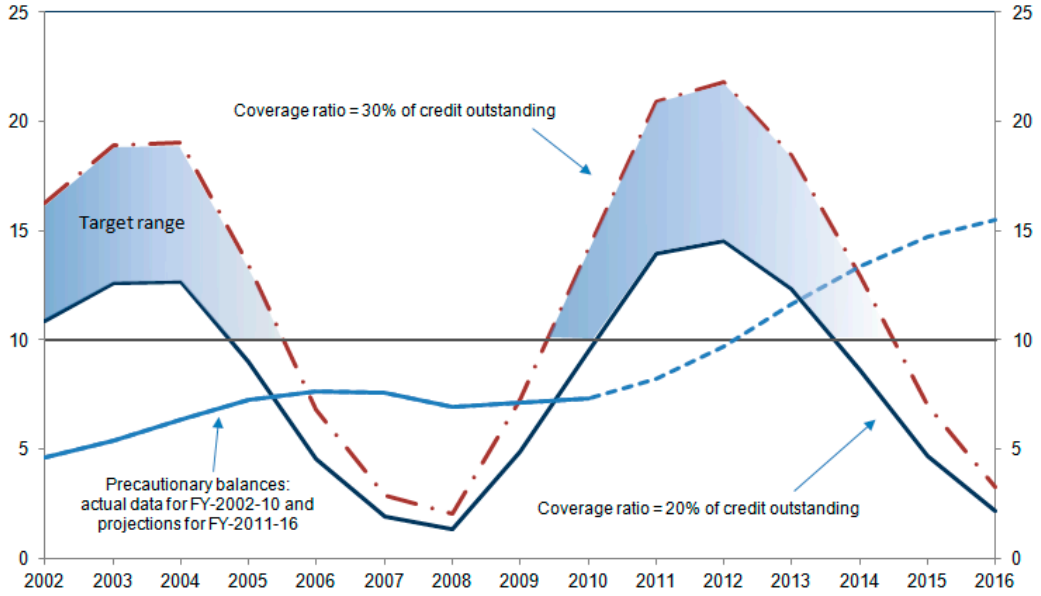
Minimum floor

28. **The framework should also incorporate a minimum floor for the target.** It is possible that Fund credit will again fall to very low levels such as those immediately prior to the crisis. In these circumstances, it would not be appropriate to also reduce the target to very low levels for two reasons. First, as noted above, in addition to protecting against credit risks, precautionary balances represent an important source of Fund income. When the new income model was approved, it was estimated that precautionary balances of SDR 6.5 billion would be needed to ensure a sustainable income position once the new model was fully in place. Second, Fund credit is highly volatile and can increase sharply whereas it takes considerable time to rebuild precautionary balances. Thus, the target needs to include some buffer to protect the Fund against an unexpected rise in credit and credit risks.

29. **One possibility would be to set the floor at the level of precautionary balances assumed in the new income model**. However, this would provide only a limited buffer to deal with an unexpected increase in credit risks. For example, based on the proposed target range, a floor of SDR 6.5 billion could support lending of SDR 22–33 billion. This is below the historical 10-year average of Fund credit outstanding, which has fluctuated in the SDR 30–50 billion range (Figure 1). Staff proposes that the minimum floor for the target be

set initially at SDR 10 billion. This is broadly in line with the current historical 10-year average of credit outstanding and also consistent with the Fund's practices over the past decade, when a target of SDR 10 billion has been maintained despite substantial fluctuations in actual credit outstanding. It is further proposed that the floor be kept under review and possibly adjusted in future in light of longer-term trends in Fund lending.

Figure 5. Target Range for Precautionary Balances with a Built-In Floor
(In SDR billions)



Source: IMF Finance Department

30. **Table 6 and Figure 5 illustrate the application of the above framework to historical data.** It would have pointed to a moderately higher target for precautionary balances in the FY 2002–05 period, when Fund lending was near previous peaks, whereas the floor would have applied during the FY 2006–09 period. As discussed in the next section, the framework currently points to an increase in the target.

Table 6. Target for Precautionary Balances with a Built-In Floor
(In SDR billions)

As of End		Credit Outstanding 1/	Proposed Measure for Credit Outstanding 2/	Coverage for Credit Outstanding 3/		Higher of Mid-point of bounds or Minimum floor of SDR 10 billion
				Lower Bound	Upper Bound	
				20%	30%	
FY-2002		51.2	54.2	10.8	16.3	13.5
FY-2003		61.6	63.0	12.6	18.9	15.7
FY-2004		66.5	63.3	12.7	19.0	15.8
FY-2005		56.1	44.8	9.0	13.4	11.2
FY-2006		34.2	22.6	4.5	6.8	10.0
FY-2007		11.7	9.5	1.9	2.8	10.0
FY-2008		6.6	6.7	1.3	2.0	10.0
FY-2009		13.1	24.3	4.9	7.3	10.0
FY-2010	4/	35.2	47.4	9.5	14.2	11.9
July 2010	***4/***	48.6	59.5	***11.9***	***17.8***	14.9
FY-2011		57.3	69.8	14.0	20.9	17.4
FY-2012		75.9	72.6	14.5	21.8	18.1
FY-2013		78.2	61.6	12.3	18.5	15.4
FY-2014		63.5	43.1	8.6	12.9	10.8
FY-2015		41.3	23.3	4.7	7.0	10.0
FY-2016	5/	21.9	10.9	2.2	3.3	10.0

Source: IMF Finance Department

1/ Average credit during the financial year; projections for 2011 - 2016.
2/ Three-year average based on one-year of backward looking data and projections two-years forward.
3/ The lower and upper bound correspond to 20 percent and 30 percent coverage for the credit measure, respectively.
4/ No further drawings are assumed under Hungary's Stand-By Arrangement which is treated as precautionary.
5/ From end-FY 2016 onwards, credit outstanding is assumed to be SDR 5 billion.

IV. Assessment of the Adequacy of Precautionary Balances

31. **This section uses the above framework to assess the precautionary balances target.** It also reviews a range of other considerations, including alternative scenarios for Fund lending and stress tests of the capacity of the burden sharing mechanism to protect the Fund's financial position against the effect of overdue obligations. Based on this analysis, the staff proposes that the precautionary balances target be increased to SDR 15 billion. The implications of this proposal for the pace of reserve accumulation are also discussed.

32. **Application of the above framework points to a range for the precautionary balances target of SDR 12–18 billion.** Average annual credit outstanding is expected to continue to increase in the next two years, peaking at over SDR 78 billion in FY 2013, which would represent a new high.[13] This assumes full disbursements under all non-precautionary arrangements approved to date, but does not make any allowance for drawings under existing precautionary arrangements or for new arrangements. The Fund's existing commitments under precautionary arrangements total SDR 52 billion, implying the potential for a further sharp increase in Fund credit outstanding in the event of drawings under one or more of these arrangements.

33. **The global economic outlook also remains uncertain.** The most recent WEO update in July noted that somewhat stronger growth was projected for 2010 but the projection of moderate growth in 2011 was unchanged and downside risks had risen sharply amid renewed financial turbulence. While the global recovery was expected to continue, the increased downside risks to the outlook highlight the potential for additional countries to seek financial support from the Fund in the period ahead.[14]

34. **Projected increases in individual exposures also point to the need for a higher precautionary balances target.** The Fund's largest individual credit exposure is currently SDR 9 billion to Romania, but if purchases under existing arrangements take place as planned, the Fund would in the next two years have exposures to three counties (Greece, Ukraine, and Romania) in excess of the current target of SDR 10 billion, and two further exposures in excess of SDR 5 billion.[15] The largest individual exposure (Greece) would peak at SDR 26.4 billion at end FY 2013.

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[13] The previous highest annual average for GRA credit outstanding was SDR 66.5 billion in FY 2004.

[14] For example, the Fund indicated in May that it stands ready to support its European members' individual adjustment and recovery programs through the design and monitoring of economic measures as well as through financial assistance, when requested, in conjunction with the new European Stabilization Mechanism (see *IMF Welcomes European Actions to Stabilize Euro Area* (PR No. 10/188, 5/9/10)).

[15] The Hungarian authorities have indicated that they do not plan to make further drawings under the SBA.

35. **In addition, the capacity of the burden sharing mechanism to protect the Fund's financial position against overdue obligations is currently very low.**[16] The burden sharing mechanism provides a first line of defense against the impact on the Fund's income of unpaid charges. The capacity of the burden sharing mechanism normally increases with a rise in credit outstanding. However, as discussed in more detail in Annex III, it is currently constrained by the unusually low SDR interest rate (also the use of borrowed resources in financing Fund lending dampens the impact of higher lending on the capacity of the mechanism to absorb unpaid charges). Currently, if any of the Fund's seven largest exposures were to go into arrears, the resulting deferred charges could not be fully covered by burden sharing.[17] Annex III presents additional stress tests that illustrate the limits of the mechanism to absorb losses, even with a significant rise in the SDR interest rate.

36. **Table 7 presents three alternative scenarios for Fund lending:**

- Under the current **baseline scenario**, as noted credit peaks at SDR 78 billion, implying that the current SDR 10 billion target would represent only 13 percent of total credit and fall significantly short of the average large exposure. At current interest rates, the maximum burden sharing capacity would only be able to absorb a fraction of the potential unpaid charges if one of the largest credits went into arrears, leaving a residual loss of the order of SDR 240 million (equivalent to roughly one-third of the Fund's administrative budget). Put differently, in the baseline scenario, the current capacity would be exhausted if only 2.4 percent of total loans went into arrears at current interest rates.

- In a **favorable scenario**, where global economic conditions improve more rapidly than anticipated, members with non-precautionary arrangements may draw less than the full amounts available under their arrangements and GRA debtors may make advance repurchases. In this scenario average credit is assumed to peak at about SDR 60 billion; the current target for precautionary balances would be 17 percent of credit outstanding, still below the lower bound of the proposed coverage ratio. Even in this more favorable scenario, the scope to absorb unpaid charges would remain limited, especially if the SDR interest rate stays close to its current record lows.

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[16] The total capacity of the burden sharing mechanism to cover unpaid charges is the sum of the maximum feasible reduction in remuneration expenses and the maximum feasible increase in income from charges. The requirement in the Articles of Agreement that the rate of remuneration be no less than 80 percent of the SDR interest rate limits the maximum reduction in remuneration expenses to: *0.2 * SDR Interest Rate * Remunerated Reserve Tranche Positions.* For more details, see Annex III.

[17] Decision No. 12189-(00/45) (April 28, 2000) limits the maximum reduction to 85 percent of the SDR interest rate (see also Decision No. 13707-(06/40), April 28, 2006). The floor for remuneration could be reduced to 80 percent by a majority of 70 percent of total voting power (Article V, Section 9). As of end-July 2010, the Fund's unused burden sharing capacity, assuming the currently applicable 85 percent floor on the rate of remuneration, was about SDR 25 million.

Table 7. Illustrative Scenarios: Implications for Burden Sharing and Precautionary Balances

	Scenario A "Favorable"	Scenario B "Baseline"	Scenario C "Adverse"
A. Peak credit outstanding (SDR billions)	60	78	150
B. Precautionary balances (PBs) to credit outstanding (in percent) if PBs at:			
SDR 10 billion	17	13	7
SDR 15 billion	25	19	10
C. Average large exposure (SDR billion) 1/	10	12	15
D. Precautionary balances (PBs) to average large exposure (in percent) if PBs at:			
SDR 10 billion	100	83	67
SDR 15 billion	150	125	100
E. Potential income loss from charges in arrears on average large exposure (SDR millions) at SDR interest rate of: 2/			
0.25 percent	250	290	370
0.75 percent	300	350	440
1.50 percent	370	440	560
F. Maximum burden sharing capacity when credit for which charges are not being paid equals average large exposure (SDR millions) at SDR interest rate of: 3/			
0.25 percent	40	50	80
0.75 percent	110	140	240
1.50 percent	220	270	490
G. Difference between burden sharing capacity and potential income loss when credit for which charges are not being paid equals average large exposure (SDR millions) at SDR interest rate of:			
0.25 percent	-210	-240	-290
0.75 percent	-190	-210	-200
1.50 percent	-150	-170	-70
H. The share of credit in arrears in total credit outstanding that would exhaust burden sharing capacity (percent) at SDR interest rate of:			
0.25 percent	2.7	2.4	2.3
0.75 percent	6.6	6.0	5.6
1.50 percent	10.3	9.3	8.8

Source: IMF Finance Department

1/ Based on illustrative assumptions for the average size of five largest borrowers.
2/ Calculations assume the currently applicable basic margin of 100 basis points and an average surcharge of 120 basis points, corresponding roughly to average surcharge for credit outstanding in FY 2011–13. Figures rounded to the nearest multiple of ten.
3/ Based on creditors' contribution of 20 percent of the SDR interest rate and assuming that 50 percent of credit in excess of SDR 30 billion is financed by borrowed resources. The calculations take into account that some burden sharing capacity is lost due to nonpayment of burden sharing adjustments by members in arrears. Based on remunerated reserve tranche positions as of end-FY 2010. Figures rounded to the nearest multiple of ten.

- In an **adverse scenario**, market conditions could deteriorate substantially, leading to a more severe sovereign debt crisis and significant additional demand for Fund credit. If credit outstanding were to peak at about SDR 150 billion, i.e., close to twice the baseline, the precautionary balances coverage based on the existing target would be only about 7 percent of credit outstanding. Potential unpaid charges in this scenario after maximum use of the burden sharing mechanism could amount to close to half of the Fund's administrative budget.[18]

37. **Application of the Basel II framework and Credit Risk+ model potentially provides a further perspective.** As noted, such approaches are designed for much more diversified portfolios, but they may provide another input into the overall assessment of reserve adequacy. Annex II updates the analysis presented in previous papers and also provides illustrative stress tests based on the above three scenarios. While the results vary widely, three out of the four methods used suggest that precautionary balances of SDR 10 billion would be insufficient even under the baseline scenario and without any deterioration in credit quality. Moreover, if lending were to expand more than anticipated and/or if average quality of the Fund's credit portfolio were to deteriorate significantly, even the mid-point of the proposed target range, i.e., SDR 15 billion, might not provide sufficient reserve cover.[19] The Basel II IRB approach, which seems most applicable to the Fund, suggests that when credit peaks, appropriate capital charges could range from SDR 12 billion (assuming no deterioration in credit quality of the Fund's credit portfolio) to SDR 22 billion (if the credit quality were to deteriorate to the historical low).

38. **The Basel II framework also provides a possible framework for considering market and operational risks.** As noted, these are currently considered to be modest for the Fund, and the resulting illustrative capital charges reported in Annex II are small and do not affect the overall assessment of reserve adequacy. However, these estimates will need to be revisited in future in light of the outcome of discussions on broadening of Fund's investment mandate.

39. **Based on the above, staff proposes that the precautionary balances target be raised to SDR 15 billion.** This corresponds to the mid-point of the SDR 12–18 billion range under the proposed new framework. Such an increase would reflect the sharp increase in

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[18] Relative to the baseline, peak credit outstanding in the adverse scenario would imply additional drawings of SDR 72 billion which could reflect a combination of new non-precautionary arrangements and drawings under arrangements that are currently precautionary. For the sake of illustration, this additional amount would correspond to members representing 3.3 percent of total Fund quotas having a drawing arrangement at an average access of 1,000 percent.

[19] These stress tests suggest that the main driver of changes in capital charges tends to be change in the size of the loan portfolio, although variations in country level default risks could also have similarly large impact under extreme circumstance in which downgradings are large and affect the bulk of the credit portfolio.

Fund lending during the crisis, including expected future purchases under existing non-precautionary arrangements. It would also take account of the sharp increase in commitments, and build in a buffer to handle unexpected increases in lending associated with either drawings under the existing FCL arrangements or potential new lending in light of the uncertain global economic outlook. It would also provide more adequate coverage of the largest projected individual exposures (while falling short of the largest single exposure expected over the next three years), and take account of the current very limited capacity of the burden sharing mechanism to absorb overdue obligations.

40. **In communicating the proposed increase in the target, it would be important to stress that the overall quality of the Fund's credit portfolio remains high.** Precautionary balances remain comfortable relative to the existing level of GRA principal arrears (SDR 0.3 billion) and no concerns have arisen with members having difficulty servicing their obligations to the Fund in the wake of the crisis to date. Thus, the increase in the target is intended as a purely precautionary measure in response to the sharp increase in Fund credit and commitments to its members since the last review.

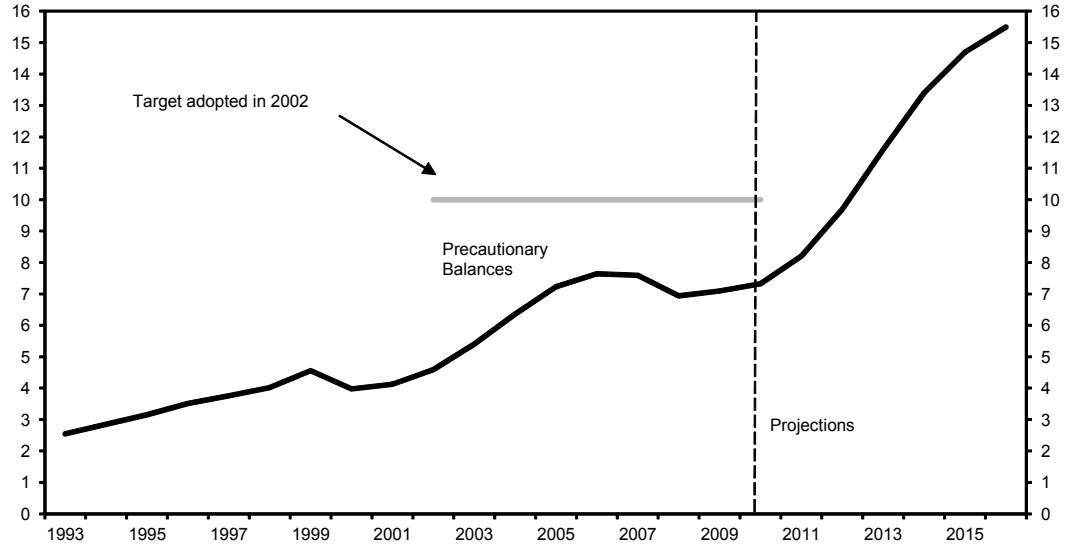
41. **It is also appropriate to review whether the expected pace of reserve accumulation is adequate in light of the higher target.** Under the new income model, the margin for the basic rate of charge is to be set in a stable and predictable manner, and should cover the Fund's intermediation costs and contribute to a buildup of reserves. Surcharges over the basic rate of charge help accelerate reserve accumulation while discouraging large and prolonged access; and the Board has decided to resume the practice of placing surcharges directly to reserves in FY 2011.

42. **Current projections point to a significant acceleration in the pace of reserve accumulation in coming years under existing policies.** The current SDR 10 billion target for precautionary balances could be reached in about two years, and the proposed SDR 15 billion target could be reached by end FY 2016 (Figure 6, Panel A). These projections assume no changes in the structure of surcharges or the margin for the rate of charge, that all scheduled drawings under non-precautionary arrangements are made, and that there are no advance repurchases. In practice, it is likely that not all scheduled purchases under existing arrangements will be made, and there could also be significant advance repurchases given the incentives for early repayment on large access loans built into the time-based surcharges, and assuming the global economic recovery continues.

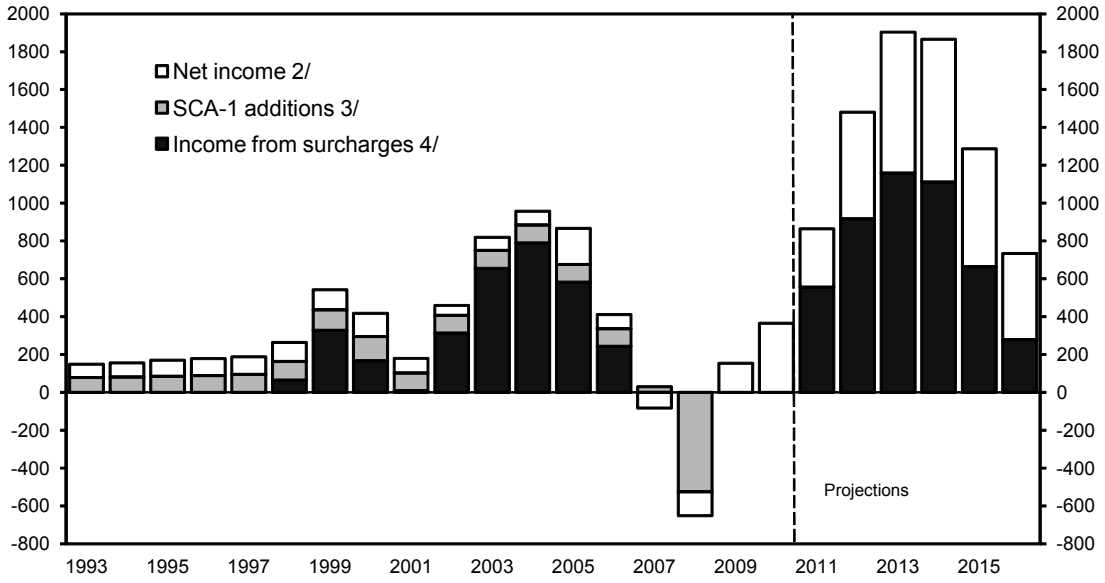
43. **Staff considers that the projected pace of reserve accumulation is adequate and no policy changes are needed at this stage.** As noted, precautionary balances remain comfortable relative to existing arrears. Moreover, the pace of reserve accumulation is already expected to accelerate significantly. While precautionary balances are projected to remain below the proposed 20 to 30 percent range for the coverage ratio until FY 2014, they would quickly rise above it in subsequent years (Figure 7), potentially leading to a situation

Figure 6. The Fund's Precautionary Balances, FY 19932016

A. Actual and Forecasted Precautionary Balances, FY 1993 - FY 2016
(In SDR billions, financial year)

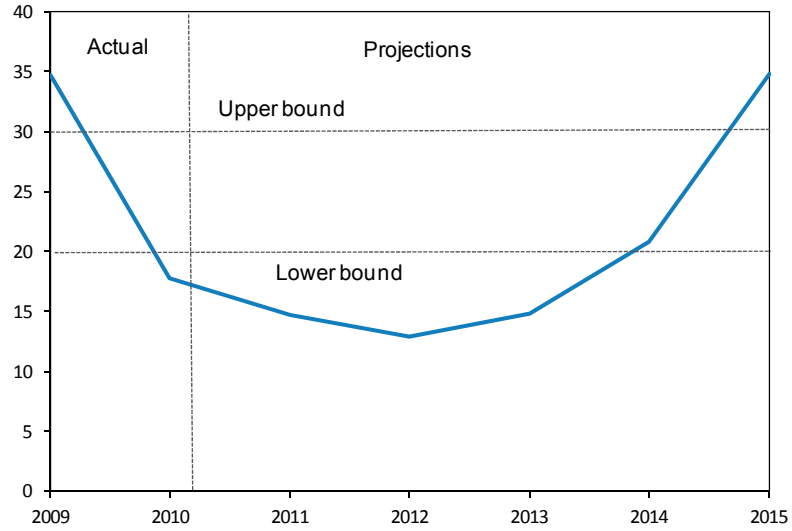


B. Additions to Precautionary Balances, FY 1993 - FY 2016 1/
(In millions of SDRs, financial year)



Source: IMF Finance Department
1/ Excludes changes in SCA-2 balances in FY1993-2000.
2/ In FY 2000-06, additions to Special Reserves were adjusted for IAS 19 related accounting gains; in FY 2010 addition to Special Reserves exclude profits from gold sales.
3/ SCA-1 accumulations were suspended from November 2007. In FY 2008, SDR 525 million was distributed to contributors.
4/ Net of costs associated with administering PRGF-ESF operations for the period FY 1998 – FY 2006. In FY2007-10, surcharges were used to help cover administrative expenses, rather than placed directly to general reserves.

Figure 7. Precautionary Balances to Credit, FY 2009–15
(In percent)



Source: IMF Finance Department

in which consideration could be given to the payment of a dividend, as envisaged under the new income model. Moreover, considerable uncertainty remains over the outlook for Fund lending in light of the uncertain global economic outlook and the planned further reforms of the Fund's lending toolkit. For these reasons, it is proposed that no changes to the policies affecting the pace of reserve accumulation be considered at this stage, but that the situation should be kept under close review.

V. Conclusions and Issues for Discussion

44. **This paper reviews the adequacy of precautionary balances and proposes a more rules-based framework for adjusting the target over time.** The proposed approach is intended to increase the transparency of decisions on the target and provide greater guidance on the need for adjustments, while at the same time avoiding a mechanistic approach and leaving scope for Board discretion in light of a broad assessment of the financial risks facing the Fund. It is envisaged that the framework will continue to be refined in light of experience, including with precautionary financing and also taking account of the envisaged broadening in the Fund's investment mandate.

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

- How do they assess the adequacy of the Fund's precautionary balances, and do they support the proposed increase in the target to SDR 15 billion?

- Do they support the proposed rules-based framework under which the target would be broadly maintained within a range of 20–30 percent of total credit, subject to a minimum floor of SDR 10 billion?

- Do they agree that commitments under precautionary arrangements should not be explicitly built into the framework at this stage but rather taken into account when setting the target itself, pending further experience with the Fund's new contingent financing mechanisms?

- Do they agree that the current projected pace of reserve accumulation remains adequate, but should be kept under close review?

Box 1. The Composition of the Fund's Precautionary Balances

The Fund's precautionary balances comprise retained earnings held in the Fund's general and special reserves and the Special Contingent Account (SCA-1). Reserves are available to absorb financial losses, including credit or income losses:

Special Reserve. It was established in 1957 and was initially funded by the proceeds from a gold investment program set up to address the deficits accumulated from annual losses the Fund suffered from its inception to April 1956. Income from the investment program was placed to the special reserve and some SDR 0.4 billion had been raised when the program was terminated in 1972. The Board also agreed in 1957 when the reserve was established that any administrative losses would first be written off against the special reserve. The special reserve is therefore the first line of defense against income losses.[1] In symmetric fashion, the Fund's annual net operational income has been placed to the special reserve since the termination of the gold investment program. Under the Fund's Articles, no distributions (dividends) can be made from the special reserve.

General Reserve. In 1958, it was decided that the reserve contemplated in Article XII, Section 6(a) of the Articles, prior to the Second Amendment, would be referred to as the general reserve to distinguish it from the special reserve. Net operational income was placed to this reserve while the gold investment program was active, i.e., during FY 1958–72, as the Fund had returned to profitability from its operations. The purpose of the general reserve is to absorb capital losses and to meet administrative losses. Reserves accumulated in the general reserve may be distributed to members, in proportion to their quota, if the Board approves such decision by a 70 percent majority of the total voting power. Further placements of resources were made to the general reserve in FY 1998 to FY 2006 as follows: net operational income generated under the Supplemental Reserve Facility (SRF), after meeting the cost of administering the PRGF Trust (FY 1998–2001); and surcharges on purchases under the SRF, credit tranches and EFF (FY 2002 to FY 2006). During FY 2007–2008, the Fund experienced net income shortfalls and subsequently, the Board agreed to resume the practice of placing surcharge income in the General Reserve in FY 2011.

The SCA-1 is held to protect the Fund against the risk of losses arising from the ultimate failure of a member to repay its overdue principal obligations in the GRA:

Special Contingent Account (SCA-1). Set up in 1987 with the specific purpose to protect the Fund against the risk of a loss resulting from the ultimate failure of a member to repay its overdue principal obligation in the GRA. The SCA-1 has primarily been funded through burden sharing contributions generated equally from debtors and creditors through adjustments to the rates of charge and remuneration, respectively.[2] During FY 1988–2000, an annual amount equal to 5 percent of reserves was placed to the SCA-1, and in FY 2001–06, annual amounts of SDR 94 million representing the income effect on the Fund from the receipt of gold, rather than currencies, in the repurchases associated with the off-market gold transactions in 1999/2000. SCA-1 accumulations were suspended effective November 1, 2006. In March 2008, a partial distribution of SDR 0.5 billion was made in the context of financing Liberia's debt relief and arrears clearance. The accumulated balances in the SCA-1 are to be distributed when there are no outstanding overdue obligations or earlier should the Fund decide to do so. The latter category of decisions to distribute SCA-1 balances require a 70 percent majority of the total voting power.

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[1] Executive Board Decision No. 708-(57/57). This decision has been applied in the financial years the Fund has since suffered a loss covering some SDR 342 million in losses, i.e., FY 1972–77 (SDR 103 million), FY 1985 (SDR 30 million), and FY 2007–8 (SDR 209 million).

[2] In FY 1987, the SCA-1 was initially funded from GRA income in excess of the target for the financial year.

Box 2. Precautionary Balances Help Safeguard the Fund's Financing Mechanism

Fund lending is based on an exchange of reserve assets. Members whose currencies are used in the Fund's lending are selected through a quarterly assessment that their balance of payments and reserve position are sufficiently strong for inclusion in the Financial Transactions Plan (FTP). Use of the Fund's holdings of these currencies in lending operations results in FTP members receiving, in exchange, a liquid claim on the Fund (reserve tranche position) that earns interest based on the SDR interest rate.

Fund reserve positions, which are part of members' reserve assets, must be fully liquid and readily available for use, if needed.[1] The Fund's *Balance of Payments and International Investment Position Manual Sixth Edition* (BPM6) defines reserve assets as "those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes …" To be readily available, reserve assets generally should be of high quality.[2]

The Fund's prudent liquidity management helps safeguard the creditors' claims. In assessing its liquidity, the Fund sets aside a prudential balance as an uncommitted liquidity buffer, set at 20 percent of the quotas of members that participate in the FTP and any amounts activated under GAB/NAB or otherwise made available under bilateral borrowing or note purchase agreements. The prudential ratio of 20 percent reflects historical experience and judgments on the indicative level of uncommitted usable resources that the Fund would normally not use to make financial commitments. It does not represent a rigid minimum and available Fund resources could on a temporary basis, fall below this level.

Precautionary balances strengthen the Fund's balance sheet and help assure the value of members' reserve positions. Fund financial assistance can result in large exposures and high credit concentration which are the inevitable consequence of the Fund's mandate to be responsive to members' balance of payments needs. Lending policies such as conditionality, access limits and the exceptional access framework, policies on charges and maturities, and safeguards assessments provide a multilayered framework, together with the Fund's de facto preferred creditor status, to mitigate the risk of arrears. Nonetheless, some residual credit risk remains, especially as borrowers may be subject to further shocks. Precautionary balances serve as a buffer against the financial consequences of such residual credit risks, helping assure that members' reserve positions remain of high quality and readily available to meet members' balance of payments needs even under adverse circumstances.

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[1] Members' reserve positions in the Fund are the sum of the reserve tranche, which reflects the reserve assets that the member has provided to the Fund under its quota-based obligations and use of the member's currency in the Fund's lending operations, plus any indebtedness of the Fund in the General Resources Account that is readily available to the member for meeting balance of payments financing needs.

[2] See BPM6, Chapter 6, paragraphs 6.64 and 6.70.

Box 3. Experience with Drawings under Precautionary Arrangements

Experience suggests that the probability of a drawing under precautionary arrangements is generally relatively low. On average, only about 4 percent of amounts available under precautionary arrangements were drawn between 1994 and 2009. There have been no drawings under precautionary arrangements during the current crisis, although this experience is limited to a small number of arrangements.

This experience might indicate that limited precautionary balances are needed in relation to precautionary arrangements. One approach would be to convert amounts available under precautionary arrangements to "credit equivalents" using historical data on drawings under precautionary arrangements. Assuming, for example, a reserve coverage ratio for projected credit outstanding of 25 percent and the historical 4 percent drawing probability under precautionary arrangements, this would suggest that the targeted reserve coverage should be about one percent (0.25*0.04=0.01) of undrawn balances under precautionary arrangements.

However, historical average experience with drawings may offer limited guidance as to a prudent allowance in relation to precautionary arrangements. In view of recent facilities reforms, especially the introduction of the FCL, the extent to which past drawings under precautionary arrangements can serve as a guide to the future is unclear. Moreover, if a drawing is needed, it may well reflect common factors such that a large portion of precautionary commitments are drawn in a brief period.

Annex I. Overview of other IFIs' Capital Adequacy Policies and Practices

This Annex summarizes the capital adequacy practices followed by selected International Financial Institutions (IFIs). The institutions reviewed are the International Bank for Reconstruction and Development (IBRD), the Inter-American Development Bank (IDB), and the Asian Development Bank (ADB).

Key themes include the following:

- Credit risks are considered to be the most significant financial risks facing the IFIs;
- Loan portfolios are generally concentrated, especially in the regional development banks that do not apply individual country exposure limits;
- Provisions are made to cover expected losses on loan and guarantee portfolios, but these are small in relation to equity (paid-in capital and reserves) that is the main source of protection against unexpected losses;
- Metrics to assess capital adequacy are forward-looking and typically involve ten-year projections and stress tests;
- While the ADB and IDB have moved away from using a target threshold for the equity-to-loans ratio as the main indicator of capital adequacy, this variable is still closely monitored, including by market participants and ratings agencies.

The International Bank for Reconstruction and Development (IBRD)

The risk that a significant proportion of its loan portfolio may go into extended arrears is recognized by the Bank as the most significant financial risk it faces and almost all of the IBRD's equity capital is held against this risk.[20] Credit risk is measured in terms of both probable and unexpected losses from protracted payments arrears. Probable losses are covered by accumulated provisions for losses on loans (including loans with a deferred drawdown options, DDOs), and guarantees, which are determined using internal credit ratings assigned to each borrower. Unexpected losses are covered by income-generating capacity and equity. For the latter, the IBRD assesses capital adequacy using an equity-to-loans ratio and a framework of income-based stress testing.

[20] *Information Statement* filed with the U.S. Securities and Exchange Commission.

The IBRD's current target range for the equity-to-loans ratio is 23 to 27 percent.[21] This range was established in 2008 under Bank's Strategic Capital Adequacy Framework. Historically, the IBRD has generally taken actions to augment is capital adequacy (capital increases or loan price increases instituted in lieu of capital increase) when the equity to loans ratio has fallen below 23 percent. Income-based stress tests, whose scale reflected the highest historical projected credit shock in the previous ten years and the average projected shock over the same period, were also used to determine the appropriate target range. The Framework envisages that when the ratio approaches or falls below the bottom of the target range, a capital review would be conducted to consider options to restore the ratio to the target range via limiting transfers, adjusting loan prices, limiting risk-taking, considering capital increases, and in cases of very low ratio, constraining loan growth. Conversely when the ratio stays above the top of the range, consideration could be given to extra loan growth, additional transfers, loan price reduction and other risk-taking initiatives. The equity-to-loans ratio has ranged from 31.4 percent to 34.5 percent from FY 2005 to FY 2009, and was 29.4 percent at the end of FY 2010.[22] In light of the rapid increase in loan demand since the outbreak of the global financial crisis and the resulting pressure on the equity-to-loan ratio, management and shareholders have worked together and taken a number of measures to enhance IBRD's capital. The package of measures included a total capital increase of $86.2 billion, including $5.1 billion in paid-in capital, higher loan pricing, reform of loan maturity terms, continued budget discipline, and working with relevant member countries to convert additional existing capital that is not fully usable into fully usable risk capital.[23]

The framework of stress testing assesses the Bank's capacity to (i) absorb the income loss due to a credit shock, and (ii) support loan growth in the following years. The first requirement on shock absorption is designed to reduce the probability of having to rely on additional shareholder support (in terms of additional paid-in capital or a call on callable capital). This is intended both to protect shareholders and to support IBRD's credit standing, which reduces borrowing costs and correspondingly, lending rates for borrowers. The second

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[21] Equity as used in the equity-to-loans ratio is comprised of usable paid-in capital (adjusted for restricted elements and net maintenance of value), Special and General Reserves, a cumulative translation adjustment for currency movements, the cumulative income earned on long term investment assets adjusted by the drawn amount, and an adjustment for the underfunded status of IBRD's pension plans, if any. Loans include the sum of loans outstanding, the present value of guarantees, effective but undisbursed DDOs, and long-term investment assets, net of relevant accumulated provisions (including DDOs) and deferred loan income. Long-term investment assets and their cumulative income have been included in the ratio since FY 2009. The ratio is computed on both a reported and fair value basis.

[22] The equity-to-loan ratio on a reported basis declined to 29.4 at the end of FY 2010 from a peak of 37.6 at the end of FY 2008, largely due to an increase in the loan portfolio.

[23] The capital increase is in the process of seeking formal Board of Governor approval with a current deadline of September 10, 2010.

requirement reflects the need to maintain the capacity to continue lending. The stress testing is typically conducted over a 10 year forecast period, using a range of credit shocks and a central assumption 3 percent annual growth in the loan portfolio.

Credit risks are also mitigated by limits on total lending and individual exposures. Total loans outstanding, participations in loans, and callable guarantees may not exceed the sum of subscribed capital, reserves and surplus. The Bank's exposure to a single borrowing country is restricted to the lower of an Equitable Access Limit (equal to 10 percent of subscribed capital, reserves and unallocated surplus) and the Single Borrower Limit established annually by assessing its impact on the overall portfolio risk relative to risk-bearing capacity, as measured by the level of usable equity. For FY 2010, the Single Borrower Limit was $16.5 billion and the Equitable Access Limit was $21.8 billion. At the end of FY 2010, the top five borrowers accounted for 46 percent of the Bank's loan portfolio.

The IBRD derives a significant share of income from its capital and retained earnings. Income from equity contributions was 74 percent and 67 percent of total income (net of funding costs and after waivers) in FY 2008 and FY 2009, respectively.

The Inter-American Development Bank (IDB)

Under the capital adequacy framework adopted by the IBD in 2003 the equity-to-loan ratio[24] served as the IDB's main indicator of capital adequacy. This framework quantified capital adequacy with a focus on credit risk on the Bank's lending portfolio taking account of the quality and concentration of its loan portfolio. The framework set a desired level of this ratio in a range of 32 to 38 percent based on an analysis of the Bank's capital needs under various financial stress test cases. At the end of FY 2009, the equity-to-loan ratio was 34.2 percent.

In February 2010, the IDB's Board adopted a new capital adequacy framework as part of a plan to enhance the Bank's financial and risk management. The new framework covers broader risk categories including credit, market, and operational risks. The capital utilization ratio replaced the equity-to-loan ratio as the main indicator of capital adequacy and essentially indicates the minimum percentage of capital required to provide protection against each risk category. The capital utilization ratio is calculated as the sum of the capital requirements for different risks divided by the total resources available.[25] To assess the

[24] The equity-to-loans ratio is equity (defined as the sum of Paid-in capital stock, Retained earnings and the allowances for loan and guarantee losses, minus borrowing countries' local currency cash balances, net receivable from members (but not net payable to members), and cumulative net fair value adjustments on non-trading portfolios) to outstanding loans and net guarantee exposure.

[25] To provide a buffer for unanticipated shocks, the capital utilization ratio has a target range which is periodically determined via credit and market stress scenarios. As of December 31, 2009, the range was 60 to 74 percent.

amount of capital required to mitigate credit risk, simulations are performed to evaluate loans that may go into a non-accrual status. The non-accrual event is used as input in a financial model, with the constraint of no negative income over a ten-year period. For market risks related to the IDB's treasury operations, the minimum capital requirement is set at five percent of the size of the investment portfolio. The capital requirement for operational risk is expected to be about one percent of total assets.

The equity-to-loan ratio no longer drives decisions on lending capacity, but is still maintained as a summary indictor of capital adequacy. The introduction of the new framework for assessing capital adequacy was not geared to attaining a specific level or change in reserve coverage. However, the ratio is monitored and reported.[26] In the last five years the ratio has fluctuated between 40.8 percent (at end-2006) and 34.2 percent (at end-2009).

Additional safeguards to protect against credit risk include an overall limit on total amount of loans and guarantees that the Bank can provide, a policy for the treatment of non-performing loans, and the maintenance of a loan loss allowance. However, the IDB does not apply a limit on single country exposure. At end-FY 2009, 95 percent of the IDB loan portfolio was sovereign guaranteed.

The IDB's loan portfolio is fairly concentrated. The top five borrowing countries accounted for 69 percent of total loans outstanding at the end of FY 2009. This concentration is due to the regional nature of the Bank's operations and the relative sizes of the economies of its borrowing members.

The Asian Development Bank (ADB)

Credit risks are viewed as the ADB's most significant financial risk. The risks of expected losses are addressed through the establishment of provisions and reserves for loan losses. For unexpected losses, the ADB relies on its income generating capacity and capital, which is the ultimate protection against credit and other risks. However, the framework for assessing capital adequacy has changed overtime.

The ADB's risk-based capital framework, introduced in 2004, used a fixed equity-loan ratio.[27] Under this framework, the equity-to-loan ratio was established as the key measure of

[26] Management Discussion and Analysis for the quarterly financial statements, March 31, 2010, noted that "the capital adequacy position of the bank remains strong as indicated by the equity-to-loans ratio". See http://www.iadb.org/en/investors/financial-information,1248.html

[27] The equity-to-loans ratio was defined as usable paid-in capital, ordinary reserves, special reserves and surplus divided by outstanding disbursed loans and present value of guarantees.

the Bank's risk bearing capacity, such that available capital should be adequate to absorb unexpected losses on the Bank's loan and guarantee portfolios. The target equity-to-loan ratio was initially set at 35 percent in view of the high concentration of lending and the risk that adverse credit events could be highly correlated.

In June 2008, the ADB adopted an enhanced capital adequacy framework. Under the new framework, the ADB primarily uses stress testing to assess the capacity of its capital to absorb unexpected losses. The objective of the stress testing is two-fold: the framework measures the ADB's ability to (i) absorb income losses caused by a credit shock, while maintaining a reduced probability that it would have to rely on shareholder support such as additional paid-in capital or a capital call,[28] and (ii) generate sufficient income to support the growth of its loan portfolio subsequent to the credit shock, since the ADB needs to have capacity to lend in adverse conditions. The stress testing measures the impact of credit shocks on capital over a ten year horizon.

The equity-to-loan ratio is still monitored as an indicator of the ADB's capital adequacy, both internally and by market participants and rating agencies. Since the introduction of the new framework, the equity-to-loan ratio has declined to just below the previous target of 35 percent. However, this reduction in capital coverage reflects the improved quality of the loan portfolio and was not an aim of the policy change.

Additional safeguards against credit risk include the lending authority, which limits the total amount of disbursed loans, approved equity investments and the maximum amount that could be demanded from ADB under its guarantee portfolio, to the total amount of ADB's unimpaired subscribed capital, reserves, and surplus. In addition, gross outstanding borrowings cannot exceed the sum of callable capital of non-borrowing members, paid-in capital, reserves and surplus.

The ADB's loan portfolio is highly concentrated. The top 5 sovereign borrowers accounted for about 90 percent of sovereign loans outstanding at the end-December 2009. However, the Bank does not apply a limit on single country exposures for its sovereign loans. Instead, it manages credit concentration by ensuring that it has the required risk bearing capacity or equity-to-loan ratio as continually assessed using the stress test framework. In 2009, the ADB established a medium-term overall limit for nonsovereign exposure equal to about 15 percent of projected total operations. Nonsovereign exposure to any single country is limited to $2.1 billion.

[28] This not only protects ADB shareholders but also supports the institution's AAA credit rating, thus reducing borrowing costs and consequently lending rates.

Annex II. Illustration of Applying the Basel II Framework to the Fund

This Annex updates and extends the analysis in the 2008 review of the application of the Basel II capital standards to the Fund. As a widely used international standard, the Basel II capital framework provides a useful reference point for the minimum capital appropriate for a financial institution, and it covers the main sources of financial risk to the Fund. [29] In addition to those presented in the 2008 review, staff has extended the analysis to credit risk using projected GRA credit outstanding through end-FY 2012.

Credit risk

The standardized and internal-ratings-based (IRB) approaches to calculating credit risk capital charges are both updated from the 2008 review. The standardized approach calculates capital charges by applying a risk weighting based on external credit ratings, with the same weights applied to a range of ratings, e.g., a C- rated credit has the same risk weight as a CCC+ rated credit.[30] In contrast, the IRB approach calculates VaR, using a more refined range of risk parameters (probability of default, loss given default, exposure at default, effective maturity, and correlation) for these calculations, and it is consistent with a bank holding sufficient capital to cover 99.9 percent of the expected and unexpected losses associated with the probabilities of such losses over a one-year horizon. The 2006 and 2008 reviews found the more risk sensitive IRB approach more applicable to the Fund's portfolio since it is skewed to higher risk categories, which is consistent with the findings below. Staff has continued to rely on external credit ratings as a source of estimates for probabilities of default in applying the IRB approach to the Fund (Table II.1).[31]

Since the 2008 review, charges for credit risk have increased with the surge in credit outstanding (Figure II.1):

- The IRB approach implies a capital charge of SDR 5 billion on average for FY 2010, as compared to SDR 3 billion in FY 2009 and an average capital charge of SDR 9 billion in the past decade. The increase from FY 2009 largely reflects the jump

[29] Pillar I of the Basel II framework is described in Part 2 of *Basel II: International Convergence of Capital Measurement and Capital Standards: a Revised Framework* (June 2004), http://www.bis.org/publ/bcbs107.htm.

[30] The standardized approach assigns risk weights for claims on sovereigns ranging from 0 to 150 percent depending on the quality of the credit. For details, see paragraph 53 of Part 2 of the Basel Guidelines.

[31] Other parameters assumed in the model include: an average loss given default of 45 percent, based on Basel II guidelines for treatment of senior claims on sovereigns under the "foundation approach" (paragraph 287 of Part 2 of the Basel II guidelines); and an average maturity of four years for each loan, which is based on the average repurchase time for a single purchase in the credit tranches.

in credit outstanding from an average of SDR 13 billion in FY 2009 to SDR 35 billion in FY 2010.

- The standardized approach implies a capital charge for credit risks of about SDR 3 billion on average in FY 2010, as compared to SDR 2 billion in FY 2009 and an average capital charge of SDR 5 billion in the past decade.

Table II.1 Standard & Poor's – Cumulative Average Default Rates 1/
(In percent)

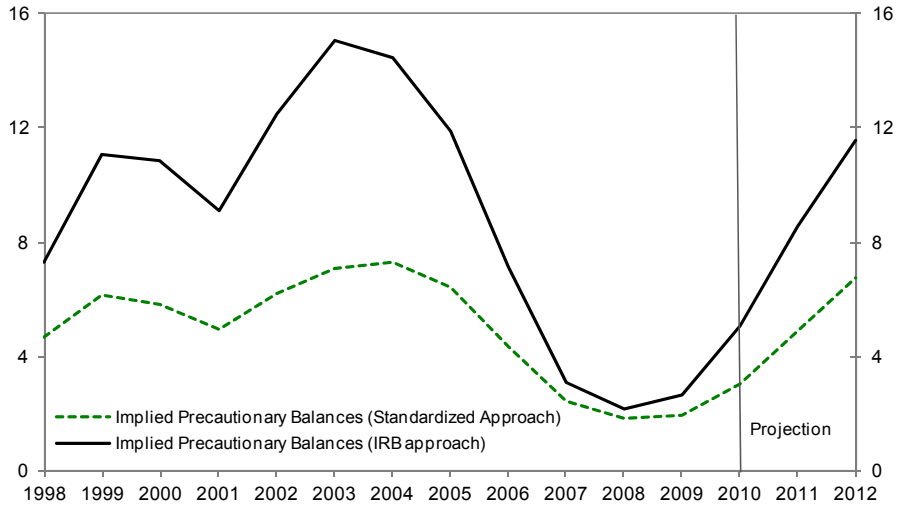
Rating	S&P Average Default Rates	Three-Category Average Probability of Default 2/ 3/
AAA	0.0	0.0
AA+	0.0	0.0
AA	0.0	0.0
AA-	0.0	0.0
A+	0.0	0.0
A	0.0	0.0
A-	0.0	0.0
BBB+	0.0	1.1
BBB	3.2	2.3
BBB-	3.6	2.7
BB+	1.3	2.8
BB	3.5	4.8
BB-	9.6	6.7
B+	7.1	8.9
B	10.1	10.0
B-	12.8	27.3
CCC+	59.1	40.6
CCC	50.0	69.7
CCC-	100.0	83.3
Below CCC-	100.0	100.0

Source: Standard & Poor's
1/ Proxy for probabilities of default, based on a four-year horizon, obtained from Sovereign Defaults and Rating Transition Data, 2009 Update (Standard & Poor's, 3/17/2010), Table 27: Sovereign Foreign-Currency Cumulative Average Default Rates with Rating Modifiers (1975-2009).
2/ Centered three-rating average. For example, BB is an average of BB+, BB, and BB-. This is done to smooth the series. CCC- ratings and below are treated as in default.
3/ Unrated countries assumed to have the same probability of default as B-.

Staff has also utilized the above two approaches to assess the capital charges for credit risk, using projected outstanding GRA credit under the existing GRA non-precautionary arrangements as of end-FY 2010 (Figure II.1).[32]

- The IRB approach implies a capital charge of SDR 9 billion for FY 2011 and SDR 12 billion for FY 2012.
- The standardized approach implies a capital charge for credit risks of about SDR 5 billion for FY 2011 and SDR 7 billion for FY 2012.

Figure II.1 Illustrative Capital Charges for Credit Risk: Basel II 1/
(In SDR billions, FY average)



Source: IMF Finance Department.
1/ Portfolio comprised of twenty largest borrowers (FY 1998-FY 2010) for FY 1998-FY 2010; portfolio comprised of twenty largest borrowers (FY 2011-FY 2012) for FY 2011-FY 2012.

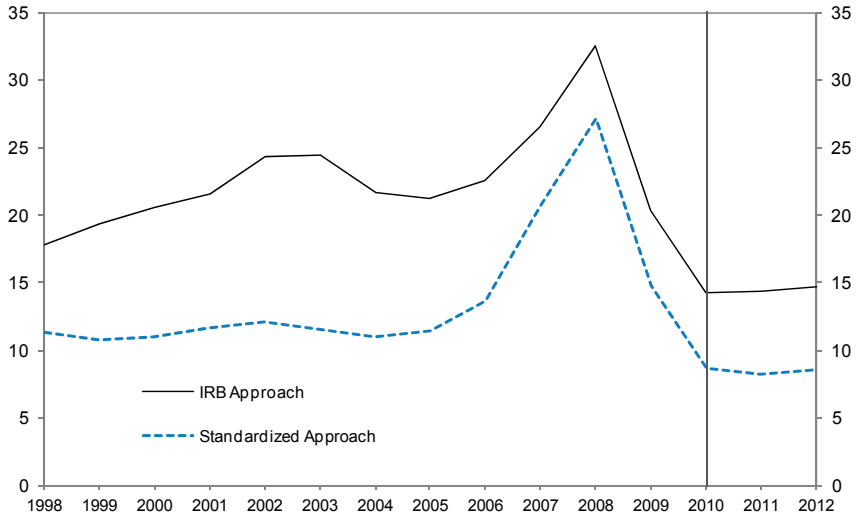
The capital charges for credit risk are also shown in the percentage of the average credit outstanding (Figure II.2).

- The IRB approach implies capital charges for credit risk-credit outstanding ratios of 14 percent for FY 2010, 15 percent for FY 2011, 15 percent for FY 2012, and an average ratio of 22 percent during FY 1998-FY 2010.

[32] The projection of outstanding GRA credit beyond end-July FY 2010 makes the following key assumptions: (1) credit ratings do not change from end-July FY 2010; (2) zero disbursements under precautionary arrangements; (3) disbursements of non-precautionary arrangements as scheduled; and (4) zero advance repurchases.

- The standardized approach implies capital charges for credit risk-credit outstanding ratios of 8 percent for both FY 2010, 9 percent for FY 2011, 9 percent for FY 2012, and an average ratio of 14 percent during FY 1998-FY 2010.

Figure II.2 Illustrative Capital Charges for Credit Risk-Credit Outstanding Ratio 1/
(In percent)



Source: IMF Finance Department.
1/ Portfolio comprised of twenty largest borrowers (FY 1998-FY 2010) for FY 1998-FY 2010; portfolio comprised of twenty largest borrowers (FY 2011-FY 2012) for FY 2011-FY 2012.

However, the calculations made under Pillar 1 do not allow for the risks of the Fund's highly concentrated portfolio. The Basel II approach would deliver inaccurate results if a portfolio is heavily concentrated.[33] While a bank would typically limit its single entity exposures to avoid concentration, concentration in the Fund's credit portfolio is the result of its mandate and remains high. Staff has applied Credit Risk+ model to the Fund's credit portfolio, using both the Bernoulli distribution and the Poisson approximation for the distribution of default events (Figure II.3).[34] Although this approach brings out concentration of a portfolio, it is generally intended to measure value-at-risk in more diversified portfolios,

[33] See Michael Gordy, 2002, *A Risk-Factor Model Foundation for Ratings-Based Bank Capital Rules*, The Federal Reserve Board, Finance and Economics Discussion Series, 2002-55.

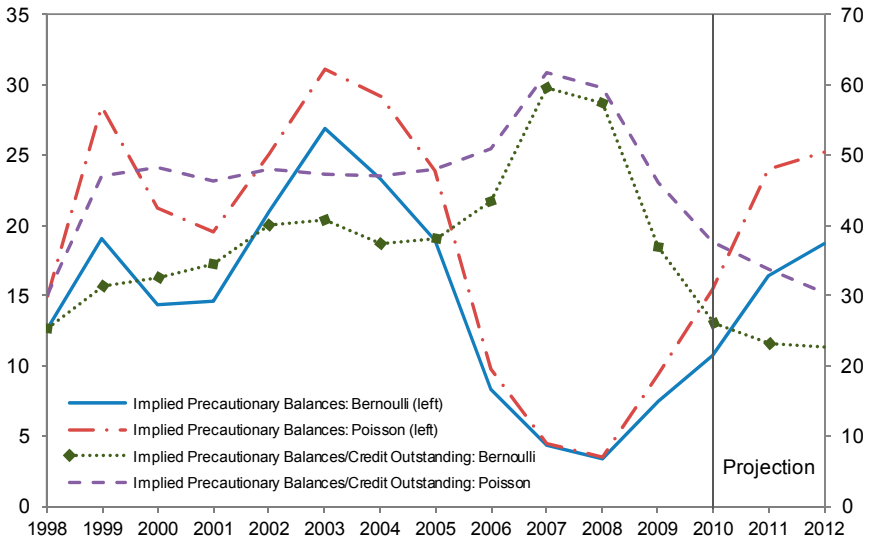
[34] This approach has been applied to Fund portfolio as of end of corresponding financial years, using the same set of assumptions on probability of default, loss given default, maturity, and treatment of arrears and is consistent with a 99.9 percent confidence interval. The Bernoulli distribution is particularly appropriate when the default probabilities are relatively constant, while the Poisson distribution is particularly appropriate when the default probabilities are more dispersed. Although realized defaults are rare, rating-based probabilities of defaults are relatively high in Fund portfolio. For comparison, results using both distributions are presented. (Details on the model are available in Avesani, Liu, Mirestean and Salvati, *Review and Implementation of Credit Risk Models of the Financial Sector Assessment Program*, WP/06/134, May 2006).

and as such the illustrative results discussed below are likely to exaggerate the Fund's needs for reserves.

- Under the Bernoulli distribution of default events, the capital charges would be in the range of SDR 8-19 billion during FY 2009-FY 2012. The capital charges for credit risk-credit outstanding ratios would be in the range of 23-37 percent during the same period. The average ratio during FY 1998-FY 2010 is 39 percent.

- Under the Poisson distribution of default events, the capital charges would be in the range of SDR 9-25 billion during FY 2009-FY 2012. The capital charges for credit risk-credit outstanding ratios would be in the range of 30-46 percent during the same period. The average ratio during FY 1998-FY 2010 is 48 percent.

Figure II.3 Illustrative Capital Charges for Credit Risk: Credit Risk+ 1/
(In SDR billions, left axis; in percentage of credit outstanding, right axis)



Source: IMF Finance Department
1/ Portfolio comprised of twenty largest borrowers as of end of each financial year.

Staff has also conducted some stress test assuming that 100 percent of credit portfolio is downgraded by five or three notches in the future, in three different credit environments (baseline, favorable, and adverse) as discussed in the main paper (Table II.2).

- Variant A: the weighted average credit rating remains unchanged at current (BB) level, regardless of the changes in peak credit outstanding.

- Variant B: a downgrade of three notches. The average credit rating in the past decade was B+, two notches below the current rating, and the standard deviation was one

notch. A downgrade of three notches assumes in the future the credit rating is one standard deviation worse than the historical mean.

- Variant C [35]: a downgrade of five notches. The worst credit-outstanding weighted average credit rating in the past decade was five notches below the credit rating in the present (CCC+ vs. BB).

Table II.2 Scenario Analysis and Stress Testing: Implied Capital Charges for Credit Risk
(In SDR billions)

Variant A: No change in credit ratings
Variant B: All credit exposures downgraded by three notches
Variant C: All credit exposures downgraded by five notches

	Scenario								
	Favorable 1/ Credit Outstanding=SDR 60 billion			Baseline Credit Outstanding=SDR 78 billion			Adverse 2/ Credit Outstanding=SDR 150 billion		
	Variant A	Variant B	Variant C	Variant A	Variant B	Variant C	Variant A	Variant B	Variant C
Basel II Standard	5.4	6.7	6.8	6.7	8.4	8.6	11.8	15.1	15.4
Basel II IRB	9.1	14.6	16.9	11.6	18.8	21.8	21.0	34.8	40.4
Credit Risk+ (Bernoulli)	15.5	22.7	27.8	18.7	29.5	36.2	37.1	55.2	67.9
Credit Risk+ (Poisson)	18.6	29.3	29.6	25.2	38.2	38.5	44.8	71.7	72.3

Source: IMF Finance Department

1/ All credits in good standing are scaled by 60/78, with arrears unchanged.
2/ All credits in good standing are scaled by 150/78, with arrears unchanged.

Market risk

Capital charges for market risk from the Investment Account (IA) portfolio are also calculated using both the standardized and internal risk models approaches. The framework calls for capital to be set aside against the trading book (i.e., securities not intended to be held to maturity), including interest rate related instruments and equities.

[35] Under the Basel II standard approach and Credit Risk+ with Poisson method, the values of Variant C in all three credit environments are only marginally higher than the values of Variant B. This is due to the nature of these two methods. The Basel II standard approach assigns the same risk weight to a range of credit ratings; therefore, a downgrade of two notches (from Variant B to Variant C) does not affect the risk weight to be applied. Similarly, the credit rating and associated default probabilities under Variant B and Variant C are very close to the higher end of the VaR produced by Credit Risk+ with Poisson method. A further downgrade from Variant C by two notches (not tabulated) also shows only a marginal increase in the VaR.

The minimum capital required for the current IA portfolio is relatively modest:

- Under the standardized approach, capital charges amount to SDR 0.1 billion, or **1.5 percent of the IA portfolio at end-FY 2010**.[36] A similarly low capital charge is calculated at end-FY 2009 reflecting the stability in size and composition of the IA portfolio, and the modest levels of risk assumed under the currency investment strategy.[37]

- **The internal models approach implies a capital charge of SDR 0.5 billion on the benchmark IA portfolio at end-FY 2010, equivalent to about 8 percent of the IA portfolio**.[38] This compares with SDR 0.7 billion or 12 percent or portfolio value at end-FY 2009.

Operational risk

A modest capital charge for operational risk is estimated, of SDR 0.1 billion in FY 2010 compared with an average of SDR 0.3 billion over the last decade. The Basel II framework requires banks to set aside capital against operational risks, defined as the risk of loss arising from inadequate or failed internal processes, people, and systems, or from external events. Of the three measurement techniques identified in the Basel II framework, the basic indicators approach can be applied to the Fund whereas the other measures are tailored more narrowly to business operations in a private financial institution. The basic indicators approach calculates the capital charge for operational risk as 15 percent of three-year average of positive gross income.

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[36] The standardized approach for measuring market risk divides risks relevant to the Fund into two categories. Charges for "specific risks" are designed to protect against an adverse movement in the price of a security related to the individual issuer, and "general risk" charges are designed to capture potential loss arising from fluctuations in market interest rates. Specific risks are measured on the basis of external credit assessment while general risks are measured on the basis of maturity or duration of the instrument.

[37] Half of the IA portfolio is composed of AAA and AA rated debt of sovereigns and international financial institutions with maturities between 1 to 3 years, with the remainder in Medium-Term Instruments with similar maturity issued by the BIS—which are treated as having a AAA rating. A zero risk weight is assigned for specific risks associated with highly-rated instruments.

[38] The internal models based approach is based on value at risk (VaR) calculations. The daily Basel II minimum capital requirement is the higher of: (i) the previous day's VaR and (ii) the average of the daily VaR for the preceding 60 days, multiplied by a factor of at least 3, which serves to provide a cushion. Basel II calls for the VaR to incorporate daily data for one year, using a 99th percentile one-tailed confidence interval, and an instantaneous price shock equivalent to a 10-day price movement (the holding period).

Annex III. Stress Testing the Impact of Charges in Arrears

This annex uses stress tests to illustrate the limits on the capacity of the burden sharing mechanism to protect the Fund's financial position against the effect of overdue obligations. It also discusses how a low SDR interest rate environment, the use of borrowed resources to supplement quota-based resources in financing Fund lending, and high average access, and resulting high average charges on credit outstanding, imply that burden sharing capacity remains relatively low despite increases in credit outstanding.

Background on burden-sharing of deferred charges

Since the establishment of the burden-sharing mechanism in 1986 it has compensated the Fund in the amount of any unpaid charges by members in arrears ("deferred charges") thereby offsetting the impact of unpaid charges on Fund income. This has proven essential to the Fund's continued compliance with International Financial Reporting Standards given the Fund's limited ability to make specific provisions under the Articles of Agreement. The Fund's creditor and debtor members contribute equally to covering the amount of unpaid charges, which is achieved through increases in the rate of charge paid by debtor members and reductions in the rate of remuneration to creditor members.[39]

Limits on the capacity of the mechanism

The total capacity of the burden sharing mechanism to cover unpaid charges is the sum of the maximum feasible reduction in remuneration expenses and the maximum feasible increase in income from charges:

- The requirement in the Articles of Agreement that the rate of remuneration be no less than 80 percent of the SDR interest rate limits the maximum reduction in remuneration expenses to:

$$0.2 * \text{SDR Interest Rate} * \text{Remunerated Reserve Tranche Positions}$$

In the absence of arrears, the maximum burden sharing capacity would simply be twice the above amount, because debtors and creditors contribute equally. But when credit in arrears increases, the debtor base contributing to burden sharing is reduced, so the capacity of the burden-sharing mechanism declines. For example, given that debtors initially account for half of the total base on which burden sharing can be collected, the capacity of the burden sharing mechanism would decline by one quarter if one half of total outstanding credit went into arrears.

[39] These adjustments also include the possible accumulation of precautionary balances in the SCA-1, see Box 1.

Overall, the burden-sharing capacity depends on the following factors:

- **Outstanding credit:** reserve tranche positions move in tandem with credit fluctuations when credit outstanding is financed fully from quota resources, so as credit rises, the base for higher charges and the base for lower remuneration both increase, increasing burden sharing capacity.

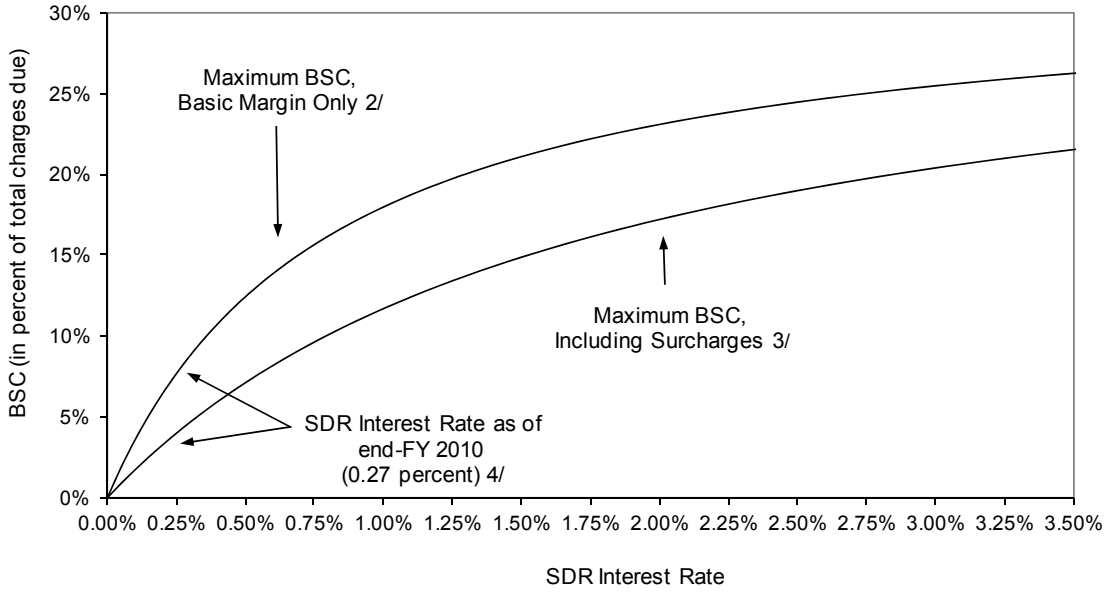
- **Borrowing by the Fund:** creditor positions arising from Fund borrowing under bilateral loan or note purchase agreements, the New Arrangements to Borrow (NAB), or the General Arrangement to Borrow (GAB) do not increase burden sharing capacity. Therefore, the higher the share of borrowed resources is in financing credit outstanding, the lower the burden sharing capacity will be.

- **SDR interest rate:** at a higher nominal SDR interest rate, the rate of remuneration can be reduced by a larger amount in terms of basis points, increasing burden-sharing capacity in nominal terms, although there may also be an increase in unpaid charges.

- **Share of credit in arrears**: as noted, a higher share of credit in arrears shrinks the debtor base making burden sharing contributions and thus reduces the burden sharing capacity.

Moreover, the level of basic margin and surcharges relative to the SDR interest rate influence the share of total charges due that can be burden shared. Since the basic margin and the level of surcharges are fixed, burden sharing capacity as percent of total charges due is lower when the SDR interest is lower or the level of average surcharges due on credit outstanding are higher, reflecting a large share of exceptional access (see Figure III.1).

Figure III.1. Burden Sharing Capacity (BSC) in Percent of Total Charges At Different Levels of the SDR Interest Rate 1/



1/ The floor for renumeration is 80 percent of the SDR interest rate. Assuming that remunerated reserve tranche positions equal credit outstanding, i.e., no borrowing by the Fund.

2/ A basic margin for the rate of charge of 100 basis points, abstracting from surcharges.

3/ A basic margin of 100 basis points, plus average surcharges of about 120 basis points for the credit outstanding (based on FY2012-2014 projected average).

Illustrative Stress Tests

Table III.1 illustrates how burden sharing capacity and potential income losses would vary, given different combinations of credit in good standing and credit in arrears, assuming:

- the maximum burden sharing adjustments allowed under the Articles of Agreement (i.e., rate of remuneration reduced by 20 percent of the SDR interest rate),
- the SDR interest rate of 1.5 percent (i.e., projected three-year average),
- the current basic margin for the rate of charge of 100 basis points,
- average surcharges of 120 basis points for credit outstanding (close to projected three-year average), and
- that half of credit in excess of SDR 30 billion is financed through borrowing by the Fund.

The term "income loss" refers to a reduction in Fund revenues from lending. The extent to which an income loss would result in a negative net income in a financial year would depend on the level of other compensating income. In the event that the Fund's net income from

other compensating sources would be zero or negative, the full amount of income loss would result in a drawdown of precautionary balances. If the net income from other sources were positive, at least part of the income loss from arrears in excess of burden sharing capacity would be reflected in a reduced accumulation of precautionary balances

Stress testing illustrates the limitations of burden-sharing arrangements:

- **The scope to absorb unpaid charges remains modest despite the recent significant increase in credit outstanding** (Table III.1, Panels A and B). For example, if total credit with unpaid charges rose to SDR 5 billion, the unpaid charges would be about SDR 190 million, and assuming total outstanding credit of SDR 45 billion (i.e., close to the current actual credit outstanding), burden sharing capacity would be exhausted.

- **Large arrears would imply substantial income losses, especially when credit in good standing is low** (Table III.1, Panel C). For instance, arrears of SDR 20 billion (which is below the largest projected exposure to a single borrower) would result in an annual income reduction of about SDR 510 million at the level of total outstanding credit of SDR 70 billion (i.e., a level comparable to the peak of projected credit outstanding of about SDR 78 billion in FY 2013). However, if the total level of credit was only SDR 30 billion, arrears of the same size would reduce annual income by about SDR 640 million. In a latter scenario, the loss would likely exceed the income available from other sources, thus resulting in a drawdown of precautionary balances. Even arrears of half of this size, i.e., SDR 10 billion (the Fund's three largest exposures are projected to exceed SDR 10 billion) would exhaust available burden sharing capacity and result in considerable income losses in all scenarios shown in Table III.1, although the size of such losses would vary greatly depending on the level of credit in good standing.

Moreover, these illustrative calculations may underestimate the potential income risks from credit arrears in practice. First, the illustrations in Table III.1 assume that the SDR interest rate increases to 1.5 percent. However, as illustrated in Figure III.1, burden sharing capacity in relation to outstanding credit would be significantly lower if the current low interest rate environment were to persist. Second, the illustrations are based on the maximum burden sharing capacity allowed by the Articles of Agreement. However, there is no precedent for using the maximum capacity of burden sharing mechanism and a reduction in the floor for remuneration would require a Board decision by 70 percent majority of total voting power.

Table III.1 Arrears, Burden Sharing and Potential Income Losses: An Illustration 1/
(In SDR millions unless otherwise indicated)

	Credit in Arrears (SDR billions) of:						
	1	3	5	10	20	30	40
A. Unpaid charges 2/	40	110	190	370	740	1,110	1,480
B. Maximum burden sharing capacity 3/							
For credit in good standing of:							
(SDR billion)							
80	300	310	310	310	330	340	350
70	270	280	280	280	290	310	320
60	240	240	250	250	260	280	290
50	210	210	220	220	230	250	260
40	180	180	190	190	200	210	230
30	150	150	150	160	170	180	190
20	100	100	110	130	140	150	160
10	40	40	50	70	100	110	130
C. Income loss due to unpaid charges after taking account of burden sharing (=B-A) 4/							
For credit in good standing of:							
(SDR billion)							
80	0	0	0	-60	-410	-770	-1130
70	0	0	0	-90	-450	-800	-1160
60	0	0	0	-120	-480	-830	-1190
50	0	0	0	-150	-510	-860	-1220
40	0	0	0	-180	-540	-900	-1250
30	0	0	-40	-210	-570	-930	-1290
20	0	-10	-80	-240	-600	-960	-1320
10	0	-70	-140	-300	-640	-1000	-1350
D. Adjustments to the rate of charge (basis points) 5/							
For credit in good standing of:							
(SDR billion)							
80	2	7	12	18	18	18	18
70	3	8	13	19	18	18	18
60	3	9	15	19	19	18	18
50	4	11	18	20	19	19	18
40	5	13	22	21	20	19	19
30	7	17	24	23	21	20	19
20	10	24	24	25	23	21	20
10	17	19	21	23	25	23	21

Source: Finance Department

1/ The shaded area indicates that the adjustment to the rate of remuneration has reached the limit of 20 percent of the SDR interest rate, i.e., 30 basis points. Figures in panels A to C are rounded to the nearest multiple of ten.

2/ The unpaid charges are calculated using the SDR interest rate of 1.5 percent and a basic margin for the rate of charge of 100 bps, and assuming average surcharges of 120 bps for credit outstanding. This SDR interest rate corresponds to the projected average SDR interest rate for FY 2011-13, the basic margin is the currently applicable rate, and the level of surcharges is based on staff projection for FY 2011-2013. Unpaid charges include the existing deferred charges on Sudan's and Somalia's existing principal arrears of SDR 293 million.

3/ Based on creditors' contribution of 20 percent of the SDR interest rate and assuming that 50 percent of credit in excess of SDR 30 billion is financed by borrowed resources. The calculations take into account that some burden sharing capacity is lost due to nonpayment of burden sharing adjustments by members in arrears. Based on remunerated reserve tranche positions as of end-FY 2010.

4/ Negative figures correspond to drawdown of precautionary balances in the absence of other compensating income.

5/ Maximum adjustments to the rate of charge would be less than the 30 bps maximum adjustment to the rate of remuneration because part of the credit outstanding is financed through borrowing and unremunerated reserve tranche positions.