



IMF POLICY PAPER

ADEQUACY OF FUND RESOURCES – PRELIMINARY CONSIDERATIONS

March 2021

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International Monetary Fund
Washington, D.C.



March 11, 2016

ADEQUACY OF FUND RESOURCES—PRELIMINARY CONSIDERATIONS

EXECUTIVE SUMMARY

This paper provides background for initial considerations on the appropriate size of the Fund’s overall lending capacity over the medium term. With its near-universal membership and wide array of lending instruments, the Fund plays a central role in promoting global economic and financial stability. In light of the experience during the global financial crisis, which the Fund entered clearly under-resourced, the paper underscores the importance of ensuring that the Fund has sufficient resources available *in advance* to meet members’ actual, potential, or prospective financing needs across a broad range of scenarios.

The paper reviews developments in the demand for Fund resources during the global crisis. With capital account and banking crises at the root of many members’ financing needs, program access tended to be much larger than during earlier crisis episodes. While a considerable part of the Fund’s expanded lending capacity was ultimately not drawn upon, this reflected importantly the relatively small size of members (in terms of share in global GDP) that made use of Fund financing during this period, as many large members had built up policy buffers (that have since dwindled in many cases), as well as confidence-building effects of a well-resourced Fund.

The paper also argues that the global economy is changing in fundamental ways, with implications for the size of the Fund. The membership is likely to be confronted with a prolonged period of volatile global financing conditions amid elevated vulnerabilities, which raise the risk of larger and more frequent crises. This comes as a result of a series of structural shifts and ongoing transitions, which are also highlighted in two related papers on the global financial safety net (GFSN) architecture and on the international monetary system (IMS).

Against this background, the analysis suggests that the current overall lending capacity of the Fund should be seen as a minimum. The Fund’s lending capacity increased significantly in the wake of the global crisis—initially relying on additional borrowed resources, and subsequently boosted by the

historic doubling of quotas under the 14th Review, which has now been substantially implemented while borrowing under the New Arrangements to Borrow (NAB) has been rolled back. The analysis highlights that given the fundamental transitions that are underway in the global economy, the Fund needs to remain adequately resourced to provide the required financial support to its entire membership. The paper's assessment, which is based on a variety of methods, suggests that a prudent approach under the current financing role and lending framework of the Fund would call for at least broadly maintaining the current overall lending capacity of the Fund—of SDR 686 billion (some US\$957 billion).

Additional resources would be needed if the Fund were to introduce changes to its lending framework. Such changes may be needed to address the weaknesses of the current, fragmented GFSN architecture, as highlighted in the two related papers on the IMS and the GFSN.

While the financing structure of the Fund should be largely quota-based, staff sees a strong case for continuing to backstop quota resources with a standing borrowing facility. The New Arrangements to Borrow (NAB) provide a tested structure that can be activated quickly if unforeseen financial needs arise.

Maintaining the Fund's current overall lending capacity would require swift action by the membership. Given the scheduled expiration of the 2012 borrowing agreements starting later this year and the expected time that any resource mobilization under the 15th General Review of Quotas will take, staff will develop specific proposals aimed at maintaining the Fund's current lending capacity in a follow-up paper in May. In addition, the renewal of the NAB decision is scheduled for Board discussion in October 2016.

Approved By
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Prepared by the Finance and Strategy, Policy, and Review
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INTRODUCTION¹

1. **The IMF plays a central role in the IMS and the GFSN.** With its near-universal membership and a wide array of lending instruments, the Fund provides for efficient risk sharing and reserve pooling at the global level, which helps promote economic and financial stability in an increasingly interconnected world. A key lesson of the recent crisis has been that, in order to fulfill this function effectively, the Fund needs to be adequately sized, with sufficient resources to play a catalytic role in assisting members to meet their actual, potential, or prospective financing needs, thereby supporting market confidence.²

2. **The recent implementation of the 14th General Review of Quotas was a historic milestone.** The doubling of quotas under the 14th Review—the largest quota increase in the history of the Fund—boosted the Fund’s permanent resources and the associated rollback of the NAB reduced reliance on borrowing. The governance reforms agreed in 2010 have also considerably strengthened the Fund’s legitimacy. The implementation of the 14th Review has put the Fund on a stronger financial footing by reducing the share of temporary resources. That said, it did not increase significantly the Fund’s overall lending capacity beyond what had been secured by the large increase in borrowed resources during the global financial crisis. Going forward, absent a new extension, the bilateral borrowing agreements put in place at the height of the crisis would start to expire later this year, with an adverse impact on the Fund’s ability to provide financial assistance to its membership.

3. **Against this background, this paper is intended to serve as a basis for an initial discussion on the appropriate size of the Fund over the medium term.** Complementing and building on the analysis provided in two related papers on the IMS and on the adequacy of the GFSN,³ this paper discusses the implications of ongoing structural shifts and transitions for the potential demand for financing from the membership and uses various methods to assess the adequacy of Fund resources. The analysis is conducted based on the Fund’s current lending framework and financing role in the GFSN. Any substantive change to this framework or more broadly an expanded financing role for the IMF would have an impact on the extent of additional resources needed.

¹ Prepared by a team led by Kevin Cheng (SPR) and Jean-Guillaume Poulain (FIN) comprising Balazs Csonto, Lucy Liu, Nujin Suphaphiphat and Frank Wallace (all SPR) and Heikki Hatanpaa, Janne Hukka, Hideaki Imamura, Lukas Kohler, Diana Mikhail, Ezgi Ozturk, and Sergio Rodriguez-Apolinar (all FIN) under the guidance of Alfred Kammer and Andreas Bauer (SPR) and Thomas Krueger and Donal McGettigan (FIN).

² See [IMF Response to the Financial and Economic Crisis](#), (10/27/2014). See also *Need as a Condition for the Use of Fund resources* (12/15/1994), which sets out that a Fund arrangement may be approved on the basis of actual, potential, or prospective balance of payment need.

³ See [The Adequacy of the Global Financial Safety Net](#), (3/10/2016); and [Strengthening the International Monetary System—A Stocktaking](#), (2/22/2016).

4. The paper is organized as follows. The next section provides context for assessing the appropriate size of the Fund and the composition of its resources. The third section discusses the changing global economic landscape and its implications for the Fund’s financing role. The fourth section provides an assessment of the potential financing needs of the membership. The penultimate and final sections conclude by putting these considerations together and presenting some issues for discussion.

RECENT DEVELOPMENTS IN FUND RESOURCES

5. The Fund entered the global financial crisis under-resourced. The Twelfth and Thirteenth General Reviews of quotas in 2003 and 2008 took place against the backdrop of sustained strong global GDP growth, ample access to external market financing for most members, and a significant drop in Fund lending, and resulted in no increase in quotas. In this benign global environment, the membership focused on tackling governance and representation concerns, and in this context agreed on ad-hoc quota increases that did not expand the resource envelope in a meaningful way. As the global financial crisis broke in 2008, there had not been a general quota increase in ten years, and the Fund’s resources were clearly insufficient to fulfill its intended role at the center of the GFSN.

6. The resource shortfall at the onset of the crisis had costs. An urgent resource mobilization effort by the membership was required and ensuing agreements resulted in a quadrupling of the Fund’s lending capacity by 2013 (see Box 1). However, these increases only came into effect after the onset of exceptional financial market volatility. Key events linked to the expansion of the Fund’s resource envelope and engagement with systemic members—such as the announcement of the first bilateral loan in late 2008, the G20 commitment to secure a large increase in Fund resources in April 2009, or the 2012 bilateral borrowing agreements in mid-2012—were associated with an easing of global volatility and emerging market credit risk (see Figure 1), underscoring the confidence-building effects of a well-resourced Fund.

7. The mobilization of borrowed resources allowed the Fund to meet the increased demand for financing by the membership.

Figure 2 illustrates that without borrowed resources, the Fund’s forward-commitment capacity (the FCC is the main measure of the Fund’s capacity to make new resources available to its members; see Box 2) would have turned negative in 2010. While much of the Fund’s expanded lending capacity was ultimately not drawn upon, this reflected factors that are not likely to be repeated. Of particular importance, most members seeking financial assistance during the global financial crisis were small (in terms of their share in

Share of Program Members in Global GDP^{1/}
(3-Year Moving Average, in percent of total GDP)

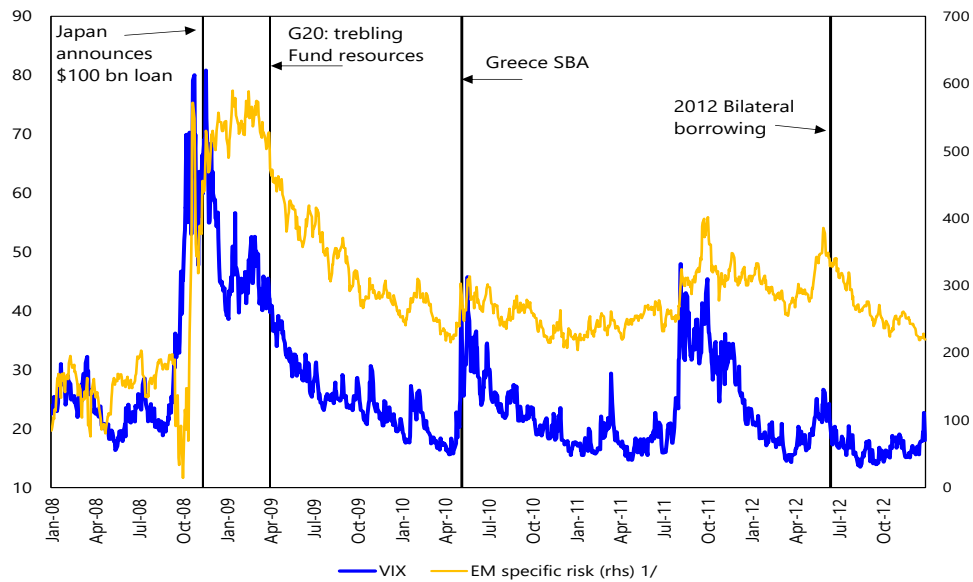


Source: IMF Finance Department.

1/ FCLs are excluded.

global GDP) compared to the typical borrower in previous crisis episodes (see Text Figure). Many larger EMEs had accumulated significant policy buffers prior to the crisis, having benefitted from an unusually supportive external environment, including favorable liquidity conditions and historically high commodity prices. This, possibly together with perceived stigma of approaching the Fund, led these members to rely instead on their own resources. It is also worth noting that the increase in the Fund’s lending capacity boosted credibility by providing assurances that resources would be available to protect members if needed, thus catalyzing private financing and ultimately limiting the need for official support.

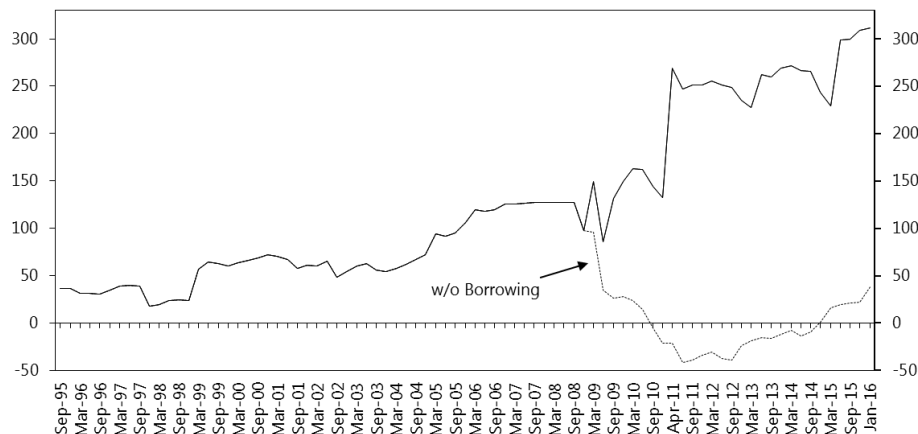
Figure 1. Fund Resources Announcements and Risk Metrics (2008–12)
(in percent, lhs, or basis points, rhs)



Sources: IMF Finance Department and Bloomberg.

1/ Sum of EMBIG residuals and constant of OLS regression against TED spreads.

Figure 2. Forward Commitment Capacity (1995–2016)
(in SDR billion)



Source: IMF Finance Department.

8. Efforts during the crisis to augment the Fund’s resource base shifted the composition of resources away from quotas. The large increase in Fund resources over the crisis period relied initially on borrowing. About 75 percent of the total lending capacity during the period 2012–15 stemmed from the NAB and bilateral borrowing agreements, which was unprecedented by historical standards (Figure 3). The doubling of quotas under the 14th Review in early 2016 and the corresponding NAB rollback have helped shift Fund resources from borrowing back toward quotas, although the share of borrowed resources remains high by historical standards at about 47 percent.

9. The membership has stressed consistently that the Fund is and should remain a quota-based institution.⁴ Quotas underpin the Fund’s finances, governance, and risk management framework. Members’ quota subscriptions constitute the Fund’s permanent lending resources and play several key roles in the Fund’s relationship with its members. They anchor members’ voting power in Fund decisions and represent the amount of financial resources that members may have to provide to the Fund. SDR allocations are also distributed in accordance with quota shares. Quotas are also linked to the Fund’s liquidity and credit risk management tools, as they determine normal access to Fund resources and the thresholds for exceptional access procedures, regulate application of surcharges and commitment fees, and activate post program monitoring. The use of quota resources also helps determine the capacity of the Fund’s burden sharing mechanism that protects the Fund’s cash flow against unpaid charges by members in arrears.⁵

10. The Fund’s practice and policy has been to borrow mainly as a temporary supplement to quota resources.⁶ The 5-yearly general reviews of quotas have aimed to ensure that the Fund remains a quota-based institution, with increases seeking to keep up with the structural changes of the global economy and tending over time to restore Fund quotas in relation to global GDP. Nevertheless, the Fund has also a long history of borrowing temporarily from its membership at times when the institution’s current or prospective liquidity was seen as inadequate, often as a bridge to the next quota increases, and to cover cyclical demands or tail

⁴ See, for instance, the [Communiqué of the Thirty-Second Meeting of the International Monetary and Financial Committee \(IMFC\)](#), (10/9/2015).

⁵ Since no burden sharing adjustment is made to the interest paid to creditors on borrowed resources, they do not increase burden sharing capacity. As a result, the use of borrowed resources reduces burden sharing capacity relative to credit outstanding.

⁶ The Fund is authorized to borrow to “replenish” its holdings of currencies in the General Resources Account (GRA) that are needed for lending (Article VII, Section 1(i)). The Guidelines for Borrowing by the Fund begin “Quota subscriptions are and should remain the basic source of the Fund’s financing. However, on a temporary basis, borrowing by the Fund can provide an important supplement to its resources.” See [Borrowing by the Fund—Operational Issues](#), (6/17/2009) and Decision No. 14367 (6/29/2009).

risks.⁷ Borrowed resources can generally be raised more quickly than quota resources to respond to the membership's immediate financing needs.

11. A standing borrowing facility can play a central role in the Fund's financing structure as an important backstop to quotas. Access to an established borrowing instrument provides confidence that resources can be scaled up relatively quickly in exceptional circumstances on pre-agreed terms, including burden sharing. It thus plays an important role to insure against tail risks when they materialize. Among potential borrowing instruments, a quasi-permanent standing facility such as the NAB, which is subject to relatively infrequent (five-yearly) reviews/renewals, and can be activated quickly with streamlined procedures, would be superior to ad-hoc bilateral borrowing agreements that can take considerable time to put in place.⁸

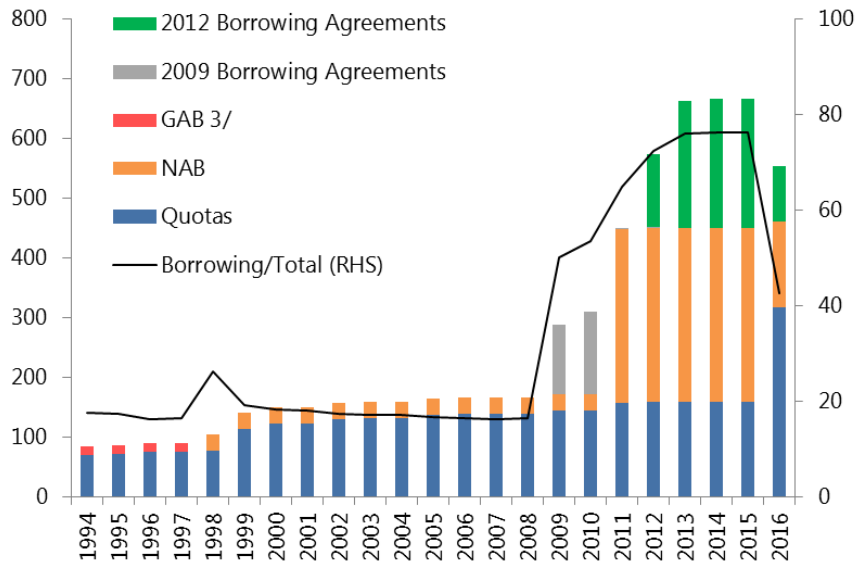
12. Without additional steps, the Fund's lending capacity would decline substantially starting later this year. The Fund's total lending capacity—based on quotas, the NAB, and the 2012 Borrowing Agreements, and after setting aside a prudential balance—currently stands at SDR 686 billion after the entry into effect of the 14th General Quota review and the accompanying roll-back of the NAB (see Box 2). However, absent any further extension, the 2012 Borrowing Agreements are set to start expiring from October 2016 onward and the Fund's total credit capacity would fall to about SDR 470 billion by end-2017 (Figure 4, green line). The Fund's resource envelope would drop even further if the NAB Decision were not renewed later this year for the five-year period starting in late 2017 (Figure 4, red line).⁹

⁷ The Fund has had standing borrowing facilities since the early 1960s. The General Agreements to Borrow (GAB) were conceived to allow industrial nations to lend to the Fund specific amounts of currency to forestall an impairment of the international monetary system. The NAB was established in 1997 based on the concern, in the wake of the Mexican financial crisis, that substantially more resources would be needed to respond to future financial crises.

⁸ Private borrowing is also possible under the Articles of Agreement and has been contemplated in the past. Nevertheless, a broad range of policy, financial, and legal issues would need to be considered before the Fund took such a step. Accordingly, this would only be a medium-term option.

⁹ The current NAB Decision expires on November 16, 2017. Paragraph 19(b) of the Decision requires that the Executive Board take a decision on renewal not later than twelve months before the termination. Renewal of the current NAB decision beyond 2022 will require new legislation from the U.S. Congress and possibly other participants.

Figure 3. Fund Lending Capacity by Source (1994–2016) ^{1/2/}
(in SDR billion, lhs, or percent, rhs)



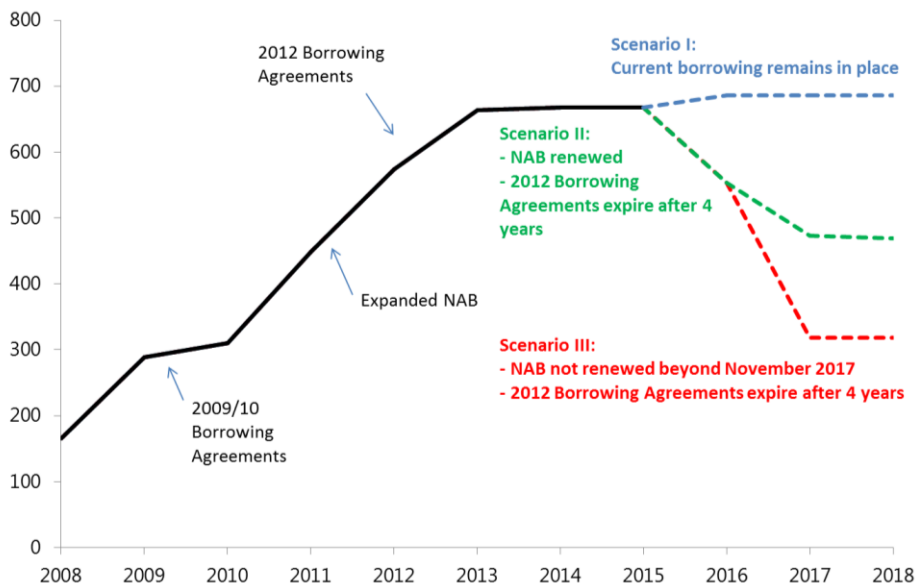
Source: IMF Finance Department.

1/ Lending capacity as measured by usable resources excluding prudential balances.

2/ 2016 is a projection and will only happen if the 2012 borrowing arrangements are not extended.

3/ Includes the associated credit arrangement with Saudi Arabia. The GAB and the credit arrangement with Saudi Arabia remain in place, but they will be available only when a proposal for NAB activation is not accepted by NAB participants.

Figure 4. Illustrative Scenarios on Fund’s Lending Capacity (2008–18)
(in SDR billion)



Source: IMF Finance Department.

1/ Total lending capacity as measured by total usable resources after prudential balances. Data as of February 18, 2016.

Box 1. Response to the Global Financial Crisis: An Unprecedented Resource Mobilization Effort

When the global crisis erupted in 2008, there had not been a general quota increase for about a decade. In January 1998, the 11th Review increased the total quota size to SDR 212 billion, thus continuing a practice dating back more than three decades in which general quota reviews resulted in quota increases which broadly kept pace with global developments. Subsequently, both the 12th and the 13th Reviews were concluded with no general quota increases against the backdrop of sustained strong global GDP growth, ample access to external market financing for most members, and a significant drop in Fund lending. Limited ad-hoc quota increases were agreed in 2006/08 aimed at addressing governance and representation concerns, but did not change the resource envelope in a meaningful way. As a consequence, during this period the Fund's resource base declined significantly relative to a broad range of possible metrics of demand.

In response, the G20 and the IMFC agreed in April 2009 on a large increase in resources through immediate borrowing from members of US\$250 billion, subsequently to be folded into an expanded NAB. As a consequence, the NAB was ultimately increased from SDR 34 billion to SDR 370 billion. It was further agreed that the 14th Review should be advanced and completed by January 2011 (ahead of the January 2013 deadline prescribed under the Articles), recognizing that the Fund was a quota-based institution.¹ An aggregate doubling of quotas was agreed in December 2010 within a package of far-reaching reforms of the Fund's quotas and governance, and to be combined with a corresponding rollback of the NAB.² Following the United States ratification of the 2010 Quota and Governance Reforms and subsequent notification of the acceptance of the Board Reform Amendment on January 26, 2016, the quota increases under the 14th Review could become effective.

Concerns about the adequacy of Fund resources reemerged in 2011 against the backdrop of a deepening euro area crisis and worries about potential spillovers. In September 2011, the IMFC called upon the Fund to undertake a review of the adequacy of Fund resources.³ In early November, G-20 Leaders in Cannes committed to ensuring that the IMF continued to have sufficient resources to play its systemic role for the benefit of its whole membership. Subsequently, in 2012, pledges were made by a number of Fund members to lend additional resources to the Fund as a second line of defense. A total of 35 agreements for SDR 282 billion were finalized, of which 34 agreements amounting to about SDR 280 billion are effective. These 2012 bilateral borrowing agreements have served as a second line of defense for tail risk events after the Fund's quota and NAB resources. The agreements have a maximum term of four years and will gradually start to expire, starting with the first set of agreements, in the last quarter of 2016.

^{1/} IMFC Communiqué, April 2009; see also G20 London Summit—Leaders Statement, April 2, 2009. A general SDR allocation of around \$250 billion provided additional resources to the membership and became effective in August 2009.

^{2/} Resolution No. 66-2, adopted December 15, 2010.

^{3/} IMFC Communiqué, September 2011.

Box 2. Calculating the Fund's Overall Lending and Forward-Commitment Capacity

The Fund's total resources are composed of total quotas of all members and commitments of creditors under the NAB and bilateral arrangements. As explained below, not all these resources are directly usable to support the Fund's lending operations. The Fund's lending capacity, or firepower, is therefore smaller than the amount of total resources.

Lending capacity or credit capacity represents resources that are usable overall for the Fund's lending activities. It is the most relevant metric for an assessment of the adequacy of the Fund's resources.

- For quota resources, it comprises quota resources of members in the Financial Transactions Plan (FTP), i.e., members with a balance of payment position deemed sufficiently strong to provide resources to other members in need. A prudential balance of 20 percent is also set aside to ensure that members' reserve tranche positions are liquid and can be counted as reserve assets.
- Lending capacity of NAB resources is the total amount of NAB credit arrangements, minus the credit arrangements of participants that have not yet adhered to the NAB Decision or are not currently in the FTP, and minus a prudential balance of 20 percent that is needed to ensure full encashability of NAB claims.
- For the 2012 Borrowing Agreements, the lending capacity is the total of amount of effective agreements, minus a prudential balance of 20 percent.

Forward commitment capacity (FCC) measures resources that are available for new financial commitments over the next 12 months. It is relevant to monitor the Fund's liquidity at any point in time. It is equal to usable resources that are uncommitted, plus repurchases one-year forward, less repayments of borrowing due one-year forward, and less the prudential balance. The FCC comprises only quota and activated borrowed resources. Following the deactivation of the NAB effective February 25, 2016, the FCC currently contains only quota resources. The 2012 Borrowing Agreements are not included in the FCC as they can only be activated if (i) the NAB is activated and (ii) the modified FCC (i.e., the FCC stemming from quotas and NAB resources) falls at or below the activation threshold determined in the Borrowing Guidelines (which is currently set at SDR 100 billion).

Fund's Key Financial Indicators

(in SDR billion)

	End-2015			After 14th review quota increases and NAB rollback		
	Nominal amount	Lending capacity	FCC	Nominal amount ^{1/}	Lending capacity ^{1/}	FCC ^{2/}
Quota	238.2	158.7	125.9	477.0	317.9	275.5
NAB	370.0	291.7	183.0	182.4	143.6	-
2012 Borrowing Agreements	271.2	217.0	-	280.4	224.3	-
Total	879.4	667.3	308.9	939.8	685.7	275.5

Source: IMF Finance Department.

^{1/} Assumes that quota payments of all members have been completed.

^{2/} Estimates only. Reflects the deactivation of the NAB and a NAB/quota financing ratio of 1:1 for eligible existing commitments.

THE FUND'S FINANCING ROLE IN THE PERIOD AHEAD

13. The adequacy of Fund resources over the medium term needs to be assessed against the potential demands of its membership. The Fund currently provides financing instruments for crisis prevention and crisis resolution, to address actual, potential, or prospective balance of payment needs, as part of a multilayered GFSN, which also comprises countries' reserve holdings, bilateral swap lines, regional financing arrangements, and market-based instruments.¹⁰ The resources needed to fulfill this function will depend on the expected global economic environment, which—together with access to financing from other layers of the GFSN—determines the membership's potential demand for Fund resources. Additional resource implications could arise if the Fund were to broaden its global financing role, for instance to help address some remaining weaknesses in the IMS/GFSN.

14. The global economic environment is changing, driven by a series of structural shifts and ongoing conjunctural transitions. These changes are likely to increase the risk of systemic stress and will thus have implications for the financing needs of the Fund's membership in the coming years.

Rising interconnectedness facilitates crisis transmission

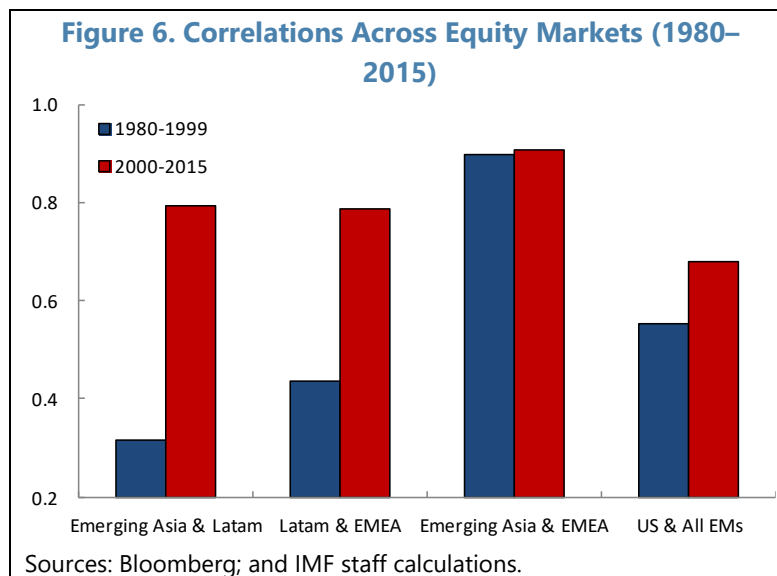
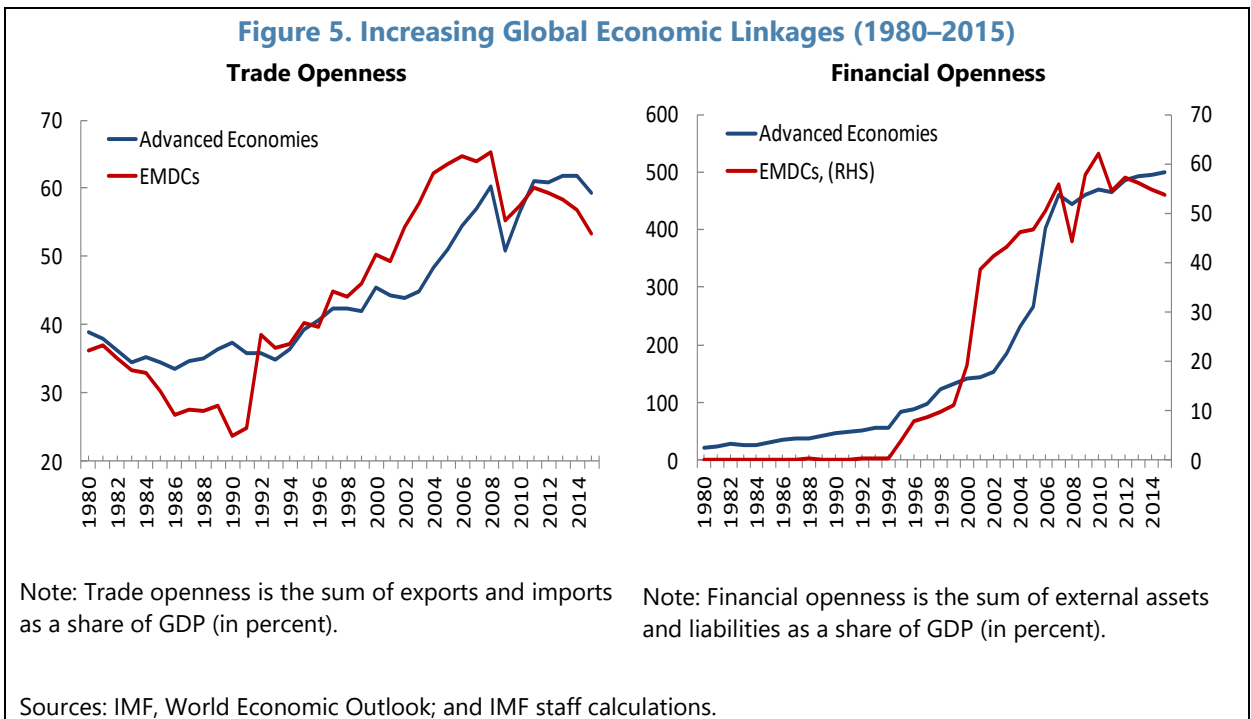
15. Global economic linkages have increased dramatically over the past two decades, reflecting an unprecedented rise in cross-border trade and, particularly, financial flows (Figure 5). Over time, the rise in financial interconnectedness has increased correlations among asset markets, exposing countries to common global shocks and engendering synchronized global financial cycles (Figure 6).¹¹ Importantly, these global financial cycles generate a potential spillover channel through which the financial conditions of systemically important countries can easily and quickly propagate throughout the rest of the world. An early symptom of these trends has been the observed shift in the principal drivers of balance of payments stress from the current account to the capital account.

16. While economic integration promotes international risk diversification and a more efficient allocation of resources, it may also increase systemic risks. Deeper economic and financial interconnections have multiplied channels of shock transmission across borders, contributing to an upward trend in the magnitude of financial spillovers with a significant spike during the global financial crisis. In such an environment, even a localized liquidity shock can quickly spread, raising the likelihood of a large-scale need for financing. Moreover, as

¹⁰ See [Strengthening the International Monetary System—A Stocktaking](#), (2/22/2016).

¹¹ As discussed in [Global Liquidity—Issues for Surveillance](#), (4/12/2014), increased synchronization of fluctuations in asset prices might have reflected the expanding role of global common financial factors.

interconnections become more complex, contagion and herd behavior are likely to amplify shocks through gatekeepers and systemic countries.¹²



¹² Indeed, the correlation between financial interconnectedness and the likelihood of financial crisis has been well documented in recent studies (e.g. [Strengthening the International Monetary System—A Stocktaking](#), (2/22/2016)); Minoiu et. al (2013); Espinosa-Vega and Russell (2015).

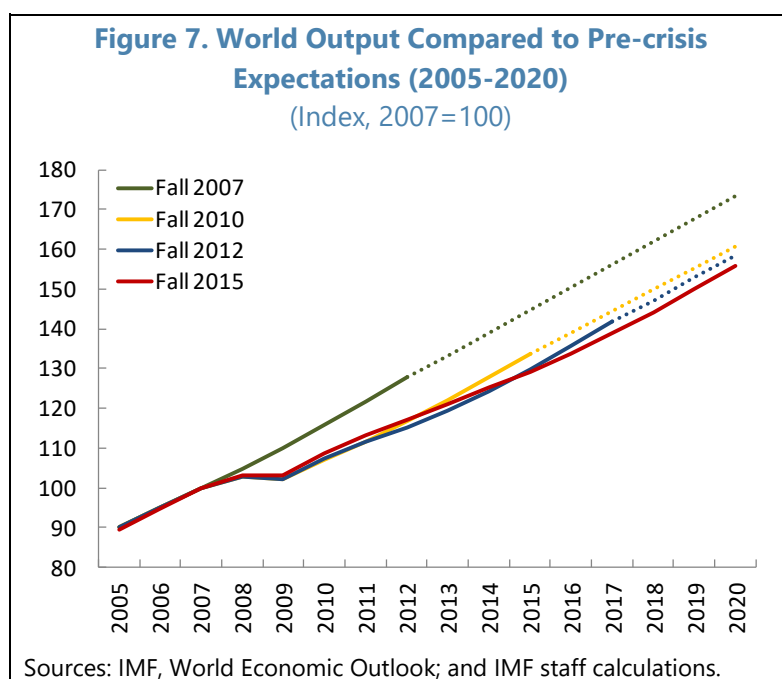
A period of elevated uncertainty, volatility, and vulnerability lies ahead

17. The medium-term global outlook is characterized by unusually high levels of uncertainty and risk as a number of transitions run their course.

- ***A major transition relates to diverging monetary stances in advanced economies and the eventual unwinding of unconventional policies.*** Over the next few years, the recoveries in the United States, the euro area, and Japan are expected to proceed at different paces, leading to a divergence in monetary policies. Over a longer time horizon, financial markets will also need to absorb the staggered reversal of the massive central bank balance sheet expansions in reserve-currency economies. In this process, intermittent risk-on and risk-off periods of high volatility could well become the new normal. In such an environment, sharp portfolio adjustments could ensue and trigger sudden capital flow reversals, a high degree of exchange rate (or reserve) volatility, and increased funding pressures for member countries.
- ***The rebalancing of growth in China is another key transition.*** While both desirable and necessary, this rebalancing could be bumpy and generate large spillovers in emerging market and developing countries (EMDCs) and also in advanced economies (AEs). In this environment, bouts of heightened volatility could become sharper and affect asset markets across the globe as recent episodes of broad-based price corrections have already shown.
- ***Low commodity prices also raise important challenges and pressures.*** As recent data has shown, the impact of the sharp price drop has added uncertainty to the outlook for growth and financial stability. The risk of further large commodity price swings also remains high and such swings could again prove disruptive, both for commodity exporters and importers.
- ***Finally, the global economy is facing shocks of non-economic origin.*** For instance, refugee flows triggered by geopolitical conflicts and global epidemics already have a significant effect on some countries and regions, and, if left unchecked, could have significant spillover effects on the global economy. Furthermore, intensifying effects of global climate change could increase the frequency and costs of natural disasters.

18. At the same time, vulnerabilities across the membership remain elevated and could rise further in the period ahead.

- Many economies could face sharply lower medium-term growth prospects.** In advanced economies, population aging and protracted crisis legacies—notably financial sector weakness, high public debt ratios, private debt overhangs and hysteresis effects in labor markets—are expected to weigh on potential growth rates (Figure 7).¹³ In addition, EMDCs are facing major headwinds. In particular, the external conditions that supported more rapid convergence over the last decade—namely, buoyant global trade and high commodity prices, driven in part by very strong growth in China and easy financing conditions—are not expected to prevail in the coming years. Reflecting these headwinds and the growth slowdown in advanced economies, emerging market growth has slowed for the fifth year in a row in 2015.¹⁴



- Financial vulnerabilities have also increased.** Legacy issues in advanced economies, such as high public and private debt, an unfinished financial sector reform agenda, some critical gaps that remain in the euro area architecture, and potential political tensions could generate additional headwinds by denting confidence. In EMDCs, reliance on rapid credit creation allowed the economies to sidestep the worst impacts of the global crisis but also led to sharply higher leverage of the private sector, accompanied by rising foreign currency-denominated debt and balance sheet mismatches. A significant share of the credit growth has been financed by surging cross-border capital flows to EMDCs (Figure 8), resulting in significant increases in gross external liability positions (Figure 9).¹⁵ During risk-off episodes,

¹³ For example, as discussed in Gordon (2014) *"The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections,"* income growth in the 25 to 40 years after 2007 may be much slower, particularly for the great majority of the population, owing to a number of headwinds.

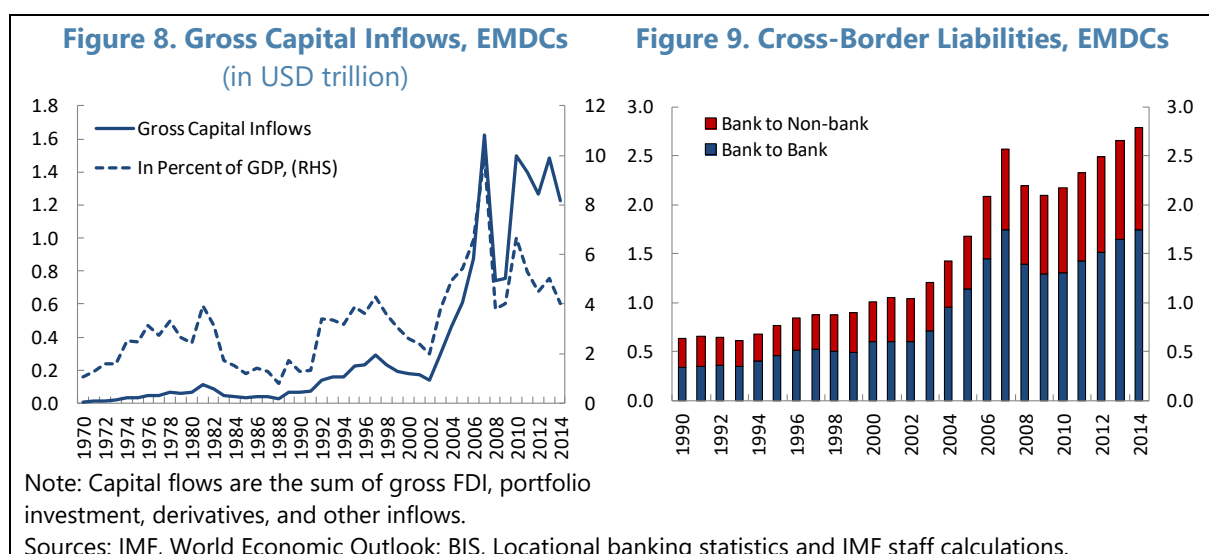
¹⁴ See discussions in L. Cubeddu et al (2014), *Emerging Markets in Transition: Growth Prospects and Challenges*, (6/12/2014).

¹⁵ For instance, as discussed in the IMS paper, while net flows between the US and EU were negligible prior to the crisis, the sheer size of underlying gross flows led to stock positions that created large-scale contagion risks

(Continued)

these positions could unravel quickly on a large scale, resulting in more frequent and widespread financial stress, including liquidity shortages in foreign currency. Globally, several financial market fragilities could amplify the impact of a decompression in market risk premiums and thus heighten the financial stability challenges.

19. The low-growth environment will tend to amplify existing and emerging vulnerabilities. For example, balance sheet vulnerabilities of corporates, households, and banks will take far longer to work out when productivity and profitability are low. Under such circumstances, any adverse shift in market sentiment could escalate and cause major capital outflows, sudden losses in liquidity and funding pressures, making economies more prone to crises.¹⁶



20. At the same time, the room for policy maneuver has generally narrowed. In many advanced countries, monetary policy is already carrying a heavy burden in supporting growth, with policy rates at or below zero and heavy reliance on unconventional policies. In addition, public and private balance sheets remain weak and in need of repair. In EMDCs, policy space to support demand has also narrowed, as public and private debt and spreads have risen, and lower commodity prices are putting pressure on fiscal positions. Inflation has also picked up in some large emerging economies, as currencies have weakened, and net capital inflows have declined, potentially shrinking reserve buffers. Scope for using exchange rate flexibility as a shock absorber varies, depending on foreign exchange exposures.

through valuation effects and network knock-on effects. Furthermore, as discussed in BIS's *International Capital Flows and EMEs' Financial Imbalances: Analysis and Data Gaps*, it is gross stocks rather than net flows that pose most vulnerability.

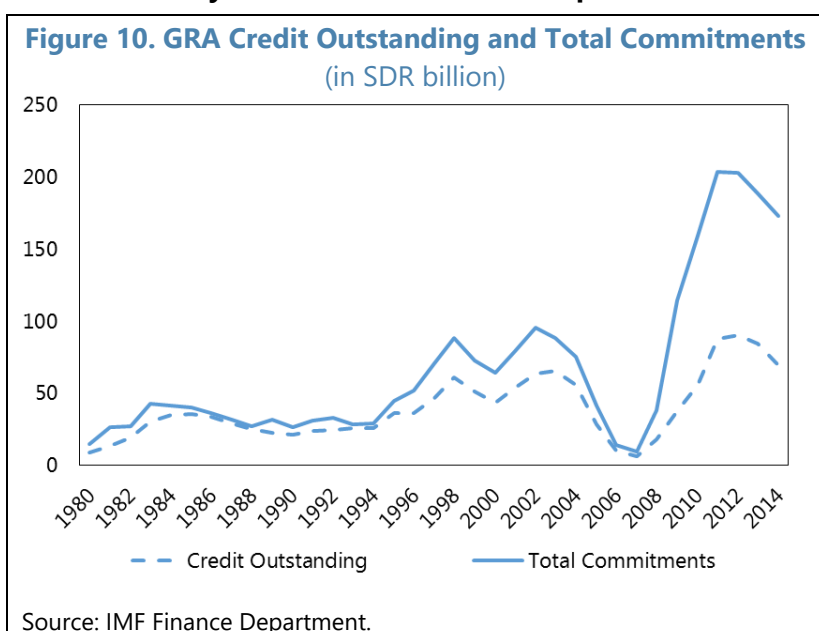
¹⁶ As elaborated in Section V.D., and reflecting these arguments, GDP growth is a statistically significant determinant of Fund lending.

Implications for the potential use of Fund resources

21. In coming years, the membership will need to carefully navigate a period of heightened risks. With limited policy options, a more volatile global financial environment, and a rising number of potential spillover channels, crises may become more frequent, systemic, deeper, and longer than experienced in the past.

22. In this environment, some of the trends observed during the global crisis regarding the use of Fund resources are likely to continue and could deepen further. The

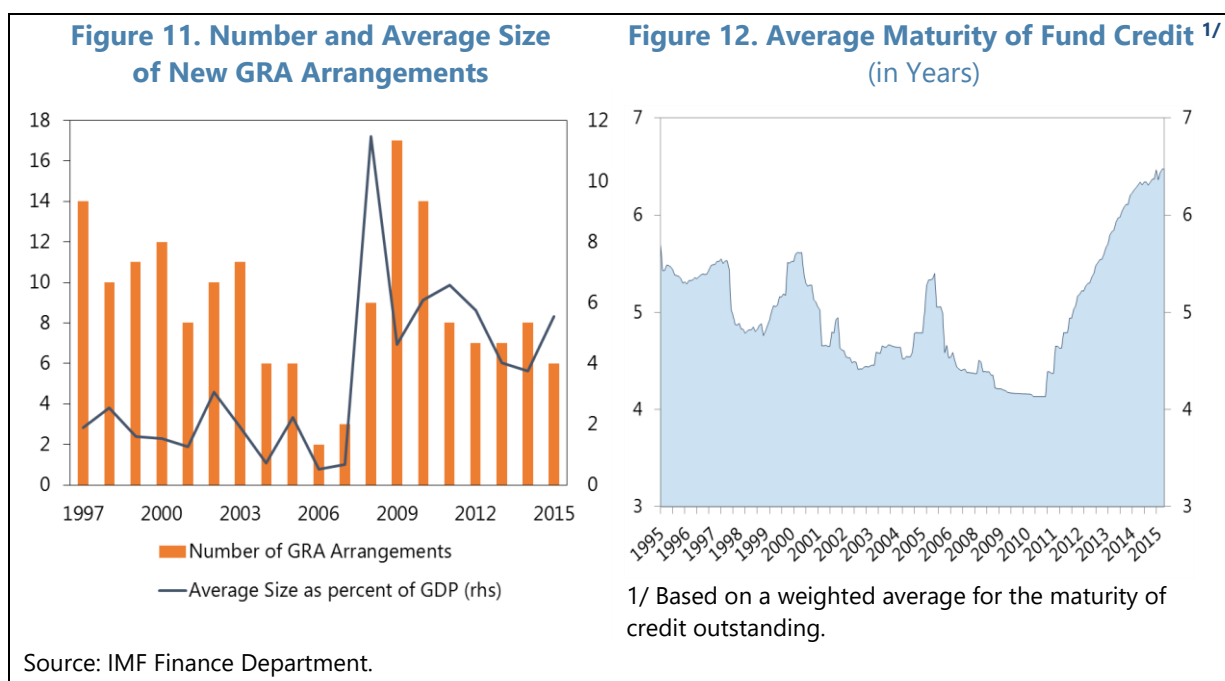
magnitude of Fund lending cycles has already been increasing over time, with both the Fund's credit outstanding and total commitments reaching a record in 2012 (Figure 10). Furthermore, comparing the most recent lending cycle with previous peaks, a number of issues stand out that are likely to remain relevant for the size of the Fund in the period ahead:



- Lending to advanced economies.** The global crisis provided a stark reminder that advanced economies may also require financial assistance from the Fund, potentially on a large scale.
- Fund-supported programs entailing larger access to Fund financing** (Figure 11). The size of access in Fund arrangements relative to individual country GDP was significantly larger during the recent crisis than in the past. In particular, in 2012, Fund credit outstanding for the top ten borrowers amounted on average to over 7 percent of a country's GDP, compared to 5.7 percent in 2003 and 4.3 percent in 1998.
- Larger share of arrangements treated as precautionary.** While much of the increase in precautionary lending was attributable to the new instruments in the Fund's toolkit (FCL, PCL/PLL), financing committed under the SBAs that was treated as precautionary also rose.
- Financing needs for longer periods.** After being on a declining trend between 1995 and 2010, the average maturity of GRA credit outstanding increased sharply since 2010, from 4 years to about 6.5 years, reflecting a surge in large and sometimes successive extended arrangements under the EFF for members with protracted structural challenges (Figure 12).¹⁷

¹⁷ See [Crisis Program Review](#), (11/10/2015).

Furthermore, FCL arrangements have remained active for an extended period given the persisting global downside risks.



23. Unlike in the global financial crisis, where the use of Fund resources was dominated by Fund-supported programs for small members, it seems plausible that also larger members would again approach the Fund for financial assistance in the next systemic crisis. Many sources of vulnerabilities—lower policy buffers, low growth, post-crisis legacies, and lower commodity prices—are expected to affect both large and small members alike. Indeed, recent Vulnerability Exercises have identified a number of large and systemically-important economies with medium or high crisis risks. The next section provides simulations illustrating this point.

24. Going forward, additional resource implications could arise if the membership were to consider strengthening the global financing role of the Fund. Although the thrust of this paper focuses on the Fund’s resource requirements on basis of its current lending policies, strengthening its global financing role as part of the efforts to address a number of shortcomings of the IMS and GFSN would have additional resource implications. These shortcomings, which are discussed in the two related papers, include incentives for excessive reliance on costly self-insurance, which can lead to an inefficient allocation of capital through continued capital flows from EMDCs toward advanced economies, with negative effects on economic convergence.

SIZE OF THE FUND: QUANTITATIVE ANALYSIS

25. This section offers preliminary quantitative considerations on the resource needs of the Fund. Because the IMF is the key player that can pool resources and provide insurance at the global level, its financial firepower is central to the resilience, strength, and efficiency of the GFSN. It has been more than five years since the 14th General Review quota increases were agreed and there is a need to revisit the size of the Fund against the background of the changing global economic environment described in the previous section. For this assessment, it is also important to establish to what extent the other elements of the current, multilayered GFSN, which have also evolved in recent years, can complement the Fund in a potential systemic crisis.

26. Given the uncertainties inherent in projecting the potential demand for Fund resources, a variety of complementary approaches are used in this paper. These include:

- **A metric-based assessment** of quotas and total Fund resources relative to (i) key traditional proxies for demand such as global GDP, trade, capital flows, and international reserves; and (ii) members' external financing needs and gross external liabilities.
- **An access-based assessment** based on past patterns of demand for Fund resources.
- An analysis of the adequacy of total Fund resources based on a **range of historical crisis scenarios involving systemic shocks**, expanding on similar work undertaken in the past, including the extension of the 2012 bilateral borrowing agreements and various NAB activations.
- A complementary **model-based estimate of the use of Fund resources** is also reported as a robustness check of the results.

27. Finally, the quantitative analysis is complemented by qualitative considerations. The discussion sheds light on how to interpret the results from the quantitative approaches, which rely on backward-looking information regarding resource coverage and crisis experiences.

A. Analysis Based on Global Economic and Financial Metrics

Traditional metrics

28. Key demand indicators have been an important reference point in past assessments of the adequacy of Fund resources.¹⁸ While recognizing that such indicators provide only a partial picture, past assessments have typically included metrics relating the Fund's resource envelope to global GDP and trade, capital flows, and international reserves.

¹⁸ See, for example, [Fourteenth General Review of Quotas—The Size of the Fund—Initial Considerations](#), (3/15/2010). The 14th Review also used scenario-based analysis to inform the discussion on the adequacy of the Fund's resources.

29. The evolution of the ratio of Fund resources relative to these metrics over time and the additional resources needed to restore them to levels agreed in past reviews are provided in Figure 13 and Table 1.

- **GDP:** The size of quotas relative to global GDP was an important consideration in past quota reviews. Each of the last four reviews where quota increases were agreed upon (8th, 9th, 11th and 14th) restored the size of the Fund's quota resources to 1.2–1.3 percent of global GDP (Figure 13, blue line). Continuing this past practice would require a 26 percent increase in quotas from their post-14th review level (Table 1.A).
- **Trade and capital flows:** While GDP is an important summary indicator of productive capacity, factors such as increasing interconnectedness, financial deepening, and growing sovereign-financial sector inter-linkages suggest that an economy's potential financing needs are imperfectly captured by its size alone. Hence, metrics related to external flows should feature prominently when assessing the adequacy of Fund resources. In this regard, the Fund's quota resources have steadily declined relative to current payments and capital flows and restoring them to the average of past reviews with quota increases would require more than doubling current quotas.
- **Reserves:** The size of quotas relative to members' own reserves has remained on a downward trend. Although there is some endogeneity in the relation between the size of the Fund and the level of international reserves, this trend is an indication of the need for a larger international liquidity pool.

Because of the large increase in borrowed resources since 2009, the percentage increases in total resources that would be required to meet historical levels for the various indicators would be smaller than those required for quotas (Table 1.B; see also the Tables in Annex II).

External financing needs

30. Estimates of members' external financing needs (EFNs) provide additional perspective. This analysis, which featured also in previous reviews of the size of the Fund, is based on estimates for 92 members with GRA arrangements and outright disbursements since 1990 for which data are available. EFNs have increased almost tenfold in the past 25 years, leading to a decline in the ratio of quotas to EFNs to a historical low of about 25 percent, compared to about 45 percent in 2000 (Figure 14, blue line). The decline is less evident when taking into account borrowed resources, with the total size of the Fund currently covering close to 50 percent of EFNs (Figure 14, green line).

Figure 13. Fund Resources Relative to Economic Indicators ^{1/}
(in percent)

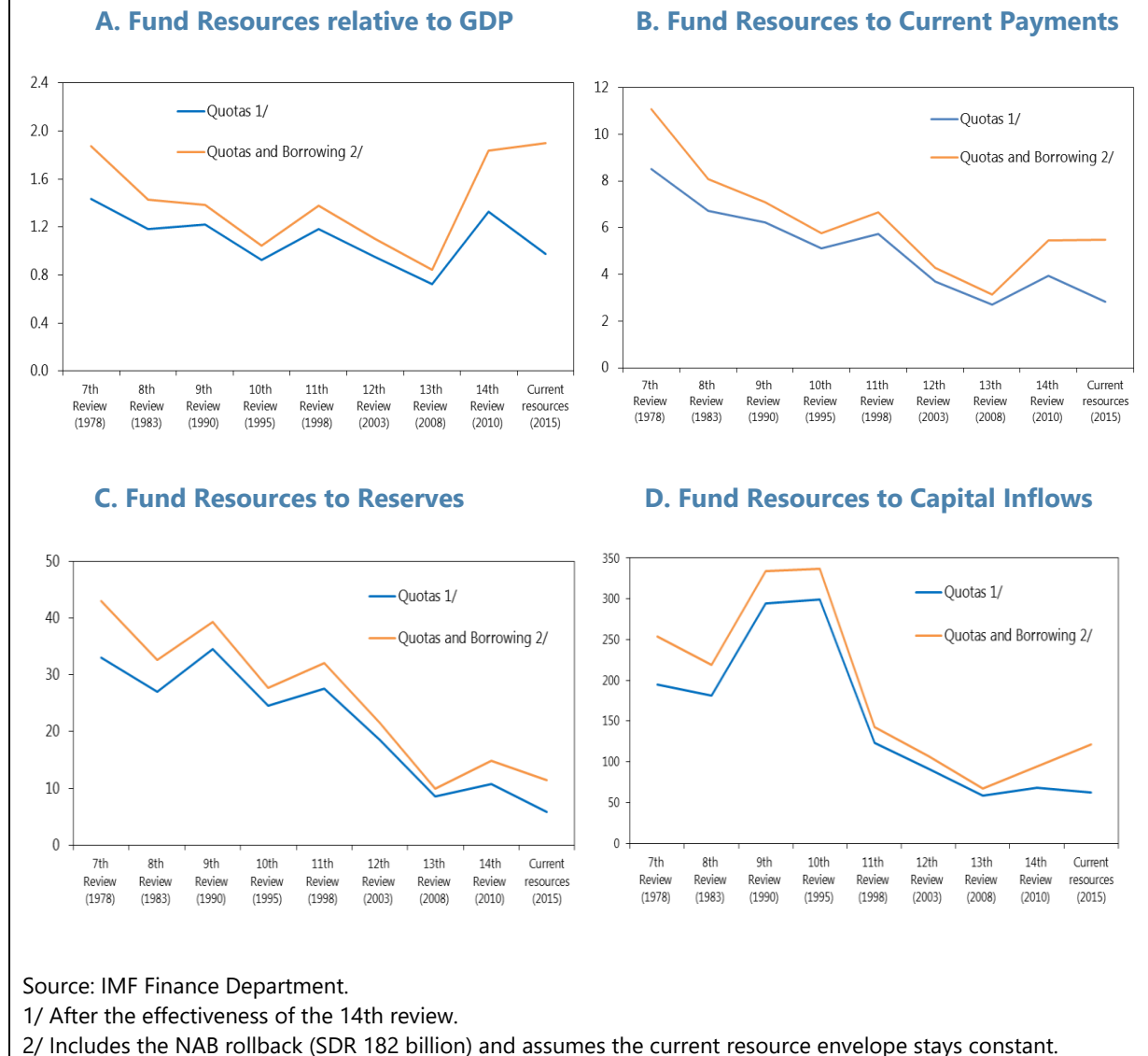
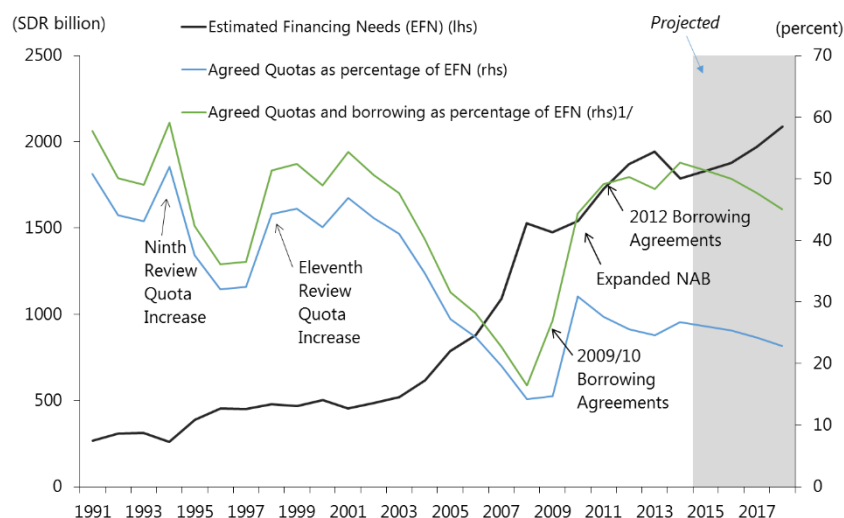


Figure 14. External Financing Needs and Fund Resources

Source: WEO database and IMF staff calculations.

1/ Assumes that the current total resources are maintained beyond 2016.

Gross external liabilities and broad money stocks

31. The adequacy of Fund resources can also be assessed against other relevant measures. The relevance of gross stocks as a source of external vulnerability and measure of financial stability risk has been re-emphasized after the global crisis.¹⁹

- **Gross external liabilities.** As the experience of the global crisis has shown, the rapid build-up of gross external liabilities, especially those at short term, increases the risk of balance sheet stress and liquidity crises.²⁰ Indeed, as external assets might be illiquid and tradable only at impaired value, net external positions might understate underlying vulnerabilities. Figure 15.A shows that, since the mid-1990s, the size of the Fund has declined relative to gross external liabilities, although the increase in total Fund resources post-2008 has somewhat mitigated the decline.
- **Broad money.** Because capital account crises are often accompanied by outflows of resident deposits, broad money (typically M2) is commonly used as a measure to capture the risk of capital flight, especially in members with large banking sectors and very open capital accounts.²¹ Figure 15.B shows that the size of the Fund relative to M2 had declined steadily since the mid-1990s but recovered with the resource mobilization after the crisis.

¹⁹ See Borio and Disyatat (2011), "Global imbalances and the financial crisis: Link or no link?", BIS Working Papers No 346, and Obstfeld (2012), "Does the Current Account Still Matter?" AER Papers and Proceedings.

²⁰ Obstfeld (2011), "International Liquidity: The Fiscal Dimension", Monetary and Economic Studies.

²¹ [Assessing Reserve Adequacy](#), (2/14/2011) and [Assessing Reserve Adequacy – Specific Proposals](#), (12/19/2014).

Table 1. Additional Resources Required to Restore Quotas/Total Fund Resources

A. Additional Resources Required to Restore Quotas
Relative to Economic Indicators 1/

	Additional quotas required (in SDR billion)	Percent increase from current quotas
EFN	673	141
GDP	124	26
Current Payments	481	101
Capital Inflows to EMDCs	850	178
External Liabilities ^{2/}	554	116
Average	536	112
Memo Items:		
Reserves	1,553	325
Variability ^{2/}	589	124

B. Additional Resources Required to Restore Total Resources
Relative to Economic Indicators

	Additional resources required (in SDR billion)	Percent increase from the current resources
EFN	494	53
GDP	(203)	(22)
Current Payments	215	23
Capital Inflows to EMDCs	633	67
External Liabilities ^{2/}	256	27
Average	279	30
Memo Items:		
Reserves	1,472	157
Variability ^{2/}	360	38

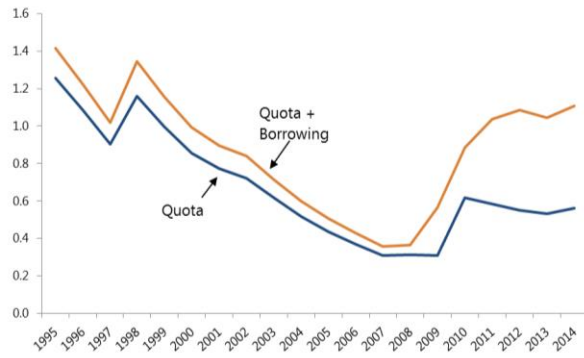
Source: IMF Finance Department, WEO, and IFS.

1/ The amount of resources needed to restore the ratio of the quotas / Total of Fund resources vs. the respective economic indicators to the average level of the last Reviews with quota increases (8th, 9th, 11th and 14th), except for external liabilities where the benchmark is the average value over 1995–2000.

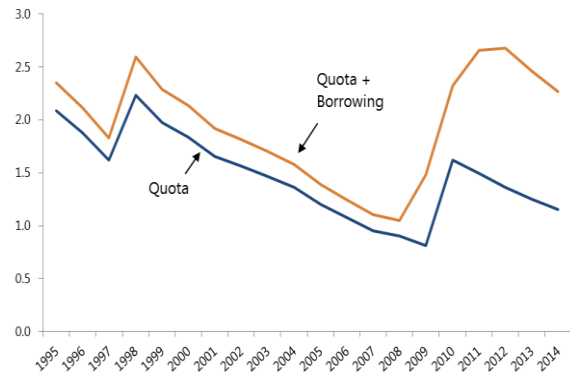
2/ Variability and external liabilities are calculated relative to average of 2009–13 and 2014, respectively.

Figure 15. Fund Resources Relative to Gross External Liabilities and Global M2 1/

A. Relative to Gross External Liabilities



B. Relative to Global M2



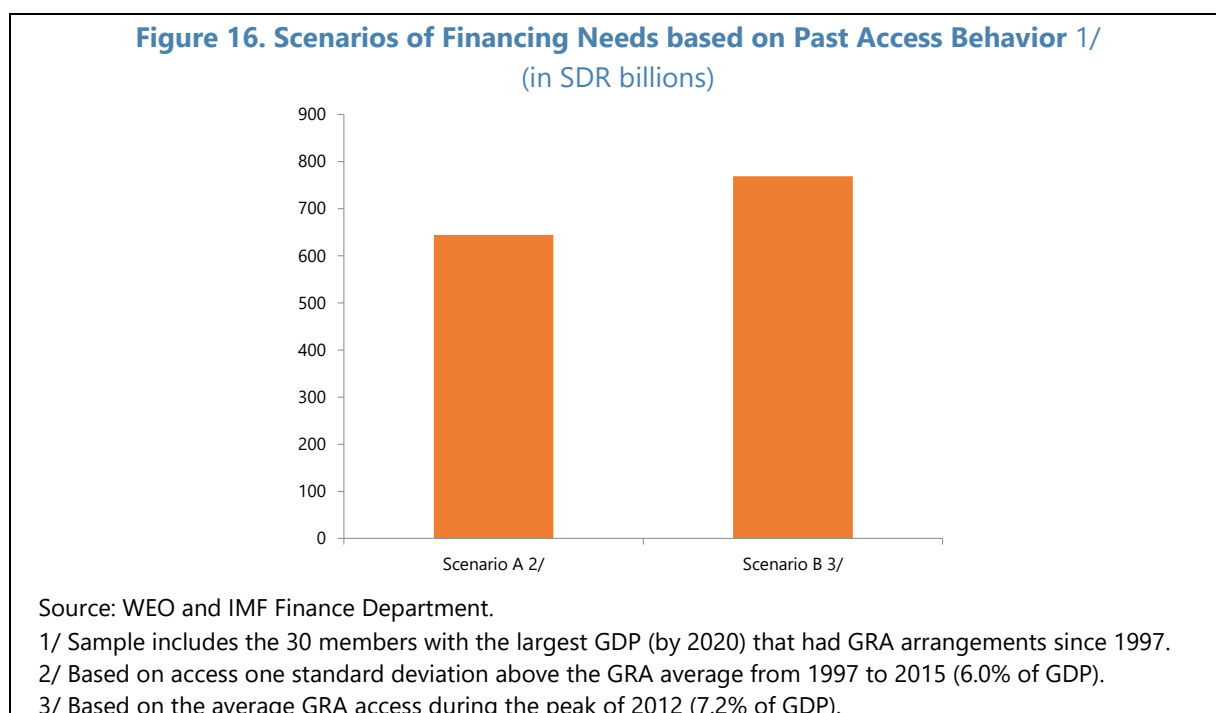
Source: IMF Finance Department, WEO database and IFS.

1/ Includes 25 Advanced Markets, 73 Emerging Markets and 8 Low Income Frontier Markets.

B. Access and Country Size: Simulations Based on Past Use of Fund Resources

32. In contrast to past crisis episodes, the recent crisis did not lead to program requests from larger members. As noted previously, many large EMEs entered the crisis with sizable policy buffers. Moreover, some of the larger EMEs benefitted from the prolonged boom in commodity prices, which extended through the crisis period. As a result, the size of Fund members that requested financing was considerably lower in relation to GDP than during earlier crisis episodes (see paragraph 7). With policy buffers now more diminished in some of the larger EMEs, there is no assurance that this will also be the case in future crises.

33. Against this background, it is useful to explore the demand for Fund resources that could arise in a crisis involving larger EMEs. Assuming access levels similar to those observed in recent years, Figure 16 shows two scenarios of potential demand for Fund resources if the sample of members that may experience financing needs is broadened to include large members that have used Fund resources in the past.²² These scenarios suggest potential financing needs between SDR 645 and SDR 769 billion, depending on the assumed average size of Fund-supported programs (in percent of GDP) based on past patterns. This range would be higher if the observed trend towards larger programs highlighted in the previous section were to continue.



²² Among members that had a GRA arrangement since 1997, the sample includes the 30 members with the largest projected GDP by 2020. The number of members selected is calibrated based on the number of new GRA arrangements in past crisis episodes over a three-year period (Arrangements for 32 members in both 1996–98 and 2008–10).

C. Global Scenarios

34. Scenario analysis offers a rich complementary framework to assess potential financing needs of the membership. Under this approach, the appropriate size of the Fund is determined by three factors:

- **First, the potential demand for financing by members in the event of a systemic shock**, which is determined by both global factors—including international trade volumes and financial flows—and country-specific risks and vulnerabilities.
- **Second, the supply of sustainable financing from sources other than the Fund**, which ranges from self-insurance—where members accumulate international reserves as a buffer against external pressures—to contributions from other regional financial arrangements (RFAs) and bilateral swap arrangements (BSAs).
- **Third, an assessment of the intensity and pervasiveness of shocks the Fund’s resources should be able to cover**, which is to some extent a judgment call. It may depend on the willingness of the membership to carry risk and the likelihood that in case of a severe crisis other instruments can be mobilized to cover the remaining needs.

35. In interpreting the results of this analytical approach, a few caveats have to be kept in mind. First, given that the shocks of the scenarios are based on historical crisis observations, the analysis does not take into account the changing contours of the global economy discussed in the previous section. Accordingly, the estimated financing needs of the membership could underestimate true needs in the period ahead. Second, the analysis implicitly treats Fund resources as a residual, after subtracting the resources provided from other sources (international reserves, RFAs, and BSAs). While this methodology is convenient to take into account other financing sources that may be available to the membership at a specific point in time, it is not to imply that this would necessarily be the most effective and efficient architecture for addressing balance of payments needs considering, for instance, the Fund’s unique ability to pool risks globally.²³ Some further considerations on these issues are provided in the sections below.

Demand for financing

36. The potential financing needs of Fund members are estimated in two steps using various historical global shock scenarios.²⁴ This approach expands on similar analysis in previous discussions of Fund resource needs.²⁵

- In the **first step** of the estimation process, members that would face funding shocks are selected

²³ For a diagnosis of the strengths and weaknesses of the different elements of the GFSN, see [Strengthening the International Monetary System—A Stocktaking](#), (2/22/2016).

²⁴ See Annex 1 for more detail on the underlying methodology.

²⁵ See, for example, [Fourteenth General Review of Quotas—The Size of the Fund: Initial Considerations](#), (3/15/2010).

based on different thresholds of estimated crisis probabilities.²⁶ The lower the threshold, the larger the number of members assumed to face shocks and, thus, the more pervasive the systemic simulated crisis. Overall, four systemic shock scenarios—varying by the degree of pervasiveness—are specified. These range from an extremely pervasive global systemic crisis affecting a large number of economies to a crisis that is largely circumscribed to emerging market and frontier economies (Table 2).²⁷

Table 2. Number of Members included in Various Scenarios

	AEs	EMFEs
a. Extremely pervasive global systematic crises (crisis probability threshold = 1 percent)	28	58
b. Very pervasive systematic crisis (crisis probability threshold = 3 percent)	26	42
c. Pervasive systemic crisis (crisis probability threshold = 5 percent)	14	41
d. Systemic crisis (crisis probability threshold = 10 percent)	1	30

Source: IMF Staff Estimates.

- In a **second step**, for each member selection, possible ranges of global financing needs are estimated based on different assumptions of the intensity (severity) of shocks, which are assumed to last for two years with declining intensity (see Table A1 in Annex I).²⁸ Financing needs arise from negative shocks applied to FDI inflows, rollover rates of short- and medium-term external debt, and deposit outflows. The severity of these shocks is calibrated based on the empirical distribution of financial crises in emerging market economies over the past 30 years using Kernel density estimators.²⁹ Simulations are provided for shocks broadly in line with the

²⁶ The sample includes advanced, emerging market, and frontier economies. Probabilities of crises are obtained from the underlying estimates of the IMF's Vulnerability Exercise based on a non-parametric, threshold-based, signal extraction approach to generate crisis probabilities. For advanced economies, a crisis is defined as a financial crisis as discussed in Laeven and Valencia (2012); for emerging market and frontier economies, a crisis is defined as a sudden-stop where there are significant declines in private net capital flows as discussed in Basu and Chamon (2015). For a given probability threshold, members with crisis probabilities above the threshold are assumed to face funding shocks.

²⁷ See Annex I for further details.

²⁸ This assumption, which is unchanged from previous exercises, appears conservative in light of the experience of the global financial crisis, where financing needs were more protracted than in earlier crisis episodes (see paragraph 22).

²⁹ Due to insufficient available observations, the scenario for advanced economies is similar to the one for emerging markets. Given the greater depth and resilience of debt markets in advanced economies and the existence of significant foreign assets and alternative financing backstops, however, the decline in rollover rates of external debt is assumed to be more moderate than that for emerging markets.

90th, 85th, 75th, and 65th percentile of the distribution, corresponding to different degrees of global “tail” risks.

37. The resulting potential global financing needs vary depending on the pervasiveness and the intensity of the shocks (Table 3). Estimates range from SDR 291 billion in the case corresponding to the least pervasive crisis with moderate crisis intensity (Scenario D, 65th percentile) to SDR 2,563 billion in the case corresponding to the most pervasive crisis with very high crisis intensity (Scenario A, 90th percentile). In past assessments of Fund resources, similar scenario analysis has often focused on the 65th to 75th percentile range. However, given that this analysis is based on information from historical crises and does not take into account of forward-looking factors such as the increasing vulnerabilities and greater potential crisis transmission channels discussed previously, it would seem prudent to focus at least on crises that are somewhat more pervasive and intense, as depicted by the 75th and 85th percentiles of Scenarios B and C. The simulation results for these Scenarios suggest central estimates ranging from SDR 838–1,413 billion (see green quadrant in Table 3).

Table 3. Total Demand for Financing in Various Stress Scenarios
(in SDR billions)

	Crisis Intensity (percentile)			
	65th	75th	85th	90th
a. Extremely pervasive global systemic crisis	991	1,429	2,019	2,563
b. Very pervasive systemic crisis	698	994	1,413	1,809
c. Pervasive systemic crisis	589	838	1,205	1,542
d. Systemic crisis	291	396	503	595

Source: IMF Staff Estimates.

Supply of non-Fund financing

38. Self-insurance and external financing sources can be used to cover potential financing needs. Members can draw on previously accumulated international reserves. In addition, some members have access to other external financing sources such as Regional Financial Arrangements (RFAs) or Bilateral Swap Arrangements (BSAs).³⁰

39. International reserves are assumed to be the first line of defense in meeting a country’s financing needs, although there are limits to reserves use. Reserves can reduce the likelihood of balance of payments pressures through their signaling effect and can also be used for intervention,

³⁰ Traditionally, multilateral and regional development banks have also provided some balance of payments assistance to members in crises but these amounts have typically been relatively small for emerging market economies.

as warranted, if such pressures materialize.³¹ However, central banks are often reluctant to resort to the heavy use of reserves during crisis periods as this could send a negative signal to markets.³² Reflecting this, nine of the largest emerging market economies refrained entirely from using reserves during the global financial crisis.³³ Consequently, in the scenario analysis, reserves are assumed not to fall by more than 25 percent relative to their initial level, and to remain in the recommended range indicated by the Fund's metric for assessing reserve adequacy (ARA), as discussed further in Annex I.

40. Resources available from RFAs have increased substantially in the last few years but there continues to be uncertainty about their availability in case of a systemic crisis.³⁴ First, access to RFAs remains uneven across members and many of them have no access to any RFA. Second, risk pooling at a regional level may not provide effective protection against shocks that affect the entire region. Third, most of the larger RFAs still remain untested, with the exception of the European Stability Mechanism (ESM) and the European Union's (EU) Balance of Payments assistance. Finally, members of RFAs might find it difficult to impose conditionality on neighboring members if adjustment is warranted, and this concern might only be mitigated by the involvement of the Fund.³⁵ Given the wide disparity in the modalities of operation of RFAs, specific assumptions—such as whether a crisis country belongs to a RFA and the corresponding terms and conditions of the agreements—are applied in calculating financing provided by each RFA (see Annex I).

41. Active bilateral swap lines are taken into account in the analysis depending on their specific characteristics and purposes. Specifically, standing unlimited BSAs among major central banks are included, although most beneficiaries do not have a financing need according to the simulations. The remaining arrangements are largely renminbi (RMB) swaps between China and a number of AEs and EMDCs. These swap lines have been established largely to provide liquidity for offshore RMB transactions and facilitate trade. The extent to which these swaps could be activated in case of a protracted balance of payments crisis is not fully clear and the calculations therefore exclude them.

42. The total financing that could be provided by sources other than the Fund depends on the shock scenario. On average, self-insurance and RFAs could jointly cover approximately one-third to one-half of total global financial needs (Table 4). In nominal terms, the central estimates for available non-Fund financing range between SDR 289–557 billion (75th/85th percentile of Scenarios B and C).

³¹ See [Assessing Reserve Adequacy—Further Considerations](#), (11/13/2013).

³² Aizenman, J., and Y. Sun (2009), "The financial crisis and sizable international reserves depletion: From 'fear of floating' to the 'fear of losing international reserves'?", NBER Working Paper 15308.

³³ Shafik, M. (2015) "Fixing the global financial safety net: lessons from central banking", Speech at the David Hume Institute, Edinburgh, Scotland, September 22, 2015.

³⁴ See [Strengthening the International Monetary System—A Stocktaking](#), (2/22/2016).

³⁵ Some RFAs, such as the Chiang Mai Multilateralization Initiative (CMMI) or the Contingent Reserve Arrangement (CRA) of the BRICS, require a Fund-supported programs for access to financing above a certain, low, threshold.

Table 4. Supply of Non-Fund Financing in Various Stress Scenarios
(in SDR billions)

	Crisis Intensity (percentile)			
	65th	75th	85th	90th
a. Extremely pervasive global systemic crisis	489	680	864	933
b. Very pervasive systemic crisis	285	394	557	596
c. Pervasive systemic crisis	210	289	435	577
d. Systemic crisis	110	116	120	126

Source: IMF Staff Estimates.

Financing needs to be covered by the Fund

43. The potential calls on Fund resources under alternative stress scenarios are summarized in Table 5. The financing needs to be covered by the IMF are obtained by subtracting from the estimated total demand the financing that could be mobilized from other sources such as RFAs or self-insurance. This remaining “financing gap” remains sizable and varies depending on the scenario, with the central estimates ranging between SDR 550–856 billion (75th/85th percentile in Scenarios B and C).

Table 5. Potential Call on Fund Resources in Various Stress Scenarios
(in SDR billions)

	Crisis Intensity (percentile)			
	65th	75th	85th	90th
a. Extremely pervasive global systemic crisis	502	749	1,155	1,630
b. Very pervasive systemic crisis	413	600	856	1,214
c. Pervasive systemic crisis	379	550	769	965
d. Systemic crisis	181	280	383	469

Source: IMF Staff Estimates.

D. Econometric Approach

44. As a robustness check, staff also assessed potential resource needs using an econometric model of the determinants of Fund lending.³⁶ The model, which is estimated for a panel of 90 advanced, emerging market and frontier economies over the period 1992–2014, is used to obtain the likelihood and size of potential GRA commitments for members during the period 2016–17, under a plausible crisis scenario (see Box 3). Consistent with the discussion in earlier sections, the global shock used for the model estimates is based on two main assumptions: (i) a volatility shock similar to 2008–09³⁷ and (ii) a slowdown in GDP growth of each member by one standard deviation below the average.³⁸ The results yield an estimate of new GRA commitments for 43 members over the period of 2016–17 in the range of SDR 770 to 867 billion, depending on the estimated size of the GRA commitments (see Table 6).

Table 6. Potential Call on Fund Resources in a Global Shock Scenario
(in SDR billions)

Commitment Size	Downside Scenario
Model prediction 1/	867
7.2% of GDP 2/	770

Source: IMF Staff Estimates.

1/ Based on the Heckman 2-step approach described in Box 3.

2/ Based on average access during the 2012 peak.

³⁶ For further details, see Box 3 and “*IMF Lending in an interconnected world: is the Fund large enough?*” (Poulain and Reynaud, forthcoming).

³⁷ The assumed shock is an increase in the VIX to 30–32 on average in 2016–17.

³⁸ Other assumptions are: a 10 percent increase in external financing needs, as defined in subsection A.; Government stability and the credit gap are kept constant in 2016–17; WEO forecasts are used for the remaining variables.

Box 3. Econometric Model of the Determinants of Fund Lending

The model can be seen as reduced-form estimates of the decision by a member to request a GRA arrangement and by the Fund to agree to such a request.

First, we estimate a panel probit model that uses country-specific economic, financial and institutional variables¹, as well as global variables

(VIX, 3-month US interest rate) to estimate the likelihood that a member requests new GRA financing. The unbalanced panel dataset covers 90 advanced and emerging market economies over 23 years with both drawing and precautionary arrangements. The significance of the external variables suggests that homegrown vulnerabilities can lead a member to seek IMF financing increases when global monetary conditions tighten and risk aversion increases. Projected new arrangements for years 2016–17 are generated as out-of-sample predictions from the statistical model under a downside scenario.

Independent Variables	dy/dx	Std. Error	P value
Past program	0.0097	0.0041	0.019 **
External Financial Needs	0.0763	0.0308	0.013 **
GDP growth	-0.0024	0.0011	0.028 **
GDP per Capita	-0.0270	0.0074	0.000 ***
GDP	0.0043	0.0047	0.352
Credit Gap	0.0008	0.0004	0.034 **
Exchange Rate Variation	-0.0333	0.0317	0.293
Government stability	-0.0144	0.0039	0.000 ***
Potential Contagion	-0.0237	0.0133	0.075 *
3-month US rate (variation)	0.0105	0.0062	0.090 *
VIX	0.0041	0.0014	0.002 ***
Pseudo R2	0.31		
Observations	1694		
Members	90		
Arrangements	116		

Notes: The table reports the marginal effects of the panel probit estimations using random effects. A constant is estimated but not reported. ***, **, and * denote significance at the 1, 5, and 10 percent respectively.

Subsequently, two methodologies are employed to estimate potential use of Fund resources:

- In the first, the size of Fund arrangements for members selected by the probit model is simply assumed to be a fixed proportion of GDP, based on historical precedents.
- The second methodology uses, a Heckman 2-step setup. It estimates both the probability that a member will have an arrangement with the IMF in a given year and, conditional on a member having an arrangement, the size of the arrangement. Here the average size of Fund-supported programs for the 43 members affected would be 6.2 percent of GDP, but with 5 large programs above 10 percent of GDP.

^{1/} All lagged: External financing needs (in percent of GDP), GDP growth, log of GDP per capita, log of GDP, credit gap (deviation of credit-to-GDP ratio from its trend), variation of bilateral nominal exchange rate vs. the US dollar, and government stability. A “potential contagion” variable $px_{i,t}$ is also calculated for each country i as:

$$px_{i,t} = \sum_{j \neq i}^{n-i} \frac{x_{j,t}}{\varphi_{j,i,t}^{e,f,d}}$$

Where $x_{j,t}$ is the GDP growth of member j and $\varphi_{j,i,t}^{e,f,d}$ a measure of interconnectedness between members i and j , measured by trade flows among trade partners.

E. Other Considerations

45. Deciding the intensity and pervasiveness of shocks that Fund resources should cover requires judgment. It depends on the membership’s assessment of the appropriate role of the Fund within the global financial safety net, and in particular on the role that Fund financing should play relative to domestic policies, accumulation and use of reserves, and recourse to other financing instruments.³⁹

46. A number of factors suggest that the quantitative analysis in the previous subsections may underestimate the adequate level of resources of the Fund going forward.

- First, as noted earlier, the approaches used to estimate the financing needs of the membership, in particular the global scenario analysis and the econometric model of the determinants of Fund lending, are based on historical crisis experiences. However, the period ahead is likely to be characterized by heightened volatility and economies that will be more vulnerable than in the past in light of low growth prospects and narrowing policy space. As a result, crises could be more pervasive and intense amid rising levels of economic and financial integration. Accordingly, net financing needs and, by extension, the appropriate size of the Fund for any given historical crisis risk threshold could be larger than suggested by the quantitative analysis. This would be consistent with a continuation of the already observed trend toward larger Fund-supported programs in recent years. Some of the additional demand could stem from large, emerging economies, which did not resort to Fund financing during the global financial crisis but have since used up much of their policy buffers.
- Second, based on the most recent crisis experience, the Fund should also brace for financing needs that could be more persistent than in the past in view of longer program and repayment periods. This could be driven by more protracted underlying structural challenges in some of the members hit by a crisis, and by the prospect of a prolonged period of heightened uncertainty and external volatility owing to the staggered normalization of unconventional monetary policies in advanced economies. Among others, this could potentially lead to a more protracted demand for Fund arrangements treated as precautionary.⁴⁰
- Third, in a severe crisis scenario, the Fund’s lending capacity would mechanically decline as members under stress drop out of the Financial Transactions Plan (FTP). If a member in the current FTP is no longer deemed to have a sufficiently strong external position, the member

³⁹ Moral hazard concerns may also feature, but appear unimportant in practice. A broad consensus has emerged in past Board discussions that this risk is low, owing to the strong framework in place to limit the risk of losses to the Fund, including strong program design. On the creditor (Fund) side, there is little evidence to date of superfluous lending.

⁴⁰ The 2008 crisis highlighted the importance of having in place effective shock buffers for “crisis bystanders.” See further discussions in [Review of Flexible Credit Line, the Precautionary and Liquidity Line, and the Rapid Financing Instrument](#) (1/28/2014).

would be excluded from the FTP.⁴¹ This would reduce the Fund's holdings of usable quota resources and the FCC. Usable NAB resources would also decline if the affected member is a NAB participant. As a result, the Fund's lending capacity would decline for a given total resource envelope. For example, under scenario C with a crisis intensity in the 85th percentile (Table 5), the net reduction in the supply of usable resources would reach about SDR 70 billion based on the current resource envelope.⁴²

- Fourth, the scenario analysis presented earlier is based on relatively demanding assumptions about the mobilization of financing from sources other than the Fund. Several of these sources have not yet been tested in a crisis.
- Last but not least, the Fund's actual lending capacity when the next crisis strikes will likely be lower than the total lending capacity, depending on the amount of GRA credit outstanding and commitments at that time. For instance, as of January 28, 2016 total outstanding lending commitments represented SDR 127.8 billion.⁴³

47. At the same time, a few factors could work in the opposite direction.

- First, the scenario analysis does not consider policy adjustments beyond the baseline assumptions in the respective member forecasts for 2016 and 2017. Additional adjustments could reduce financing needs in some cases.
- Second, recent changes to the Fund's lending framework with regard to the treatment of sovereign debt could reduce demand for Fund financing compared to past experience, as new rules could trigger earlier action on the debt and thus bail in more creditors.⁴⁴
- Third, there is a possibility that major central banks could grant temporary swap lines on an ad hoc basis to selected partner economies, although this is far from certain given the domestic policy mandates of most central banks.
- Fourth, the financial regulatory reforms that have been implemented since 2008 to make financial systems safer could reduce the likelihood and/or cost of financial crises in the future.

⁴¹ The exclusion is subject to a Board decision. This would be the case, for example, where a FTP member borrows from the Fund.

⁴² Further decline in the FCC would be possible if the affected member(s) also purchases its reserve tranche, or requests early repayment of their NAB claims.

⁴³ Total commitments are calculated as the sum of GRA credit outstanding plus aggregate undrawn balances under active GRA arrangements.

⁴⁴ See further discussions in [The Fund's Lending Framework and Sovereign Debt—Preliminary Considerations](#), (6/13/2014) and [The Fund's Lending Framework and Sovereign Debt—Further Considerations](#), (4/9/2015).

PUTTING IT ALL TOGETHER

48. The Fund needs to be adequately resourced to meet the evolving needs of its membership. This central imperative has been emphasized consistently by the IMFC and the G20, with the IMFC's latest communique again stressing the membership's commitment to a maintaining a strong, well-resourced, and quota-based IMF.⁴⁵ An adequately resourced Fund provides confidence to members and financial markets, helps prevent negative feedback loops from taking hold, and fosters more favorable outcomes in crisis times. An adequately resourced Fund also establishes credibility, thereby limiting *ex post* financing needs by preventing shocks from being amplified and propagated. Furthermore, it can help address broader weaknesses of the IMS such as global imbalances rooted in excessive reserve buildup.⁴⁶

49. The direct financial costs to the membership of an adequately resourced Fund would likely be limited. The resources provided to the Fund remain reserve assets, given the Fund's unique role and financial arrangements.⁴⁷ By contrast, the potential costs associated with an inadequate resource base are potentially much larger in terms of the impact of disorderly adjustment on members and on the system if the Fund were unable to fulfill its responsibilities.

50. The analysis in the previous sections suggests a range for the overall lending capacity of the Fund, which indicates that the current capacity should at least be maintained. The paper considers the Fund's resource needs from a broad range of approaches and takes account of lessons from the global crisis as well as implications of global medium- and longer-term trends. Against this backdrop, the various approaches presented in the paper suggest possible ranges for the adequacy of the Fund's total lending capacity, which are summarized in Table 7. The current lending capacity of SDR 686 billion, which includes quota resources, the NAB, and bilateral borrowing arrangements, is below the midpoint of these ranges.

51. The paper's analysis has implications for upcoming quota and borrowing discussions. These issues will be dealt with in separate papers, including in future work on quotas in the context of the 15th Review, in a forthcoming Board paper on the 2012 borrowing agreements, scheduled for Board discussion in May 2016, and in the discussion on the NAB renewal, scheduled for October 2016. At least maintaining the Fund's lending capacity in the period ahead, as indicated by the

⁴⁵ See [Communique of the Thirty-Second Meeting of the IMFC](#), (10/9/2015).

⁴⁶ See, for example, Martin Wolf (2014), "*The Shifts and the Shocks*", as well as [Adequacy of the Global Financial Safety Net](#), (3/10/2016).

⁴⁷ As discussed in Box 2, prudential balances amounting to 20 percent of quotas are set aside to ensure the liquidity of members' reserve tranche positions in the Fund. The main financial cost to the members of providing quota resources to the Fund is the opportunity cost of the reserve tranche position, i.e., the opportunity cost of holding an SDR-denominated asset paying the SDR interest rate rather than alternative reserve assets. That said, there may be political costs associated with the mobilization of resources for the Fund and, for most members, they require parliamentary approval.

analysis in this paper, will require swift action by the membership given the scheduled expiration of the first 2012 borrowing agreements in the second half of this year.

	Lending capacity		Mid-Point	Shortfall 2/
	Range			
Simulations based on past access	645	769	707	21
Global Scenario Analysis	550	856	703	17
Econometric approach	770	867	819	133
Traditional Metrics 1/	538	1,148	843	157
<i>Memo item</i>				
Current Total Lending Capacity			686	

Source: IMF Staff Estimates.
 1/ Assuming that a given increase in total resources translates into a similar increase in lending capacity (i.e. assuming the composition of resources remains unchanged).
 2/ Indicates the amount needed to increase the current lending capacity to the mid-point of the range.

52. Additional resources could be needed if the Fund were to introduce changes to its role and lending framework. As highlighted in two related papers on the IMS and GFSN, such changes could be considered to strengthen the global financing role of the Fund with a view to address some of the weaknesses of the current, fragmented GFSN architecture.

ISSUES FOR DISCUSSION

53. Directors may wish to comment on the following issues:

- Do Directors agree that the current overall lending capacity of the Fund should, at a minimum, be maintained in the period ahead?
- Do Directors agree that the bulk of the Fund's resources should be provided by quotas?
- Do Directors agree that there is a strong case for maintaining a standing lending facility of moderate size as part of the Fund's financing structure?

Annex I. Methodology for Estimating the Size of the Fund

This annex provides additional detail about the methodology and assumptions used in the estimation of financing based on global scenarios. It elaborates on the estimation of the demand for financing, as well as the supply of financing from non-Fund sources.

A. Demand for Financing

The scenario analysis estimates financing needs associated with systemic crises in two steps based on historical probability distributions. The first step is to select members that will face funding shocks based on different thresholds of estimated crisis probabilities. Specifically, for a given probability threshold, members with crisis probabilities above the threshold are assumed to face funding shocks. The lower the threshold, the higher the number of members facing shocks, which corresponds to a more pervasive and more systemic crisis. Overall, four systemic shock scenarios—varying by the degree of pervasiveness—are specified:¹

- On one extreme (Scenario A), the analysis assumes a crisis probability threshold of 1 percent; in other words, members with at least a one percent probability of having a crisis are assumed to exhibit funding shocks. Given that a one-percent crisis probability is relatively low, many members are included in this scenario, which therefore constitutes a highly pervasive systemic shock. As such, it would correspond to a “perfect storm”, for instance triggered by multiple potential shocks such as a protracted slowdown in key advanced economies along with a hard landing in China, a reassessment of fundamentals driven by unanticipated changes in growth prospects, market displacement from asynchronous policy normalization, and/or geopolitical tensions.²
- On the other extreme (Scenario D), the analysis considers a far less pervasive funding shock to members with at least a ten percent probability of crisis. Given that very few advanced economies have a crisis probability above ten percent, this scenario corresponds to a more circumscribed funding shock that affects primarily emerging and frontier economies.
- The analysis also considers two “middle-of-the-road” scenarios (Scenarios B and C) in which members with at least a three or five percent probability of crisis are assumed to encounter funding shocks.

In the second step, for each member selection, possible ranges of global financing needs for 2016–17 are estimated based on different assumptions on the severity of shocks, using a

¹ The sample in Scenario A includes 29 AMs and 43 EMs; Scenario B includes 27 AMs and 27 EMs; Scenario C includes 14 AMs and 26 EMs; Scenario D includes 1 AMs and 15 EMs. All scenarios include 15 frontier economies in Africa.

² It is important to note that the probability threshold used for the country selection in a scenario is different from the likelihood of that scenario. For example, in Scenario A, all members with at least a 1 percent crisis probability are assumed to face funding shocks. However, the likelihood of the scenario is not at least 1 percent because it depends on the joint probability of all members in the group having a funding shocks, which cannot be inferred directly from the univariate crisis probability for each country.

similar method to previous analyses of Fund resources. Funding pressures are generated through shocks applied to FDI inflows, rollover rates of short, as well as medium-term external debt, and deposit outflows. The severity of these shocks is calibrated based on the empirical distribution of financial crises in emerging market economies in the past 30 years using Kernel density estimators. Different scenarios are developed to capture various degrees of global tail risks. For frontier and emerging economies, simulations are provided for shocks broadly in line with the 90th, 85th, 75th, and 65th percentile of the distribution.³ For advanced economies, a somewhat less severe impact is assumed as they have deeper and more resilient capital and financial markets as well as significant foreign assets and alternative official financing backstops. (Table A1).

Table A1. Scenario Assumptions								
Emerging Market and Frontier Economies								
<i>Percent deviation from baseline, unless otherwise indicated</i>								
	<u>90th percentile</u>		<u>85th percentile</u>		<u>75th percentile</u>		<u>65th percentile</u>	
	2016	2017	2016	2017	2016	2017	2016	2017
Reduction in FDI inflows	-30	-30	-25	-25	-20	-20	-15	-15
Short-term debt rollover rate (percent)	65	75	70	80	80	85	85	90
Medium and long-term debt rollover rate (percent)	45	60	50	65	60	75	80	85
Outflows of bank deposits	-10	0	-8	0	-5	0	-3	0
Floor on reserves (percent of ARA metrics)	100		100		100		100	
Maximum use of reserves (percent of total)	25		25		25		25	
Advanced Economies								
<i>Percent deviation from baseline, unless otherwise indicated</i>								
	<u>90th percentile</u>		<u>85th percentile</u>		<u>75th percentile</u>		<u>65th percentile</u>	
	2016	2017	2016	2017	2016	2017	2016	2017
Reduction in FDI inflows	-30	-30	-25	-25	-20	-20	-15	-15
Short-term debt rollover rate (percent)	80	90	85	95	90	100	95	100
Medium and long-term debt rollover rate (percent)	65	85	70	90	75	95	85	100
Floor on reserves (percent of ST debt)	100		100		100		100	
Maximum use of reserves (percent of total)	25		25		25		25	

Source: IMF Staff Estimates.

By combining steps one and two, potential financing needs are estimated for a given degree of pervasiveness of the crisis and intensity of the shock. Estimates are derived as the sum of two components:

- Net external financing requirements measured by the difference between external financing needs (current account deficit and debt amortization) and sources (foreign direct investment inflows and total new borrowings); and

³ Due to the limited number of observations in the tail, the shock values are smoothed and adjusted downward in absolute terms (meaning that the shock intensity is reduced) relative to the raw data. As a result, the estimated resource needs are more conservative (smaller) than would have been suggested by the raw estimates.

- Additional financing needs to cover potential deposit outflows.

B. Financing Sources other than the IMF

Self-insurance

Two assumptions are used in calculating the use of reserves to meet financing needs. First, the use of reserves is subject to the constraint that they should remain above 100 percent of the level suggested by the Fund's ARA metric for emerging markets and above 100 percent of short-term debt for advanced economies. Second, reserves are assumed not to fall by more than 25 percent relative to their initial level, reflecting the observed reluctance of central banks in practice to draw down reserves substantially.

Role of Regional Financial Arrangements

Given the wide disparity in the modalities, specific assumptions are applied in calculating financing provided by each RFA.

- In the case of the ESM and the EU's Balance of Payments assistance, based on historical patterns, Fund financing is expected to cover 1/3 of the financing gap after the use of reserves.
- As the BRICS CRA and the CMIM are swap arrangements with 70 percent of access to their resources conditional on the existence of a Fund-supported program, member countries are assumed to first tap into the unconditional part (30 percent) of their access limit. The rest is assumed to be co-financed by the Fund and the RFAs, with the Fund covering 1/3 and the RFAs covering the rest. However, the amount covered by the RFAs is constrained by the country-specific access limit and the ability of member countries to provide financing for the others.
- Finally, members are assumed to use their access limit in the case of other smaller RFAs (CAREC Anti-Crisis Fund – ACF, Arab Monetary Fund – AMF, and Latin American Reserve Fund – FLAR).

Bilateral Swap Arrangements

Active bilateral swap lines are taken into account depending on their specific characteristics and purposes. Standing unlimited BSAs among major central banks (such as the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank) are included in the analysis but beneficiaries are generally not expected to have a demand for financing according to the simulations. Most bilateral swap lines established during the global crisis between major central banks and EMDCs have expired and are thus not considered. While swap lines established between China and a large number of AEs and EMDCs remain active,

they are not counted in the analysis given uncertainties about the scope of possible use in case of a protracted balance of payments need, as noted in the main text.⁴

⁴ Furthermore, a number of standing or soon-to-expire small swap lines among various central banks—amounting to less than USD 20 billion each—are also excluded from our estimation due to both their small size as well as uncertainties about their long-term availability and scope of possible use when financing needs arise.

Annex II. Additional Information on Global Economic and Financial Metrics and Related Resource Adequacy Indicators

This Annex provides further information on the total resources that would be required to meet historical levels for various resource adequacy indicators, as discussed in the main text.

- Table A2.1 shows the amount of additional **total Fund resources** needed to restore the relative size of total resources to levels at the time of past General Reviews of Quotas, starting with the 7th Review. For instance, increases of SDR 194 billion (SDR 694 billion) in total resources would be needed to restore the size of the Fund relative to capital inflows to EMDCs (EFN) to its level at the time of the 11th review (see rows 4.e and 4.g in Table A2.1).
- Similarly, Table A2.2 shows the amount of additional **quota resources** that would be required to restore the relative size of quotas to levels at the time of past reviews.

Table A2.1 Fund Total Resources and Economic Indicators
(in SDR billion)

	Seventh Review 1978 1/	Eighth Review 1983 1/	Ninth Review 1990 1/	Tenth Review 1995 1/	Eleventh Review 1998 1/	Twelfth Review 2003 1/	Thirteenth Review 2008 1/	Fourteenth Review 2010 1/	Current Resources 2015
1. Total Fund resources 2/ 3/ 4/ 5/	79.6	108.5	153.7	164.6	246.0	247.7	251.6	659.4	939.8
2. Economic indicators and applicable data periods	<u>1972-76</u>	<u>1976-80</u>	<u>1981-85</u>	<u>1986-90</u>	<u>1990-94</u>	<u>1995-99</u>	<u>2001-05</u>	<u>2004-08</u>	<u>2011-15</u>
a. GDP	4,253	7,588	11,083	15,744	17,884	22,442	29,912	35,906	48,889
b. Current payments 6/	718	1,341	2,168	2,852	3,700	5,785	8,026	12,112	16,941
c. Reserves	185	333	391	594	768	1,150	2,539	4,426	8,121
d. Capital inflows 7/	89	199	291	634	718	1,608	2,990	4,310	2,305
e. Capital inflows to EMDCs 7/	31	50	46	49	173	233	373	689	795
f. Variability of current receipts 8/	43	67	112	159	173	264	345	415	866
g. EFN				201	276	449	572	980	1,832
3. Ratio of total Fund resources to economic indicators (in percent)									
a. GDP	1.9	1.4	1.4	1.0	1.4	1.1	0.8	1.8	1.9
b. Current payments 6/	11.1	8.1	7.1	5.8	6.6	4.3	3.1	5.4	5.5
c. Reserves	43.0	32.6	39.3	27.7	32.0	21.5	9.9	14.9	11.6
d. Capital inflows 7/	89.1	54.5	52.9	26.0	34.2	15.4	8.4	15.3	40.8
e. Capital inflows to EMDCs 7/	254.1	218.7	334.1	336.9	142.6	106.4	67.5	95.7	118.2
f. Variability of current receipts 8/	185.1	161.9	137.2	103.5	142.0	93.9	72.9	158.9	108.5
g. EFN	n.a.	n.a.	n.a.	82.0	89.2	55.2	44.0	67.3	51.3
4. Additional Fund resources needed to restore relative size of Fund at the time of past quota increases (in billions of SDR)									
<i>Based on data through 2015</i>									
a. GDP	-	-	-	-	-	-	-	-	-
b. Current payments 6/	938	431	261	38	187	-	-	-	-
c. Reserves	2,554	1,706	2,253	1,311	1,660	809	-	270	-
d. Capital inflows 7/	1,113	317	278	-	-	-	-	-	-
e. Capital inflows to EMDCs 7/	1,081	799	1,717	1,739	194	-	-	-	-
f. Variability of current receipts 8/	664	463	249	-	290	-	-	436	-
g. EFN	n.a.	n.a.	n.a.	562	694	71	-	293	-

Source: IMF Finance Department.

1/ Year in which the quota review was completed, i.e., when the Board of Governors' Resolution on quota increases was approved. The Tenth Review did not provide for an increase in quotas, and the increase in actual quotas relative to the Ninth Review is due to the increase in the number of members.

2/ Column for Seventh Review includes the special quota increases for China and Saudi Arabia in 1980 and 1981.

3/ Column for Twelfth Review includes China's ad hoc quota increase of SDR 1.682 billion in 2002.

4/ Column for Thirteenth Review includes ad hoc quota increases for China, Mexico, Korea, and Turkey of SDR 3.809 billion in 2006.

5/ Includes the GAB, the NAB, the 2009/10 Borrowing Agreements, and the 2012 Borrowing Agreements.

6/ Defined as the average of the sum of payments on goods, services, income and current transfers for a five-year period.

7/ Defined as the three-year average of the sum of inflows of direct, portfolio and other investment. Data based on World Economic Outlook, October 2015.

8/ Variability data in the last column reflects average of 2009–13.

Table A2.2 Fund Quotas and Economic Indicators
(in SDR billion)

	Seventh Review 1978 1/	Eighth Review 1983 1/	Ninth Review 1990 1/	Tenth Review 1995 1/	Eleventh Review 1998 1/	Twelfth Review 2003 1/	Thirteenth Review 2008 1/	Fourteenth Review 2010 1/	Current Resources 2015
Size of Quota Increase, in Percent	50.9	47.5	50.0	0.0	45.0	0.0	0.0	100.0	n.a.
Agreed Quotas 2/ 3/ 4/	61.1	90.0	135.2	146.1	212.0	213.7	217.6	477.0	477.0
1. Total Fund resources 5/	79.6	108.5	153.7	164.6	246.0	247.7	251.6	659.4	939.8
2. Economic indicators and applicable data periods	<u>1972-76</u>	<u>1976-80</u>	<u>1981-85</u>	<u>1986-90</u>	<u>1990-94</u>	<u>1995-99</u>	<u>2001-05</u>	<u>2004-08</u>	<u>2011-15</u>
a. GDP	4,253	7,588	11,083	15,744	17,884	22,442	29,912	35,906	48,889
b. Current payments 6/	718	1,341	2,168	2,852	3,700	5,785	8,026	12,112	16,941
c. Reserves	185	333	391	594	768	1,150	2,539	4,426	8,121
d. Capital inflows 7/	89	199	291	634	718	1,608	2,990	4,310	2,305
e. Capital inflows to EMDCs 7/	31	50	46	49	173	233	373	689	795
f. Variability of current receipts 8/	43	67	112	159	173	264	345	415	866
g. EFN				201	276	449	572	980	1,832
3. Ratio of Quota resources to economic indicators (in percent)									
a. GDP	1.4	1.19	1.22	0.9	1.19	1.0	0.7	1.33	1.0
b. Current payments 6/	8.5	6.7	6.2	5.1	5.7	3.7	2.7	3.9	2.8
c. Reserves	33.0	27.0	34.6	24.6	27.6	18.6	8.6	10.8	5.9
d. Capital inflows 7/	68.4	45.2	46.5	23.1	29.5	13.3	7.3	11.1	20.7
e. Capital inflows to EMDCs 7/	195.1	181.4	293.9	299.0	122.9	91.8	58.4	69.3	60.0
f. Variability of current receipts 8/	142.1	134.3	120.7	91.9	122.4	81.0	63.1	114.9	55.1
g. EFN	n.a.	n.a.	n.a.	72.8	76.9	47.6	38.0	48.7	26.0
4. Additional Quota resources needed to restore relative size of Fund at the time of past quota increases (in billions of SDR)									
<i>Based on data through 2015</i>									
a. GDP	225	103	119	-	103	-	-	172	-
b. Current payments 6/	965	660	579	391	494	149	-	190	-
c. Reserves	2,205	1,718	2,331	1,520	1,764	1,032	219	398	-
d. Capital inflows 7/	1,099	565	595	54	203	-	-	-	-
e. Capital inflows to EMDCs 7/	1,074	966	1,860	1,901	500	253	-	74	-
f. Variability of current receipts 8/	754	687	569	319	583	224	69	518	-
g. EFN	n.a.	n.a.	n.a.	856	931	395	220	415	-

Source: IMF Finance Department.

1/ Year in which the quota review was completed, i.e., when the Board of Governors' Resolution on quota increases was approved. The Tenth Review did not provide for an increase in quotas, and the increase in actual quotas relative to the Ninth Review is due to the increase in the number of members.

2/ Column for Seventh Review includes the special quota increases for China and Saudi Arabia in 1980 and 1981.

3/ Column for Twelfth Review includes China's ad hoc quota increase of SDR 1.682 billion in 2002.

4/ Column for Thirteenth Review includes ad hoc quota increases for China, Mexico, Korea, and Turkey of SDR 3.809 billion in 2006.

5/ Includes the GAB, the NAB, the 2009/10 Borrowing Agreements, and the 2012 Borrowing Agreements.

6/ Defined as the average of the sum of payments on goods, services, income and current transfers for a five-year period.

7/ Defined as the three-year average of the sum of inflows of direct, portfolio and other investment. Data based on World Economic Outlook, October 2015.

8/ Variability data in the last column reflects average of 2009–13.