

INTERNATIONAL MONETARY FUND

Analytics of Systemic Crises and the Role of Global Financial Safety Nets

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Executive Summary

Backdrop and objectives: In response to the global crisis, the Fund overhauled its lending toolkit and boosted its resources, strengthening its ability to pre-empt financial crises. This paper—with the companion paper on *Mapping Cross-Border Financial Linkages*—takes another look at the recent global crisis in the context of a broader review of past systemic crises to (i) assess whether rising linkages across countries is a source of latent systemic instability and (ii) ascertain whether the global financial safety net (GFSN) is adequate to contain crisis and contagion risks arising from such systemic instability. This paper develops a new methodology to identify systemic crises and reviews associated policy responses from a global, rather than country-level, perspective.

Identification of systemic crises: Systemic crises are characterized by severe economic and financial stress and—differently from idiosyncratic crises—widespread contagion. Based on a systemic crisis indicator developed here, synthesizing financial and economic stress indices across countries, identifies four clusters of systemic crises since 1980: the 1982 Latin American debt crisis, the 1992/93 European Exchange Rate Mechanism (ERM) crisis, the Asian/Russian/Long Term Capital Management combined crises of the late 1990s, and the 2008 global financial crisis.

Key characteristics and impact: In general, the triggers either originated in large or more integrated economies with the potential to hit a large number of countries, or they acted as wake up calls for investors to reassess risks for a whole asset class or region/group of countries. Shocks were rapidly transmitted across borders and amplified by trade and financial linkages among countries and herding behavior by investors. A large number of countries are found to be affected by systemic crises, including a group called “crisis bystanders”—i.e., countries with relatively strong fundamentals for which likelihood of an idiosyncratic crisis is normally low.

Policy responses: Policy responses were mostly driven by domestic considerations and initially focused on the restoration of market confidence. From a global perspective, policy responses were generally reactive and uncoordinated. Fund and other IFIs played key financing roles in systemic crises, sometimes complemented by bilateral and regional financing and private sector liquidity commitments. Large-scale liquidity support, including via accommodative monetary policy by reserve-currency central banks, varied across crises responding mostly to domestic considerations.

Implications for the global financial safety net: To strengthen global management of systemic crises, improved bilateral and multilateral surveillance to minimize the likelihood of systemic crises—work for which is ongoing both within and outside the Fund—could be complemented with enhancements to the financial safety net, especially liquidity financing during systemic events. In particular, rapid short-term liquidity provision to countries with relatively strong fundamentals (crisis bystanders) at the outset of a systemic shock could help mitigate the crisis cost and strengthen the Fund’s catalytic role by boosting market confidence. The existence of such a liquidity mechanism may even prevent the occurrence of systemic liquidity runs in the first place. These benefits can be achieved by enhancing flexibility in the current toolkit to provide evenhanded and predictable short-term liquidity support to crisis bystanders during systemic events. Any such liquidity mechanism would need to embed safeguards to Fund resources and minimize moral hazard risks.

I. INTRODUCTION¹

1. **Recent reforms have enhanced the Fund’s ability to pre-empt financial crises, but doubts linger about its capacity to address the growing risks of systemic instability.** Sizeable increase in resources, together with the creation and subsequent enhancement of the Flexible Credit Line (FCL) and the establishment of the Precautionary Credit Line (PCL) were important steps in strengthening the global financial safety net (GFSN), expanding available country insurance instruments.² However, as noted in the Fund’s series on *crisis program reviews*, most affected countries tend to turn to the Fund only *after* they are already in crisis, needing large policy adjustments to stabilize financial conditions and avoid abrupt outcomes.³ Moreover, increased trade and financial linkages—while good for risk diversification from an *individual* country perspective—can increase the risk of instability for the *system* as a whole. In particular:

- Recent work on cross-border flows shows that capital inflow surges start at different times for different countries, but often end together due to, say, a rise in global risk aversion, creating broad-based economic and financial distress.⁴
- There is also growing evidence that increased importance and complexity of trade and financial linkages among economies tends to spread deleveraging and asset price shocks across borders.⁵ During episodes of financial stress, multiple linkages across countries and asset classes amplify the shock, compounding instability to the system.
- Against this, as the recent paper on *Strengthening the International Monetary System* (henceforth called the *Stocktaking* paper) points out, the size of the financial safety net created by the Fund plus regional arrangements has remained broadly constant as a share of global GDP, but has massively declined relative to the size of global capital flows.⁶ The *Stocktaking* paper also notes that the recent global crisis made clear that a systemic liquidity crisis requires the potential availability of very large resources, and there is no global mechanism currently to ensure this function in a predictable manner.

¹ Prepared by an SPR team comprising R. Bi, M. Goretti, I. Halikias, M. Jamal, S. Lanau, R. Llaudes, Y. Miao, T. Miyoshi, F. Presciuttini, and M. Saenz, and led by U. Ramakrishnan under the supervision of L. Giorgianni. We are grateful to the WEO division of RES for making available updated data on their Financial Stress Index.

² Throughout this paper, GFSN refers to a network of country insurance and lending instruments—from multilateral institutions like the IMF, regional financing arrangements, and individual countries (both domestic and foreign)—that countries could draw on to cope with volatility and contagion from a crisis.

³ See [Review of Recent Crisis Programs, IMF Policy Paper, September, 2009](#), and its more recent update [Review of Crisis Program](#), April 2011.

⁴ [Recent Experiences in Managing Capital Flows—Cross-Cutting Themes and Possible Policy Framework](#), IMF Policy Paper, April 2011.

⁵ The forthcoming companion paper *Mapping Cross-Border Financial Linkages: A Supporting Case for Global Financial Safety Nets*—henceforth called the *Linkages* paper—takes a systematic look at linkages from and to emerging markets, providing support to enhance global financial safety nets.

⁶ [Strengthening the International Monetary System—Taking Stock and Looking Ahead](#), IMF paper, March 2011.

2. **Recognizing these risks, academics and policymakers have called for further GFSN reforms.** A developing academic literature discussed below supports the formalization of an international lender of last resort (ILOLR) to deal with the risks from increased exchange rate flexibility and financial globalization. The G-20 Leaders have also recognized that enhancing the GFSN, which countries could proactively draw on when faced with a major global crisis, is conducive to a more stable international monetary system.⁷ There has also been growing emphasis on enhancing Fund cooperation with regional financing arrangements (RFAs) in surveillance and financing, efforts for which are already underway.

3. **In past discussions, the IMF's Executive Board has indicated interest in analysis focusing on responses to systemic crises.** During the August 2010 Executive Board discussion of *The Fund's Mandate: The Future Financing Role—Reform Proposals*, for instance, Directors welcomed the opportunity to have an initial discussion of options for strengthening the Fund's response to systemic shocks, including the proposal to establish a Global Stabilization Mechanism.⁸ While Directors' responses were mixed on the need for a formal lending framework to deal with systemic crises, on balance, most Directors were open to further discussion of options and modalities to address systemic events. In the more recent informal discussion of the *Stocktaking* paper, many Directors concurred that a systemic liquidity provision mechanism to preserve global financial stability would be useful.

4. **This paper analyzes past systemic crises to ascertain whether any residual gaps remain in the GFSN in responding to such crises.** The paper (i) develops a new methodology to identify systemic crises over the last 30 years (Section II); (ii) examines the characteristics of these crises (Sections III and IV); (iii) takes stock of policy responses, focusing on liquidity measures to highlight the need to protect countries—especially those with relatively strong fundamentals—from contagion effects (Section V);⁹ and (iv) discerns key lessons that carry implications for the GFSN, with particular emphasis on remaining gaps in the lending toolkit to help prevent and/or mitigate systemic crises (Section VI). Rooted in this analysis, a case is made for establishing a mechanism for the provision of global liquidity during systemic crises to ring-fence countries that, despite their relatively strong fundamentals, are affected by exogenous stress factors due to their financial and trade linkages. Such a mechanism for liquidity provision could help stem contagion and lower output losses during systemic crises. Based on Directors' feedback regarding further needed measures (Section VII), specific reform proposals could be brought to the Board for formal consideration at a later stage.

⁷ See [The Seoul Summit Document, G20 Seoul Summit, 2010](#).

⁸ *The Fund's Mandate—The Future Financing Role—Reform Proposals*, IMF Policy Paper, June 2010, *The Chairman's Summing Up: The Fund's Mandate—The Future Financing Role—Reform Proposals*, August 2010, (BUFF/10/125). See also *The Fund's Mandate: Future Financing Role*, IMF Policy paper, March 2010.

⁹ Consequently, the analysis covers only countries with market access.

II. IDENTIFYING PAST SYSTEMIC CRISES

5. **History is strewn with economic and financial crises, though most analyses of these crises are from an individual country perspective, rather than a global or “systemic” view.** Since the 1980s, increasing trade and financial linkages among economies have been accompanied by episodes of high market stress that have varied in their severity, transmission speed, and global reach. Using different techniques, the literature has classified various types of crises: banking/financial crises, currency crises, capital account crises, and sovereign debt crises (Box 1). Most existing studies approach crisis events on an idiosyncratic basis, examining triggers, vulnerabilities, and impact at a country level. Complementing this literature, this paper reviews severe and widespread, or “systemic”, crisis episodes experienced in the last three decades, starting in this section by proposing an analytical framework for identifying such crises.

6. **Two elements characterize a systemic crisis—severity of the financial and economic stress and the extent of contagion.** In a systemic crisis, financial markets come under severe pressure including because of panic, herd-like responses by investors, creating a generalized and acute liquidity crunch and spreading rapidly beyond the epicenter of the shock. Real effects of the shock are quickly realized—through severe output losses—as trade and financial flows across countries are disrupted, and as macro-financial feedback loops pull the global economy into a vicious cycle. In contrast, idiosyncratic crises could be severe for a particular country, but not for the system as a whole.

7. **A number of crisis episodes in the last three decades seem to follow this script, and hence are potential “systemic crisis” candidates.** Global financial and economic stress indices are constructed to capture the severity and synchronicity of the distress.

- The global *financial* stress index is defined as a weighted average of country-level financial stress index (FSI) and exchange market pressure index (EMPI), where the FSI is for advanced economies (monthly data for 20 countries) and the EMPI is for emerging markets (monthly data for 60 countries) from 1980M1 to 2011M3.¹⁰ Country-level quarterly FSI and EMPI are calculated by averaging monthly data—shown in Figure 1 for some countries—which are then weighted by their financial openness, defined as the

¹⁰ The FSI is based on data from the IMF’s Research Department, originally developed in “Financial Stress and Economic Contractions” *World Economic Outlook*, October 2008. The analysis was updated to include emerging markets in “How Linkages Fuel the Fire: the Transmission of Financial Stress from Advanced to Emerging Economies”, *World Economic Outlook*, April 2009. For each country, the FSI is constructed as an average of the following indicators: (i) three banking-related variables (the “beta” of banking sector stocks; the spread between interbank rates and the yield on treasury bills—the so-called TED spread, which measures the premium banks charge each other over the U.S. T-bill rates; and the slope of the yield curve); (ii) three securities-market-related variables (corporate bond spreads, stock market returns, and time-varying stock return volatility); and (iii) one foreign exchange variable (time-varying effective exchange rate volatility). The EMPI is a simple average of standardized month-on-month percent changes in the exchange rate and total reserves minus gold. Data availability varies by country.

ratio of a country's total assets plus liabilities to the world's total assets and liabilities, using data from Lane and Milesi-Ferretti (2010).

- The global *economic stress index*—capturing the severity of the stress event on the real economy—is similarly constructed as a PPP-weighted average of country-level quarterly real GDP growth (year-on-year) from 1980Q1 to 2010Q4 (Figure 1).¹¹
- Plots of the two weighted indices point to several large “joint peaks”, suggesting a few potential systemic crisis episodes (Figure 2).

Box 1. Crisis Identification Literature

Banking/financial crises: According to Schwartz (1986), the essence of a financial crisis is a banking crisis, although its definition and identification differ considerably. Bordo et al (2001) note that bank runs or widespread bank failures are the defining features of banking crises. Absent bank runs, Reinhart and Rogoff (2008, 2010) qualify an episode as a banking crisis by the closure, merging, takeover or large scale public assistance of a systemically important financial institution or group of institutions. They have also documented that banking crises often precede or accompany sovereign debt crises, while both types of crises are often preceded by surges in public and private borrowing. They found that banking crises help predict sovereign debt crises, and public borrowing accelerates before the outbreak of a debt crisis (possibly due to banking crisis), although such events are rare. Laeven and Valencia (2008) identify 124 systemic banking crises since 1970, defined as distress in systemically important financial institutions.

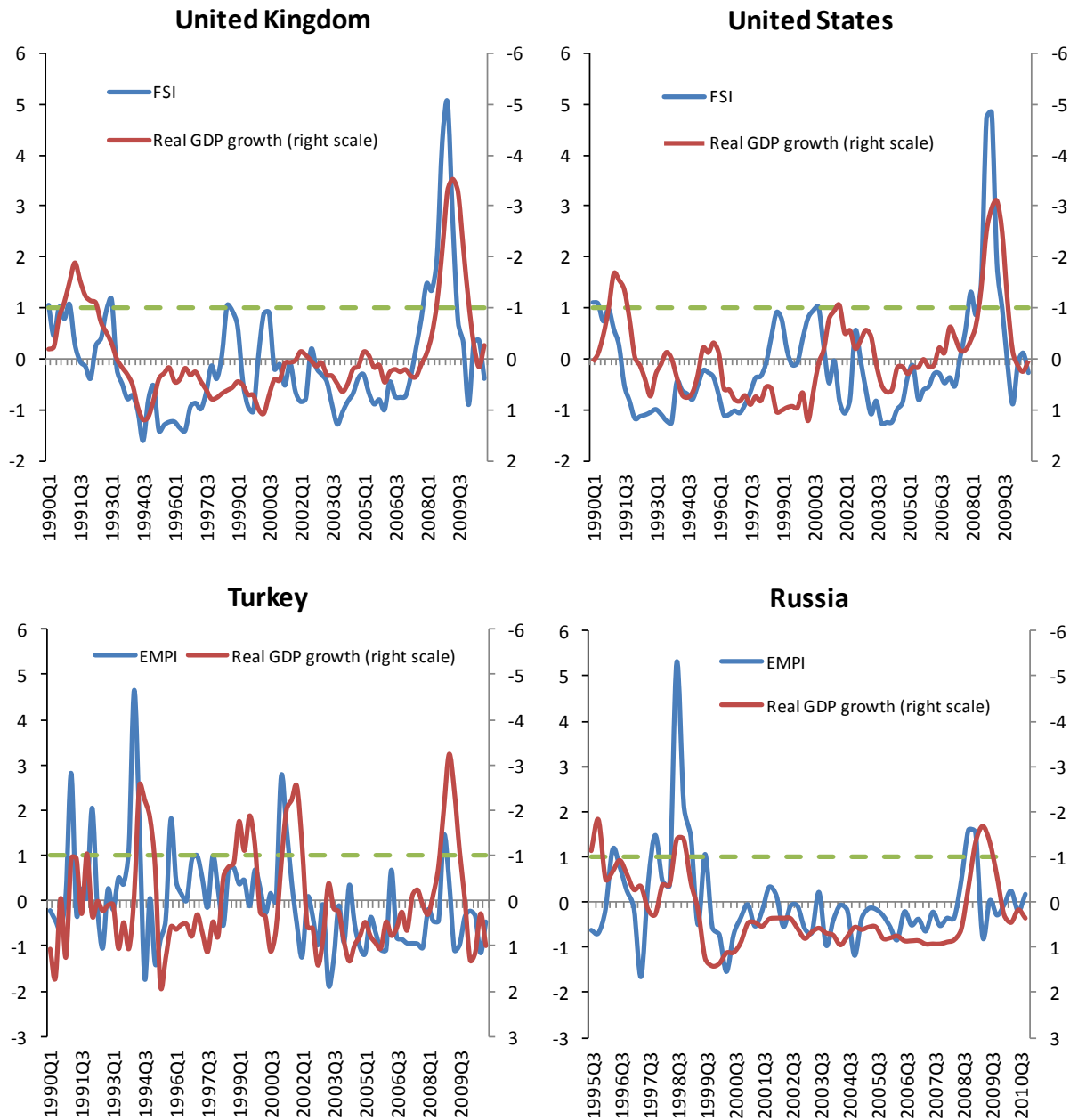
Currency and capital account crises: A currency crisis is often identified via a variant of the EMPI as in Frankel and Rose (1996). Reinhart and Rogoff (2010) focus exclusively on exchange rate depreciation for simplicity and data availability reasons, while others kept reserve losses and interest rate hikes in the EMPI (Bordo and Lane, 2010). Following Calvo (1998), several academics have identified capital account crises by capturing sudden stops in capital flows. Many define a sudden stop episode as one where the financial account balance in percent of GDP falls below its mean by one or two standard deviations.

Debt crises: The beginning of both domestic and external debt crises is often marked by either outright payment default of debt obligations or debt restructuring. In practice, debt distress and inability to access markets could be prolonged and remain elevated before a default or restructuring, making the start of a debt crisis ambiguous. Academics have relied on default cases compiled by rating agencies and narratives and generations of literature in documenting debt crises. In the recent past, restructuring agreements with creditors and the return to debt markets have signaled the end of debt crises.

Global financial crises: Bordo and Lane (2010) identify five global crises since 1880: 1880-91, 1907-08, 1913-14, 1931-32, and 2007-08. They include all crises in the literature, and weight each crisis country by its real GDP relative to U.S. GDP in 1990 dollars. A global crisis is identified if (i) the weighted sum of total crises is three standard deviations above mean; and (ii) the combined weight is more than U.S. output. The Fund's GFSR (2010) examines systemic liquidity risk as a defining characteristic of the global financial crisis.

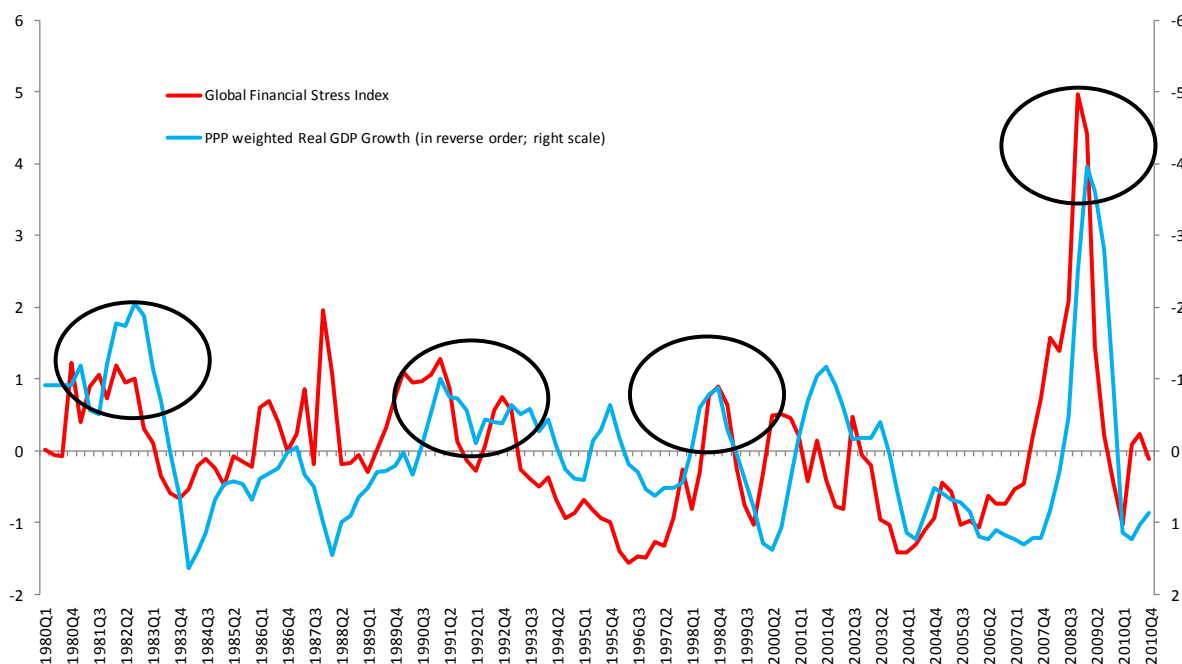
¹¹ For countries with no quarterly real GDP data in early years or throughout the whole sample period, quarterly real GDP growth (year-on-year) was assumed to equal annual growth.

Figure 1. Country Examples of FSI/EMPI and Real GDP Growth



Source: WEO database and staff calculations.

1/ The FSI, EMPI and real GDP growth are normalized for easy presentation.

Figure 2. Global Real GDP Growth and Financial Stress Index

Source: WEO database and IMF staff calculations.

1/ Global financial stress index is a weighted average of country-level financial stress index (advanced economies) or exchange market pressure index (emerging markets). A country's weight is the ratio of its total assets and liabilities to the world's total assets and liabilities. For easy presentation, both global indices are normalized.

8. **More formally, a *systemic crisis indicator* is constructed by combining and aggregating financial and real indicators at the country level.**¹² Weighting is applied either by “systemic importance”, or by equal weights as follows:

- ***Weighting by systemic importance*** focuses on countries or financial systems important for global stability. As discussed in the recent paper *Integrating Assessments Under Financial Sector Assessment Program into Article IV Surveillance*, financial sectors of some countries are highly interconnected to the rest of the world, and deemed to have the most impact on systemic stability in a crisis.¹³ Such a notion of “systemic” was applied to construct the global economic and financial stress indices, weighting economic stress by PPP-based GDP, and financial stress by financial openness (see ¶7). Normalizing the two

¹² The *country-level crisis indicator* is a simple average of the FSI/EMPI and real GDP growth, both normalized to ensure that the financial and the real indicators carry the same weight in the composite indicator. A country is considered to be affected by a crisis if its composite indicator is one standard deviation above mean.

¹³ See *Integrating Assessments Under the Financial Sector Assessment Program into Article IV Surveillance*, IMF Paper, August 2010, and *Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations*, IMF/BIS/FSB, 2009. The forthcoming Board paper *Changing Patterns of Global Trade* analyzes the evolution of trade linkages over time, and also identifies countries with systemically important trade sectors.

indices and taking their simple average gives a systemic crisis indicator weighted by systemic importance (henceforth called *systemic-weighted crisis indicator*).

- Conversely, *equally weighting* countries allows the possibility that even a small country could be the center of a systemic crisis because a large shock there could be transmitted rapidly to a core node of a financial network to which the country may be linked, as well as lead international investors to reappraise risks in similarly-situated, but not directly connected, countries that may, in turn, be more closely connected to other core nodes. (see *Linkages* paper ¶15 and Box 6). Latvia, for example, judged by economic size or financial linkages, is arguably not systemic. However, Latvia’s 2008/09 crisis triggered broader creditor panic, affecting many similarly-situated emerging markets notably in Eastern Europe, in turn more closely connected to core European banking systems, contributing to the systemic nature of the global crisis. Since it is difficult to know *ex ante* if stress in small countries could trigger a “systemic” market response, using a weighted systemic crisis indicator risks overlooking global stress arising from smaller countries; *ex post*, such negligence could become costly.¹⁴ The construction of an equal-weighted systemic crisis indicator is based on a simple average of normalized country-level real GDP growth and FSI/EMPI to build global economic and financial stress indices, respectively. A simple average of the two normalized global indices is then taken to get the equal-weighted crisis indicator.

9. Both indicators identify a similar set of systemic crises, but the equal-weighted indicator does better in capturing contagion. Specifically:

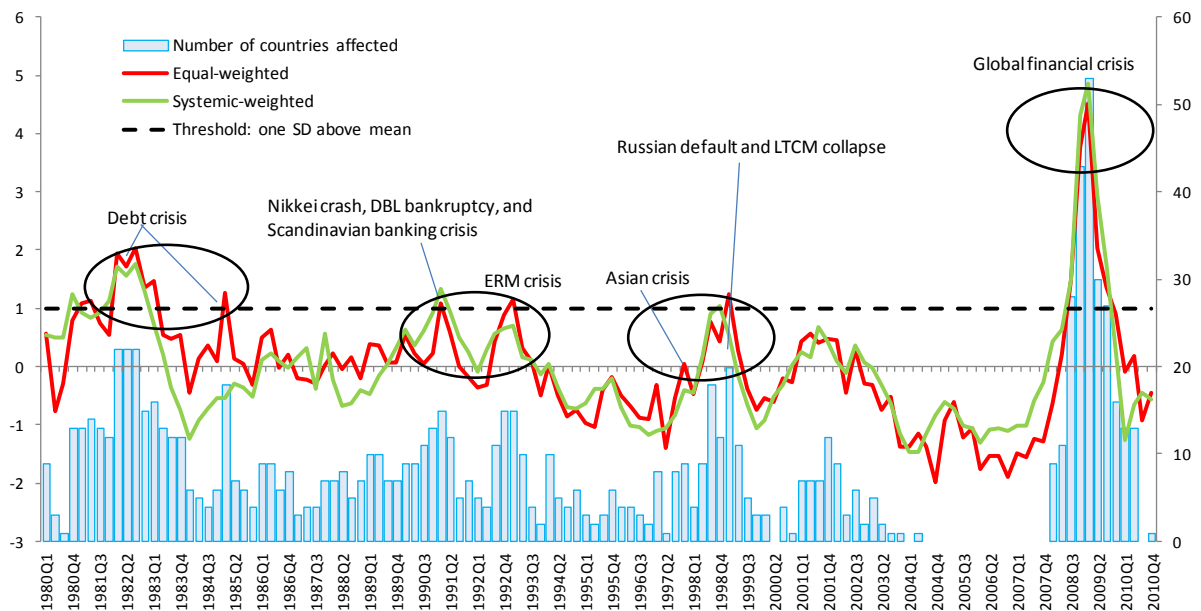
- The systemic- and equal-weighted indicators have co-moved closely in the last three decades (Figure 3). Using a threshold of one standard deviation above mean to identify systemic events, both indicators point to the debt crisis in the early 1980s, the Russian/Long Term Capital Management (LTCM) crisis in 1998 (preceded by the Asian crisis in 1997), and the recent global crisis.¹⁵ They differ slightly on the identification of two borderline cases in the early 1990s—the 1990-91 crisis corresponding to a union of several idiosyncratic shocks (Nikkei crash, Drexel bankruptcy, U.S. recession, and the Nordic banking crisis), and the European Exchange Rate Mechanism (ERM) crisis in 1992-93. The systemic-weighted indicator suggests that only the former episode is systemic, while the equal-weighted indicator shows both to be systemic.
- The equal-weighted indicator captures contagion better than the systemic-weighted indicator. For example, in the 1990/91 episode, the systemic-weighted indicator is above

¹⁴ Even with equal weighting, “systemic importance” is indirectly accounted. Stress in a systemic country quickly spreads to other interconnected economies, pushing up the aggregate indicator disproportionately as in the global crisis.

¹⁵ See Annex I for robustness checks on the threshold.

the equal-weighted indicator as the U.S., the U.K. and Japan were all under stress. In the ERM crisis, by contrast, the U.S. was out of a recession and stresses in the U.K. had declined (Figure 1), improving the systemic-weighted indicator. The equal-weighted indicator, however, remains at about the same level in both events as the extent of contagion (i.e., number of countries affected) was broadly similar. Likewise, comparison of the 1990/91 episode with the Russian/LTCM crisis suggests that the latter was less systemic by the systemic-weighted indicator. The equal-weighted indicator suggests otherwise, as the contagion was more severe in 1998. Thus, the equal-weighted approach is more cautious by better capturing episodes with severe contagion, even if no “systemic” economies were involved.

Figure 3. Systemic-weighted and Equal-weighted Global Systemic Crisis Indicators



Source: WEO database and IMF staff calculations.

1/ A country is considered "affected" if its country-level crisis indicator (a simple average of FSI/EMPI and real GDP growth, both normalized) is above one standard deviation from its mean. Global systemic crisis indicators are constructed as a simple average of normalized global real and financial stress indices, which aggregate country-level indicators using either "systemic importance" as weights (systemic-weighted) or equal weights. Both global crisis indicators are normalized for easy presentation and comparison.

10. **Thus, six events corresponding to four systemic crises are identified.** Besides the two unambiguous cases, the debt crisis in the early 1980s and the recent global crisis, the 1990/91 episode and the ERM crisis are identified as two events but treated as one systemic crisis given the proximity in their timing. However, this paper focuses mainly on the ERM crisis, in which countries were hit by a *common shock* rather than different but coincident idiosyncratic shocks. Likewise, the Asian crisis that began in 1997 and the Russian default/LTCM collapse in 1998 are two systemic events, but treated as part of the same crisis since the collapse in commodity prices following the Asian crisis eventually led to the Russian default, which in turn made global investors reassess their risk in both mature and emerging markets. Box 2 illustrates how systemic crises could be detected in real time.

Box 2. Detection of Future Systemic Crises: An Illustration

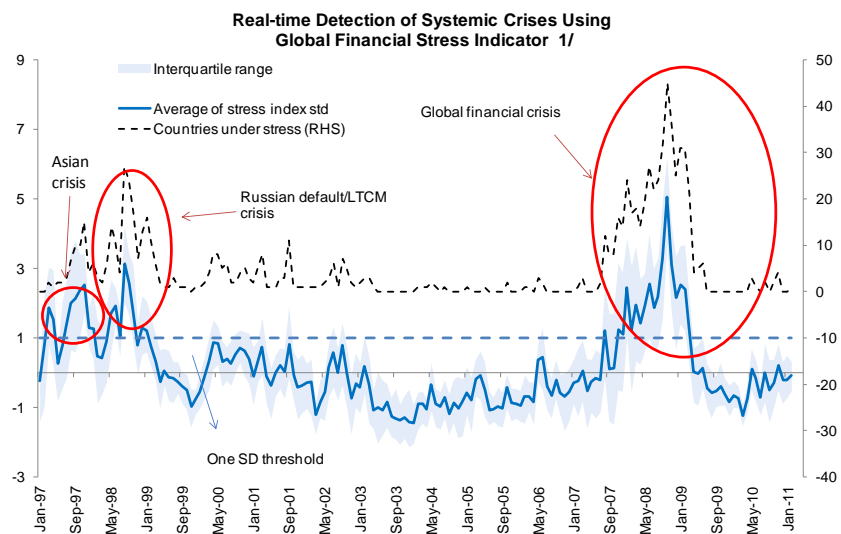
A natural question is whether the proposed index could help detect systemic crises in real time. To illustrate this, a high-frequency financial stress indicator is constructed using monthly FSIs for both advanced and emerging markets. The focus on financial stress variables is due to the lack of reliable and consistent cross-country monthly real sector data. However, the historical analysis suggests that financial and real systemic stress indicators tend to peak together during systemic stress events due to macro-financial feedback loops (see Figure 1), suggesting the FSI alone is a good indicator to detect a systemic stress event. The sample has 46 countries, albeit for a shorter time period (advanced economies from 1995 and emerging markets from 1997), given deficient financial data for emerging markets for prior years.

Applying the same methodology as before, but using only past information for normalization—mimicking what will be available in real time—all three systemic crisis events could have been identified early on.¹

For example, using this indicator, the global crisis could have been called as early as September 2007. In 2000-02, the indicator was very close to the threshold, suggesting

that the dot-com crash and September 2001 terrorist attack on the U.S. may have had the potential to turn systemic but was possibly averted by timely policy responses (Annex II).²

To call a systemic crisis in real-time, quantitative stress indicators would have to be complemented with other risk analyses and judgment. In addition to tracking the FSI, risks identified in the WEO, GFSR, FSB reports, as well as in the Early Warning Exercise and the Vulnerability Exercises would need to play a large role in alerting to risks that could potentially trigger a systemic event. Consultations with central banks and financial supervisors in countries with large financial systems may also provide additional useful information for detecting unfolding systemic events.



Source: IMF staff calculations.

1/ A simple average of (normalized) monthly FSI of both advanced economies and emerging markets is used for real-time detection of systemic crises. The final global financial stress indicator is normalized for easy presentation. All normalizations use past information only.

¹ An alternative is to use a rolling window for normalization. The real-time identification remains the same as long as a reasonably long (e.g., 10-year) rolling window is used.

² An interesting issue is whether persistence in the FSI *below* one standard deviation is also worrisome (e.g., during 2003-07). Indeed, it could signal loose financial market conditions, implying ripe conditions for overvaluation in asset prices.

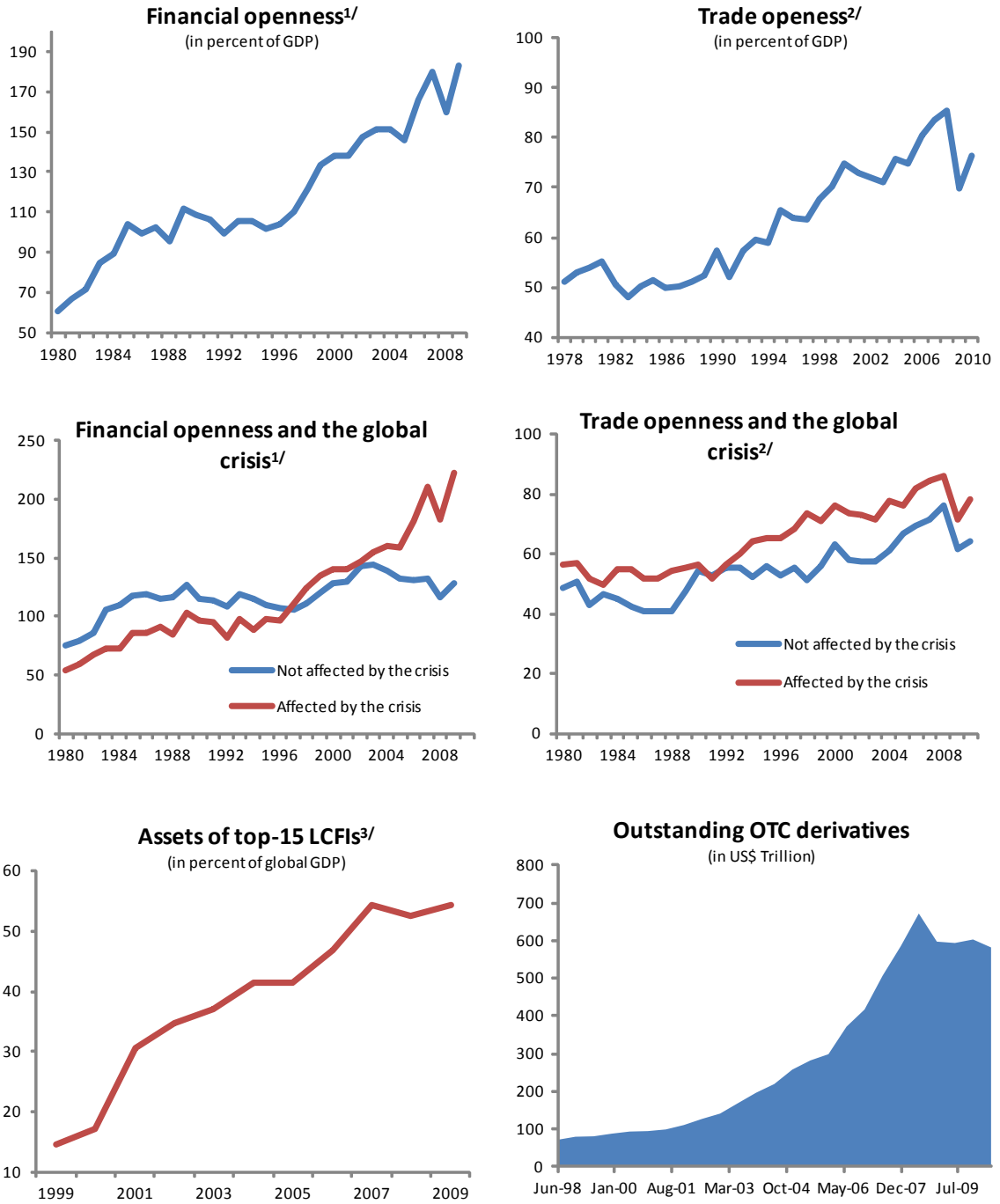
III. TRANSMISSION CHANNELS

11. **Rising trade and financial openness facilitated the propagation of the global crisis, a trend that potentially poses greater systemic risk going forward.**

- Both trade and financial openness display a clear upward trend—peaking in 2007—owing to the reduction of tariffs and increased capital account openness across the globe (Figure 4, top panels). The severity of the recent global crisis—both in terms of number of affected countries and large deviation of the systemic indicator from the mean—is at least partly attributable to the growth of trade and financial linkages in the last decade, increasing the scope for quick and global transmission of shocks (Cetorelli and Goldberg, 2010). Indeed, countries that were not affected by the recent global crisis had lower trade and financial linkages relative to the affected countries (Figure 4, middle panel. Appendix I has the list of affected countries for each systemic crisis).
- As discussed in the *Linkages* paper, network theory suggests that higher interconnectedness brings economic benefits for an individual country via higher funding diversification. However, higher interconnectedness also increases the propagation of shocks across the system, exposing the whole network to greater systemic risk.¹⁶ The sophistication and complexity of the financial system has also increased as shown by the steady growth of large and complex financial institutions (LCFIs) and over-the-counter (OTC) markets (Figure 4, bottom panels), creating an environment prone to fire sales and liquidity crunches (Caballero and Simsek, 2011).
- That said, the 1980s debt crisis is identified to be systemic, even though cross-border interconnectedness was relatively limited and financial markets largely segmented at that time. Indeed, the crisis was more rooted in deeper structural problems (discussed further in Section IV.B).

¹⁶ Garrat, Mahadeva and Svirydzenka (2011) track contagion over time, linking it to international banking networks. They show that using a fixed modular structure benchmarking, a combination of large financial centers, networks have become more prone to risk of system-wide contagion since 1989.

Figure 4. Trade and Financial Integration



Source: Lane and Milesi-Ferretti (2010), WEO, Bankscope, and BIS

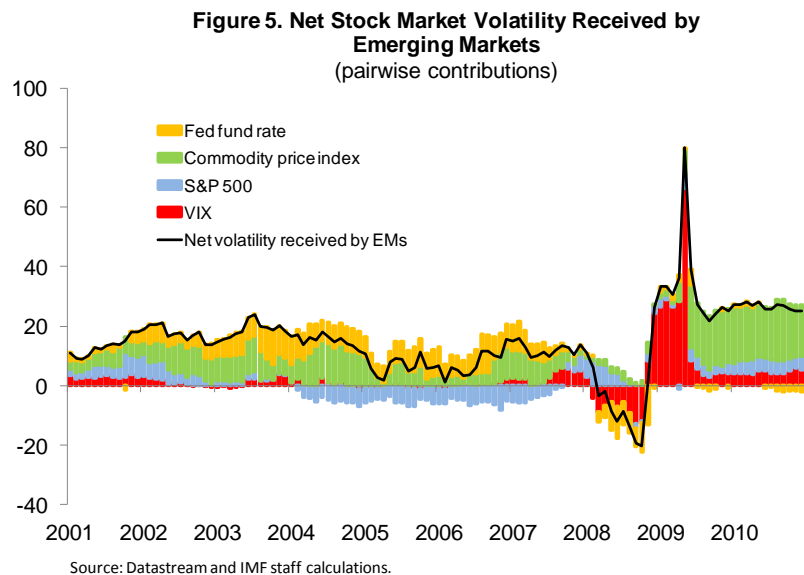
1/ Financial openness is defined as external assets plus external liabilities over GDP, including reserve assets

2/ Trade openness is defined as imports plus exports over GDP

3/ Top-15 LCFIs are the 15 LCFIs with the largest assets as of 2009

12. **In addition, pure contagion and herd behavior could propagate shocks beyond those related to trade and financial linkages.** The literature shows that in the presence of incomplete information, financial integration strengthens investors' incentives for herding behavior (Calvo and Mendoza, 1997), where herding behavior is self-fulfilling when individual investors simply mimic the choices of the majority. Kim and Wei (1999) show evidence of herding behavior in the Korean market before and during the Asian crisis.¹⁷ It has also been shown that unusual or unexpected events can trigger a perception of 'immeasurable risk' among investors, which leads to a flight to quality where investors shed all assets but the safest (Caballero, 2009).¹⁸

13. **As a result, the transmission of financial shocks can be highly non-linear during turbulent episodes** (Figure 5). As discussed in the *Linkages* paper, such non-linearity can be seen, for instance, when measuring and decomposing the volatility received and transmitted by emerging markets to and from global financial markets (using a methodology proposed by Diebold and Yilmaz, 2009, 2011).¹⁹ Such decomposition illustrates how global risk aversion (measured by the VIX) has become an increasingly important source in driving emerging market stock market volatility, with a spike at the time of the global crisis.



IV. ANATOMY OF SYSTEMIC CRISES

14. **This section delves into some key stylized facts on the identified systemic crises, including triggers, underlying factors and vulnerabilities, and crisis impact.** Detailed economic events and assessments during these crises are well documented elsewhere and are

¹⁷ See Bikhchandani and Sharma (2000) for a broader overview of the empirical evidence.

¹⁸ Immeasurable risk, also known as Knightian uncertainty, is a situation where agents are unable to attach probabilities to possible outcomes and act under the assumption that the worst-case scenario will materialize with probability one.

¹⁹ See Annex V of the *Linkages* paper for details of the methodology and its application in measuring volatility received and transmitted by emerging markets.

not repeated here.²⁰ Instead, the focus is on global economic and/or policy conditions that resulted in the systemic shock, and its initial transmission. A better understanding of these issues would inform the scope for strengthening the GFSN with a view to mitigating the costs associated with systemic events.

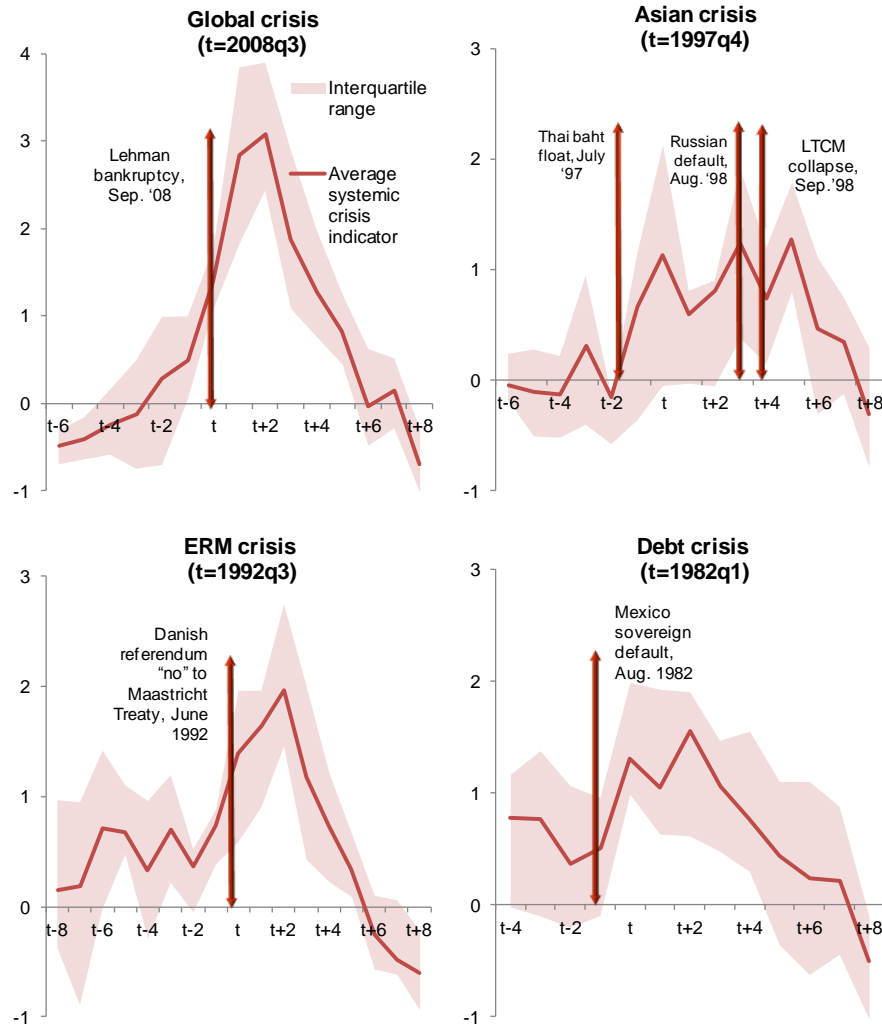
A. Triggers and Vulnerabilities

15. **The triggers of systemic crises are similar to idiosyncratic crises—what differs is the scale and potential impact of the triggers.** Also, there is no single feature that recurrently stands out as the *ultimate trigger* of systemic crises (Figure 6 summarizes the triggers of each systemic crisis). The triggers sometimes originated in large and more integrated economies (e.g., the recent global crisis), in line with the more traditional definition of “systemic” noted earlier. At other times, however, the triggers were associated with common shocks to a region or the globe (e.g., the debt crisis, the ERM crisis and the Asian/Russian crisis). In general, the triggers had the potential to hit a large number of countries or they acted as “eye openers” for investors to reassess risks for a whole asset class or region/group of countries. Specifically:

- *Debt crisis*: The main trigger was the sovereign default by Mexico in August 1982, following a buildup of balance sheet vulnerabilities caused by the U.S. dollar appreciation and interest rate increases in the U.S. after the oil crisis of the late 1970s. The whole region suffered a sudden stop.
- *ERM crisis*: A main trigger was the Danish rejection of the Maastricht Treaty criteria in June 1992, which in turn set off deeper and broader scrutiny of the feasibility of the common currency projects as well as a wider belief that the criteria were not consistent with broader fundamentals of the member countries. A speculative attack on those ERM currencies considered to be more vulnerable ensued.
- *Asian crisis*: The flotation of the Thai baht in July 1997 was the main trigger, which was also a wake-up call on the underlying vulnerabilities in other countries in the region. This, and the ensuing collapse in commodity prices, led to the Russian sovereign default and LTCM crisis, triggering a second wave of that systemic crisis.
- *Global crisis*: The alarms for the global crisis are well-known, with Lehman’s bankruptcy being the final trigger that globally froze wholesale and securitization markets.

²⁰ For detailed discussions of the debt crises, see Cline (1995), and James (1996); for the ERM crisis, see Buiter et al (1998); for Asian/Russian/LTCM crisis, see IMF (1998), Lane et al. (1999), CGFS (1999), Edwards (1999), Ghosh et al. (2002), and IMF (2003). For details on the global crisis, see chapters 13 and 15 in Reinhart and Rogoff (2009), IMF (2011), and Lane and Milesi-Ferretti (2010).

Figure 6. Ultimate Triggers of Systemic Crises^{1/}



Source: IMFstaff calculations.

^{1/} Time in quarters. t is defined as the quarter when the average systemic crisis indicator goes above one standard deviation. Average systemic crisis indicator is a simple average of affected countries indicators.

Some common patterns emerge in terms of *underlying vulnerabilities/factors*, with exogenous factors playing a key role in many affected countries. Underlying factors are grouped into two, i.e., domestic policy factors and externally-driven factors (Table 1). Specifically, key domestic factors that created crisis vulnerabilities are as follows.

- ***Financial vulnerabilities*** were a common theme. For instance, currency and maturity mismatches in balance sheets of crisis countries featured in all but the ERM crisis. Risky lending, contributing to asset price bubbles, created vulnerabilities in the debt, Asian, and global crises. Excessive optimism and complacency in boom times led to erosion of sound risk management practices in financial institutions, compounded by weaknesses in

financial regulation and supervision.²¹ Weaknesses in financial oversight exacerbated excessive risk-taking and mispricing of risks, including through proliferation of opaque financial instrument prior to the global crisis.

- **Debt sustainability** issues were a standard feature across the crises, with external debt averaging as high as 75 percent of GDP among the crisis countries during the debt crisis. In the ERM crisis, average EU public debt was 73 percent of GDP. In the Asian crisis, declining reserve cover at the start of the crisis (to 50-70 percent of short-term external debt) was followed by jumps in external debt due to exchange rate depreciation and output collapse (above 150 percent of GDP in Indonesia in end-1998 and 90 percent in Russia in end-1999). At the onset of the global crisis, average external debt among crisis countries was 122 percent of GDP, with a few outliers displaying very high debt levels.

Table 1. Factors Underlying Systemic Crises

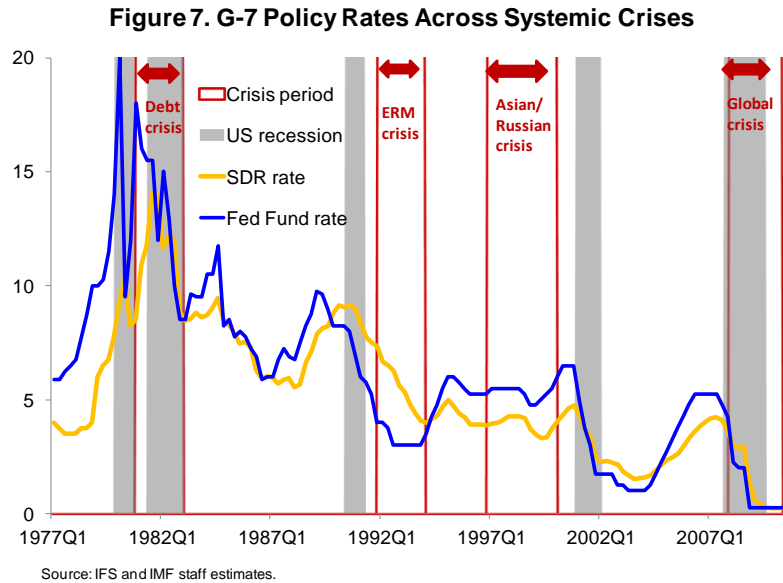
Underlying factor	Debt	ERM	Asia	Russia	Global
Domestic factors					
Balance sheet mismatches	√		√	√	√
Public debt sustainability	√	√	√	√	√
Unsustainable ER pegs		√	√	√	
Asset price bubble	√	√			√
External factors					
Monetary policy in major AMs	√	√			
Commodity prices	√			√	√

- **Exchange rate policy management** was another factor that ran through many crises, often resulting in speculative attacks on the currencies. Many of the crisis countries typically had a pegged exchange rate in conjunction with an inconsistent policy mix, including large fiscal deficits in a number of cases.

16. **Exogenous factors in systemic crises include domestic policy choices of large advanced economies and sharp commodity price changes.** Specifically:

²¹ Caprio et al. (1998), Demirgüç-Kunt and Detragiache (1998), Lane et al (1999), Financial Stability Forum (2008), Reinhart and Rogoff (2009), [The Recent Financial Turmoil—Initial Assessment, Policy Lessons, and Implications for Fund Surveillance](#), [Lessons of the Financial Crisis for Future Regulation of Financial Institutions and Markets and for Liquidity Management](#).

- Monetary policy in advanced markets:** Policies in advanced economies, while consistent with their domestic policy mandates, may carry systemic implications for the rest of the world. For example, a prolonged period of loose monetary conditions in advanced economies could support a credit boom in their domestic economies and push capital outflows, which, when reversed by a tightening, could lead to sudden deleveraging and stop the capital inflows to other countries, potentially triggering a systemic crisis.²² Such an association is identified with monetary policy in the G-7 countries in three out of the four systemic crises (Figure 7).



- The U.S. monetary policy tightening following the oil price shock of the 1970s added to the existing vulnerabilities in Mexico, given the currency and maturity structure of Mexico's external debt. Higher interest rates resulted in unsustainable debt costs in Mexico and its eventual default, and the ensuing run on other Latin American countries.
- Likewise, following the reunification of Germany, fiscal spending accelerated, resulting in strong domestic demand and a buildup of inflationary pressures. The Bundesbank raised interest rates in response, resulting in the Deutsche mark (DM) appreciating and a run on other European currencies as many of them were overvalued relative to the DM.
- In the global crisis, accommodative monetary policy in advanced markets, combined with high saving in many Asian and oil surplus countries, was reflected in low global interest rates (the so-called "great moderation"), feeding into the buildup of systemic vulnerabilities before monetary policy was tightened²³.

²² Blanchard et al. (2010) discuss the pre-crisis macroeconomic policy framework, and suggest that the global crisis puts into doubt the "benign neglect" view that it is better to clean up after an asset bubble bust than to prevent its growth.

²³ See [Initial Lessons of the Crisis](#). Some argue that loose U.S. monetary policy during 2001 to 2005 was in large part responsible for creating the U.S. housing bubble, which propagated to the rest of the world through financial interconnectedness. See Taylor (2007).

- *Movements in commodity prices* have also been an important external factor during some of the systemic crises. Sharp drops in commodity prices had severe implications for their exporters during the debt crisis, as well as for Russia in the late 1990s. They were less of a problem during the global crisis given the large reserve buffers many large emerging markets had going into the crisis. Likewise, increases in commodity prices have also resulted in monetary policy tightening in advanced markets to contain inflation, triggering systemic crises as noted above (e.g., debt crisis).

B. Crisis Impact

17. **A key feature of systemic crises is the large number of countries with relatively strong fundamentals—or “crisis bystanders”—engulfed by the crisis** (Figure 8).

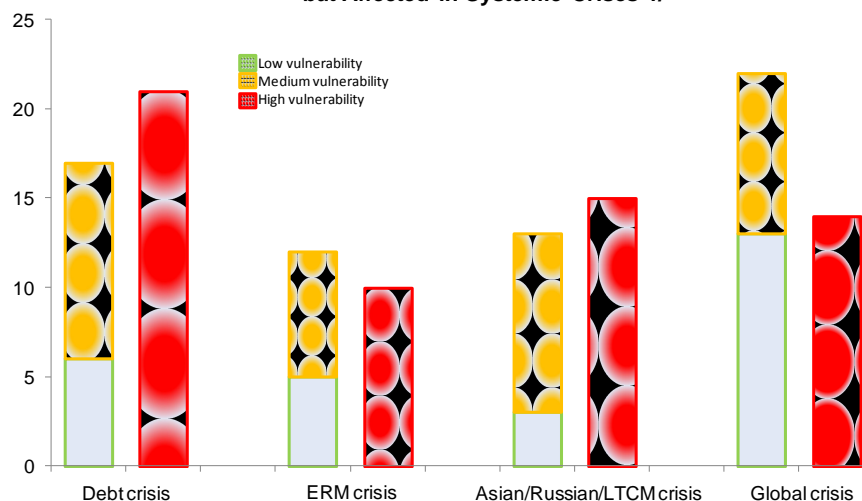
- Systemic crises affect many countries together, including those with relatively strong fundamentals, as determined by their low or moderate external vulnerabilities. In the absence of a systemic shock, these countries are unlikely to suffer an idiosyncratic economic or financial crisis (Box 3 illustrates the vulnerability indicators for crisis bystanders).²⁴ The focus of the analysis of crisis bystanders is on emerging market countries, but this is purely for data reasons, and does not imply that advanced markets and low-income countries did not have such crisis bystanders.²⁵
- The relatively strong fundamentals of these bystanders make them attractive to international investors who favor countries with fewer capital account restrictions and well-developed liquid markets. But, when global risk aversion rises, the need for investors to deleverage ends up drying up liquidity from these very same markets, without full regard to the relative strength of their fundamentals.
- The global crisis had a particularly large number of such crisis bystanders, hit by the synchronized deleveraging by a number of advanced economy banks.²⁶ The debt crisis, on the other hand, had the most number of highly vulnerable economies, given their deep rooted structural problems (noted in ¶11, third bullet).

²⁴ The external vulnerability ratings (based on reserve cover, current account balance, exchange rate overvaluation, external debt, and private sector external debt) apply only to the affected emerging market countries since the methodology and data lend themselves to extending backward to a longer period. The ratings are measured as “High”, “Medium” or “Low” based on the methodology described in the [methodology update done for the Fall 2010 vulnerability exercise](#).

²⁵ For advanced markets, data from the vulnerability exercise are available only from 2009; for low-income countries, the exercise is just underway, making it hard to attain their pre-crisis rating for the identified crises.

²⁶ For the purposes of this exercise, we expand the number of indicator-based affected countries to include those with a GRA -supported Fund program starting during the crisis year, since some of these countries are small with underdeveloped financial markets that may not necessarily reflect the stress event.

Figure 8. Emerging Markets with Relatively Strong Fundamentals but Affected in Systemic Crises 1/



Source: IMF staff calculations.

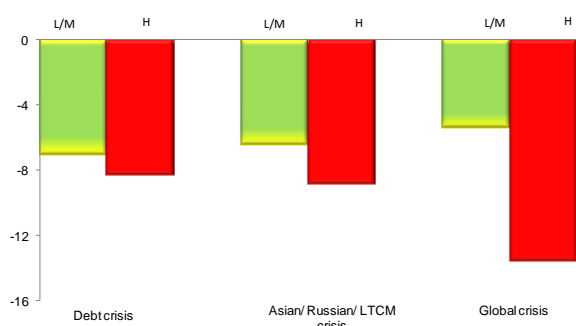
1/ An emerging market (EM) is considered to have relatively strong fundamentals if it had low or medium pre-crisis external vulnerability (overall vulnerability for the global crisis). See footnote 24 for details on the construction of the vulnerability indicators.

18. Despite their relatively strong fundamentals, crisis bystanders were not immune to the liquidity crunch and output loss experienced by countries at the crisis epicenter.

- Consistent with the above discussion, crisis bystanders suffered a large foreign exchange liquidity crunch arising from capital outflows (Figure 9). Net capital outflows of the bystanders was about 5½ percent of GDP during the global crisis, only slightly lower than the 6½ percent of GDP net outflows during the Asian crisis and 7 percent of GDP during the debt crisis.²⁷ The outflows during the global crisis occurred despite stronger initial conditions in many more countries than in past crises.
- Also, crisis bystanders were not exempt from large output losses, albeit smaller than that for the highly vulnerable countries (Figure 10). The loss in GDP growth (peak-to-trough change) among countries affected by a systemic event was largest during the global crisis. The median output loss was 4½ percent for crisis bystanders and 8 percent for highly vulnerable countries, compared with less than 3 percent and 6 percent output loss during the Asian crisis for the two groups, respectively. The difference during the global crisis was the large decline in external demand conditions, resulting in a substantial adverse impact across countries.

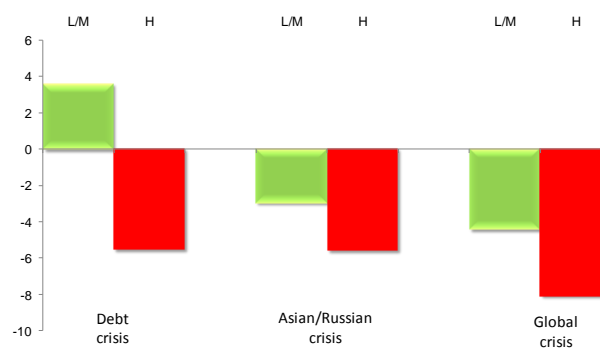
²⁷ The ERM crisis did not have a substantial impact on the emerging market economies. Its adverse effects were mostly contained to the large European countries.

Figure 9. EM Affected Countries: Median Net Inflows
(peak-to-trough deviation, period T-3 to T+3, T=crisis start, percent of GDP)



Source: IMF staff calculations.

Figure 10. EM Affected countries: Median Output Loss by Vulnerability
(peak-to-trough, percent)



Source: IMF staff calculations.

V. POLICY RESPONSES TO SYSTEMIC CRISES

19. **This section focuses on the key elements of policy responses to past systemic crises, particularly the role of the different strata of the GFSN in providing liquidity.** It highlights the role of liquidity support in providing adequate room for policy action to countries that, as crisis bystanders, were affected by shocks originating in other countries.

20. **The analysis suggests that policy responses were reactive, driven by individual country considerations, limiting their ability to control contagion.** Country-specific domestic policy responses were typically supported by financing assistance from the Fund and other international financial institutions (IFIs). Some crises also involved bilateral and regional financing support, as well as liquidity commitments by the private sector. Large-scale liquidity support, including through accommodative monetary policy by reserve-currency central banks, varied across crises, and was mostly driven by domestic factors. Also, responses have tended to be lagged and ad hoc, lacking the coordination needed to ensure a prompt and effective liquidity response to buttress market confidence and avoid contagion to bystanders.

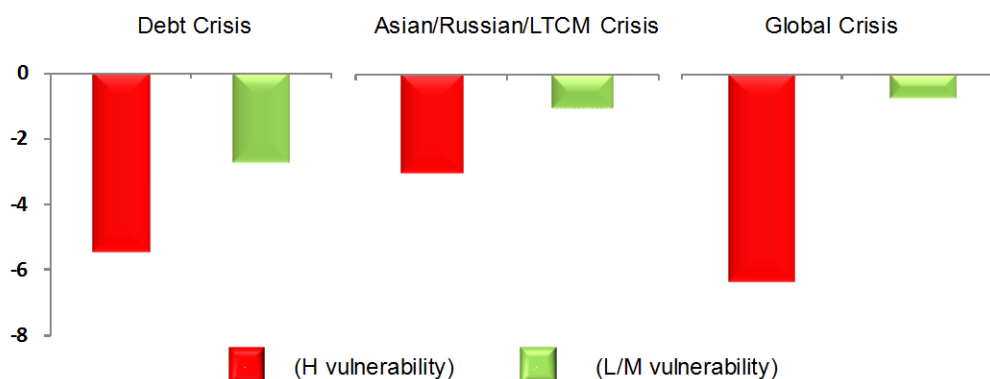
A. Domestic Policy Responses

21. **Domestic responses in past systemic events have aimed at restoring market confidence by combining policy adjustment with liquidity injections to absorb external shocks.** Policy adjustment—measured by the peak-to-trough correction in the current-account deficit—was achieved through fiscal policy and domestic liquidity provision, the latter measured by the relative changes in the country's exchange rate, international reserves, and policy interest rate.

22. **Policy adjustment was sizable in past systemic crises** (Figure 11).

- Greater policy adjustment occurred in countries with larger vulnerabilities affected by the crisis: crisis bystanders' adjustment averaged about 1.5 percent of GDP, while that for countries with high vulnerabilities averaged above 5 percent of GDP. The bystanders' relatively stronger fundamentals created room for countercyclical policies (see pre-crisis primary balance in Box 3).

Figure 11. Peak-to-Trough CA Deficit Adjustment by Crisis Episode
(Average, in percent of GDP)



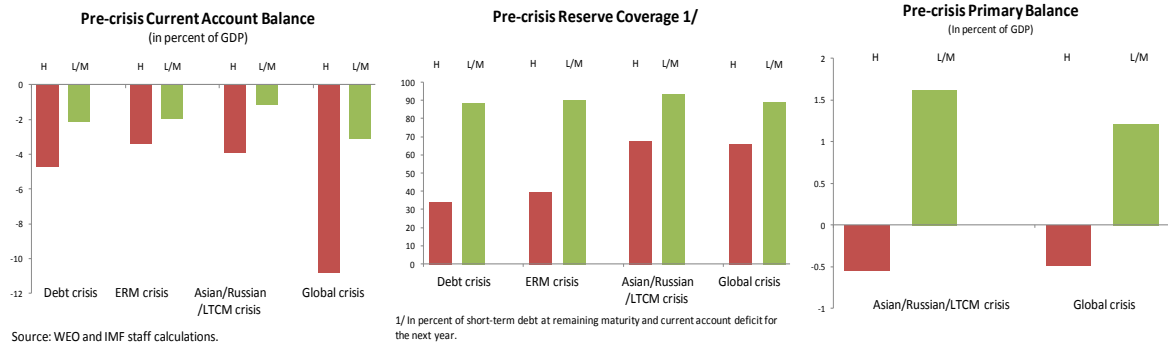
Source: WEO database and IMF staff calculations.

- Despite very weak external demand during the global crisis—import growth from G-7 economies *declined* by 14 percent in 2009 vis-à-vis an *increase* by 8½ percent in 1998 during the Asian/Russian/LTCM crisis—adjustment needs have not been as wrenching as in past crises, thanks to less severe fiscal adjustment, less overshooting of the exchange rate, fewer banking sector problems, and lower inflation.²⁸

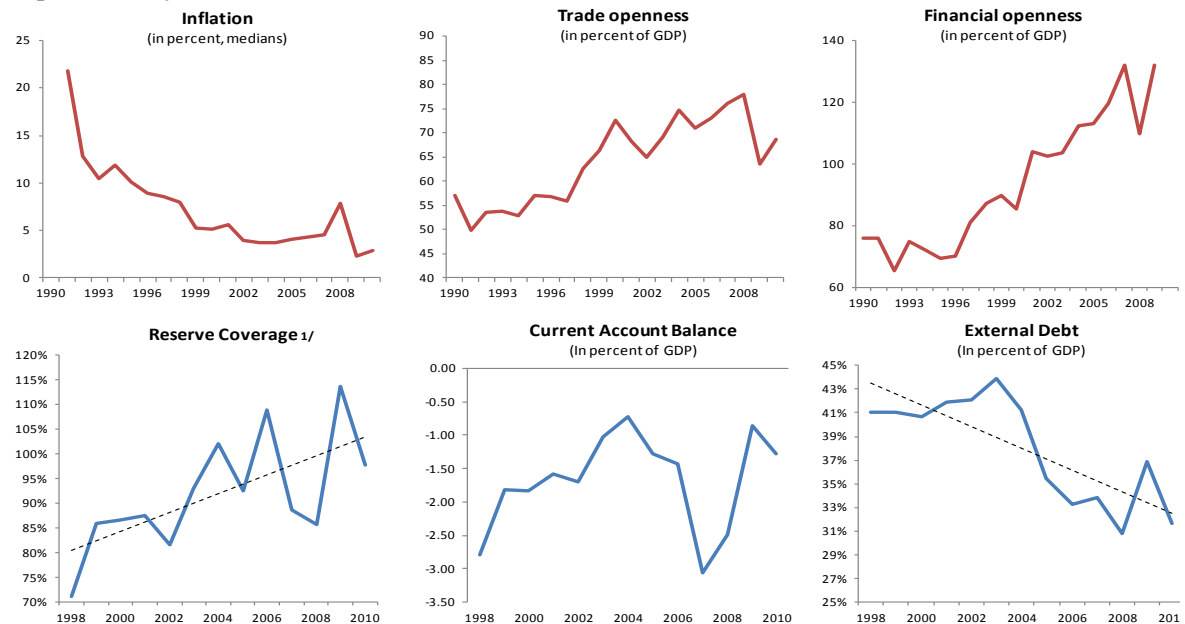
²⁸ For broader comparisons of domestic policy responses during the global crisis against past crises, see the Fund's *crisis program review* series referenced in footnote 3.

Box 3. Vulnerabilities of “crisis bystanders”

Crisis bystanders are defined as countries with relatively strong fundamentals—i.e., low or medium pre-crisis external vulnerabilities—but nonetheless affected in systemic crises due to their international linkages and exposure to contagion. As noted in ¶18, the focus here is on emerging markets due to data limitations. Prior to each systemic event, the median crisis bystander had a smaller current account deficit and larger reserve cover (of projected external financing needs in the following year) than the highly vulnerable group, suggesting that the crisis bystanders had a lower likelihood to experience an idiosyncratic crisis. Fiscal indicators—excluded in the definition of crisis bystanders due to data limitations for earlier systemic crises—tell a similar story: crisis bystanders in general had better pre-crisis primary balance positions.



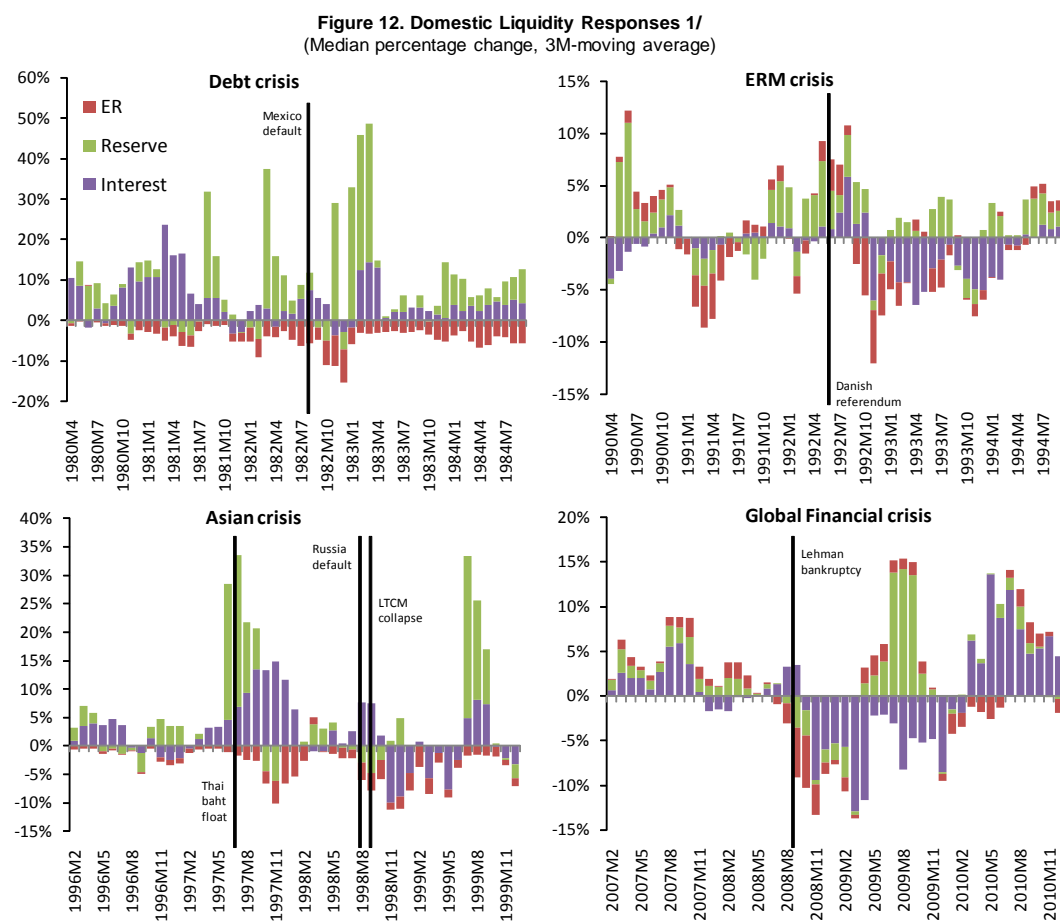
From a historical perspective, the strength of fundamentals for the group of crisis bystanders at the onset of the recent global crisis was the result of sustained efforts to improve their policies and policy frameworks following the sequel of financial crises faced by many of them during the 1980s and 1990s. As shown below, their inflation and balance sheets have been steadily improving for more than a decade. Such developments also make these countries more attractive to international investors (and more integrated with the global economy), increasing their exposure to systemic shocks.



1/ In percent of short-term debt at remaining maturity and current account deficit projected for the next year.

23. **Domestic liquidity responses to soften adjustment during systemic crises have also varied depending on country-specific circumstances and external conditions.**

- Decomposition of exchange market pressure indicators for crisis countries during systemic events highlights the variability of monetary and exchange rate policies across crises (Figure 12). This variability may be linked to domestic conditions, such as the exchange rate regime and the presence of currency and maturity mismatches in balance sheets, constraining countries' ability to accommodate domestic and foreign exchange liquidity needs to avoid costly currency depreciation.²⁹ The differences in domestic policy responses may also reflect global liquidity conditions (as discussed in ¶25).



Source: WEO database and IMF staff calculation.
1/ A decrease in exchange rate is a depreciation; a decrease in reserves is decumulation.

- In particular, during the Asian crisis—in the absence of liquidity injections by major central banks—policy rates were hiked sharply after unsustainable pegs were abandoned

²⁹ As shown in Beck, Demirgüç-Kunt and Levine (2003), banking crises often occur at the same time as currency crises in emerging markets. Depreciations under such conditions could aggravate credit constraints and worsen balance sheets.

to avoid disorderly currency depreciation, given very large currency mismatches. In the global crisis, policy rates—also aimed at avoiding balance sheet effects—were not hiked as aggressively upfront due to procyclicality risks in an already weak domestic and external environment. Accordingly, rates were generally reduced as soon as initial pressures receded.

- In the Asian crisis countries, foreign exchange intervention to defend the pegs had depleted the stock of reserves, severely constraining monetary policy and injection of domestic and foreign exchange liquidity. In the global crisis, the sizable stock buildup of reserves prior to the crisis enabled upfront use of reserves at the onset of the crisis, helping avoid excessive exchange rate overshooting in most cases and contributing to a more accommodative monetary policy. That said, only about half the emerging markets actually relied on significant depletion of their reserves during the global crisis, suggesting a “fear of losing reserves” rather than a “fear of floating” (Box 4).

Box 4. Availability and Use of Reserves in Systemic Crises¹

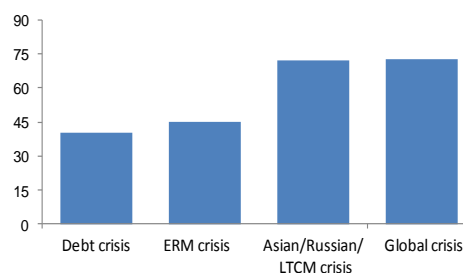
Reserves have been an important factor in mitigating the impact of systemic crises, but with diminishing benefits. Moreover, self-insurance can be costly, and the reserves may not be readily used by countries for “fear of losing reserves”.

- Liquidity buffers have helped smooth consumption during systemic crises, enabling some countries to manage large financing pressures without experiencing a costly crisis. However, as noted in recent Board papers ([How Did Emerging Markets Cope in the Crisis](#) and [Reserves Accumulation and International Monetary Stability](#)), these benefits tend to diminish with the extent of reserve cover. Large reserve accumulation is also costly at the country level (the average cost of holding reserves for the median emerging market is estimated to be ½ percent of GDP over 2005-10), and a symptom of imbalances at the global level.

- Also, reserve cover—measured relative to a country’s short-term financing needs—has remarkably increased in the run-up to the recent global crisis, but actual use of reserves has been limited. Some countries demonstrated a reluctance to use reserves in the recent crisis, preferring to draw on foreign currency central bank swap lines, or use liquid assets in their sovereign wealth funds, putting into question the usability of large reserve holdings.

- Specifically, recent empirical work suggests that only about half of emerging markets relied on significant depletion of their international reserves as part of their adjustment mechanism (Aizenman and Sun, 2009). Only nine emerging markets in their sample experienced sizable reserve losses—at least 10 percent of their international reserves—during July 2008 to February 2009, and anyway limited their interventions during the crisis to less than one-quarter of their pre-crisis reserve holdings. In general, countries more exposed to financial than trade shocks refrained from using reserves during the global crisis, exhibiting a “fear of losing reserves” rather than “fear of floating”. This has been associated with the signaling value of reserve holdings and the risk that dwindling reserves may signal greater vulnerability, triggering a run on its remaining reserves, especially in the context of high uncertainty on the duration and extent of the crisis.

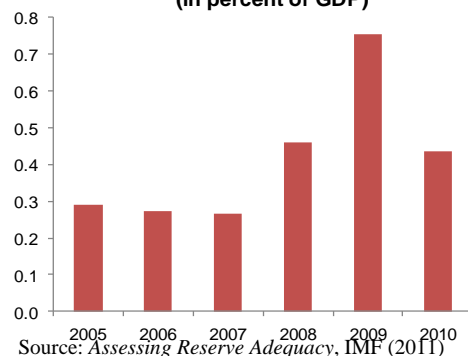
Pre-crisis Reserve Coverage 1/



1/ In percent of short-term debt at remaining maturity and current account deficit for the next year.

Source: *Assessing Reserve Adequacy*, IMF (2011)

Median Cost of Holding Reserves, 2005-10 (in percent of GDP)



Source: *Assessing Reserve Adequacy*, IMF (2011)

1/ This box builds on recent analytical work in [Assessing Reserve Adequacy](#), IMF Policy Paper; Feb., 2011.

B. Global Liquidity Response

Reserve-currency central banks' liquidity response

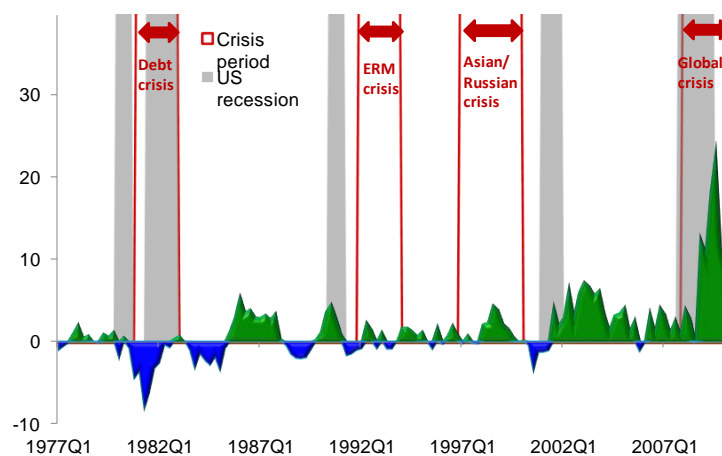
24. **The response of large reserve-currency central banks varied, depending on domestic conditions and impact of these crises on their countries.** In systemic crises,

where a large number of countries are affected and their central banks may be constrained in their ability to inject liquidity due to large depreciation fears and/or balance sheet risks, one option is for major advanced market (e.g., reserve-currency) central banks to help reduce foreign exchange liquidity pressures. However, central banks are driven by their domestic mandates, which

may not always align with global needs. Indeed, analysis of global liquidity (average change in GDP-weighted narrow money for the U.S., Euro Area, Japan, and the UK), shows that the responses tended to be uneven (Figure 13):³⁰

- During the 1980s debt crisis, global monetary conditions were tightened in response to inflationary pressures in advanced markets following the oil crisis and despite an ongoing, yet somewhat milder, recession in the U.S. and other G7 countries. Thus, monetary responses remained geared to a domestic reaction function rather than global stability considerations.
- In the Asian crisis, liquidity injections from major central banks were rather small, as most advanced economies initially remained strong and even benefited from investors' "flight to safety."³¹

Figure 13. Annual Change in Global Liquidity 1/
(In percent of GDP)

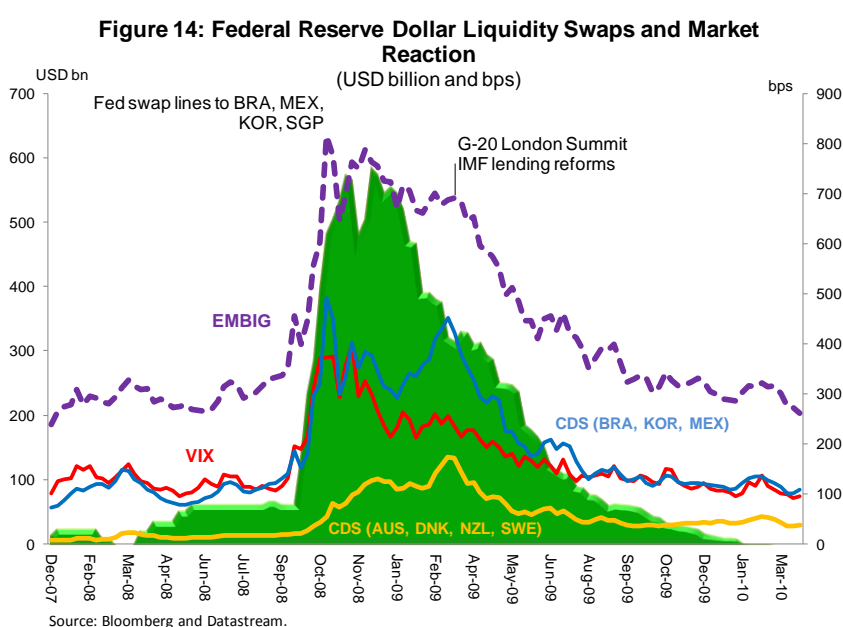


1/ Global liquidity is calculated as average quarterly narrow money (converted in US\$ and divided by GDP) in the U.S., Euro Area, Japan, and the U.K. Figures for the Euro Area refer to M1.
Sources: IFS and staff estimates.

³⁰ This quantity-based measure of global liquidity is fairly commonly accepted, and is consistent with the definition followed in IMF (2007). Alternative measures such as adding world international reserves to capture the liquidity held abroad, or including gross private capital outflows from G-4 economies, or using price-based indicators to reflect the relative liquidity of an asset, or a combined price and quantity measure are all viable options to measure global liquidity, but each has its own limitations, including data constraints for earlier periods. There is ongoing technical work by staff on a comprehensive definition of global liquidity as part of the reforms to the international monetary system.

25. **The scale of the recent global crisis, however, resulted in an unprecedented coordinated response with a crucial role played by the U.S. Federal Reserve (Fed).**³² To avoid a global breakdown of dollar funding, the Fed authorized dollar liquidity swap lines with a number of central banks around the world (Box 5). At its peak, following Lehman’s bankruptcy, the amount drawn reached almost \$600 billion, accounting for over 25 percent of the Fed’s total assets (Figure 10).³³ This was paralleled by €250 billion swap lines by the European Central Bank (ECB), of which about €200 billion was with the U.S. Fed.³⁴ In October 2008, the Fed also authorized swap lines for \$30 billion each to four emerging markets—Brazil, Korea, Mexico, and Singapore—given their large dollar funding shortages and the sizable exposure of U.S. banks to these countries (Aizenman, Yothin, and Park, 2010, and Aizenman and Pasricha, 2010).

26. **Market reaction to the Fed swap lines during the global crisis was instantaneous, albeit somewhat short-lived for emerging markets** (Figure 14). The swap lines were successful in smoothing disruptions in overseas dollar funding markets, with their announcements and operations associated with improved market conditions across the board (Fleming and Klage, 2010). The VIX declined sharply after the swap lines’ outstanding amounts reached their peak, although there was no stark decline in



³¹ The change came in late 1999 as the U.S. Federal Reserve and the Bank of England eased monetary policy in response to the market turbulence following the Russian/LTCM crisis (CGFS, 1999). More global liquidity was injected in a “non-crisis” period from 2002 to 2007 partly due to the U.S. Fed’s response to September 11, 2001 terrorist attacks (see Annex II).

³² See “[Credit and Liquidity Programs and the Balance Sheet](#)”, Board of Governors of the Federal Reserve System, and Goldberg et al (2010).

³³ The swap lines were “uncapped” for the ECB, the Swiss National Bank, the Bank of Japan, and the Bank of England on October 13, 2008, in view of extreme liquidity pressures.

³⁴ The ECB and Swiss National Bank also introduced swap lines to provide CHF liquidity. The ECB established repo arrangements with Poland and Hungary to provide euros, while the Riksbank and Denmark National Bank, benefiting from the swap lines from the ECB, in turn entered into agreements to provide euros to Latvia and Iceland. The Bank of Japan upgraded its swap line to Korea, and China established swap lines with some trading partners to help finance trade with China.

the CDS spreads for the advanced economies with capped swap lines as counterparty credit risks lingered (Coffey et al, 2009). CDS spreads for the emerging markets that received the \$30 billion swap lines declined only temporarily—through January 2009—in line with the overall decline in risk aversion—but then started to rise again given ongoing market pressures, notably in Europe. Overall, emerging markets also saw only a brief decline in the EMBI-Global spread after the Fed swaps were announced. Exchange rate performance largely mimicked that of bond spreads (Aizenman and Pasricha, 2010). A long-lasting and universal decline in spreads occurred only in April 2009 after the announcement that the U.S. Fed would expand its asset purchases by more than a \$1 trillion (March 18, 2009) and the G20 London summit announced a coordinated policy response to the global crisis, including a substantial increase in Fund resources and the overhaul of its lending toolkit (see also ¶29 for additional analysis on spreads).

Box 5. Salient Features of the U.S. Fed Swap Lines with Selected Central Banks¹

On October 29, 2008, the Fed established four swap lines for a uniform amount of up to US\$30 billion each with the central banks of Brazil (equivalent to 650 percent of quota), Korea (670 percent of quota), Mexico (620 percent of quota), and Singapore (2,300 percent of quota). The recipient central banks were selected to address the global break-down in the U.S. dollar wholesale funding and swap markets, and to avoid large synchronized sales of U.S. government paper as countries faced the need to use their international reserves to intervene in the foreign exchange market.²

The swap-line use was restricted to specific short-term financing needs, i.e. to counter dollar-funding constraints in their local markets. Such funding constraints were addressed through tender operations in U.S. dollars conducted by the counterpart central banks with their domestic financial institutions. Therefore, the swap lines allowed central banks to provide lender-of-last-resort liquidity in U.S. dollars without being forced to draw down dollar holdings of foreign exchange reserves or to transact directly in the open market.

Swaps entailed the exchange of domestic currency for dollars, had short-term maturities ranging from overnight to three months, and carried a cost equivalent to the interest earned by the counterpart central banks on their tender operations, which were priced at a spread over Overnight Index Swap or LIBOR rates. Rather than bearing stigma, recipient countries perceived the swap line as a seal of approval from the Fed, despite constraints on the use of the money and drawings being subject to Fed approval.³

The central banks of Korea and Mexico drew on the swap lines, which were fully repaid and eventually closed on February 1, 2010, in light of improved market conditions.

¹ See also Box 2, in *The Fund's Mandate—Future Financing Role*, IMF Policy Paper; March 25, 2010.

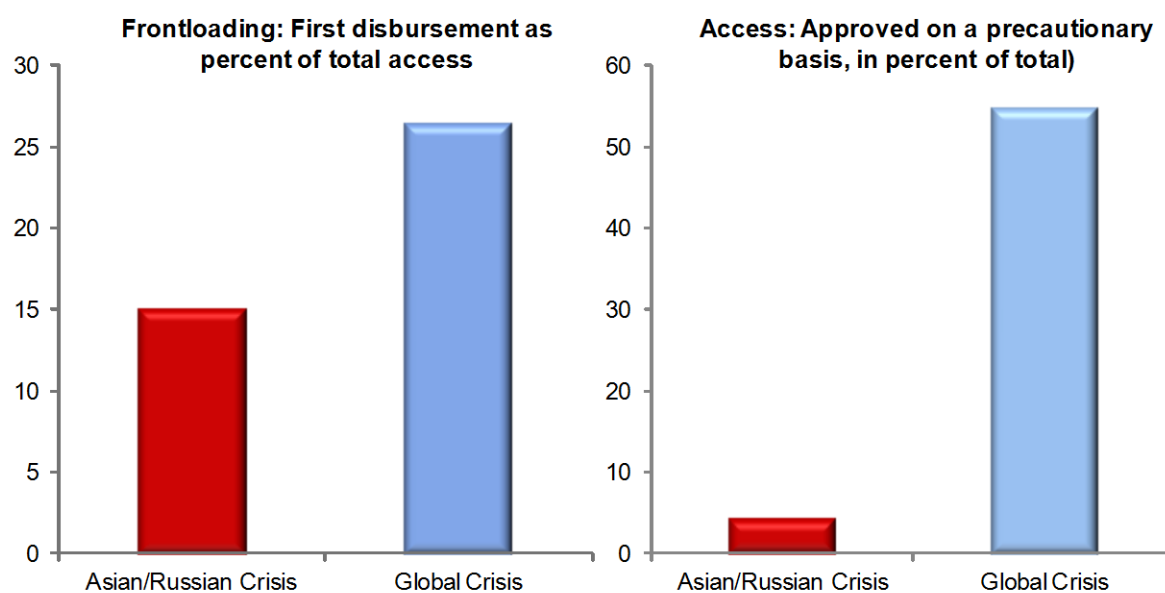
² In general, swap lines are only imperfect substitutes for reserves, given their ad hoc nature and selectivity for countries with significant trade and financial linkages (Aizenman, Yothin and Park, 2010).

³ Obstfeld et al (2009) has a discussion of the signaling role of the Fed swap lines to emerging markets.

IMF financing

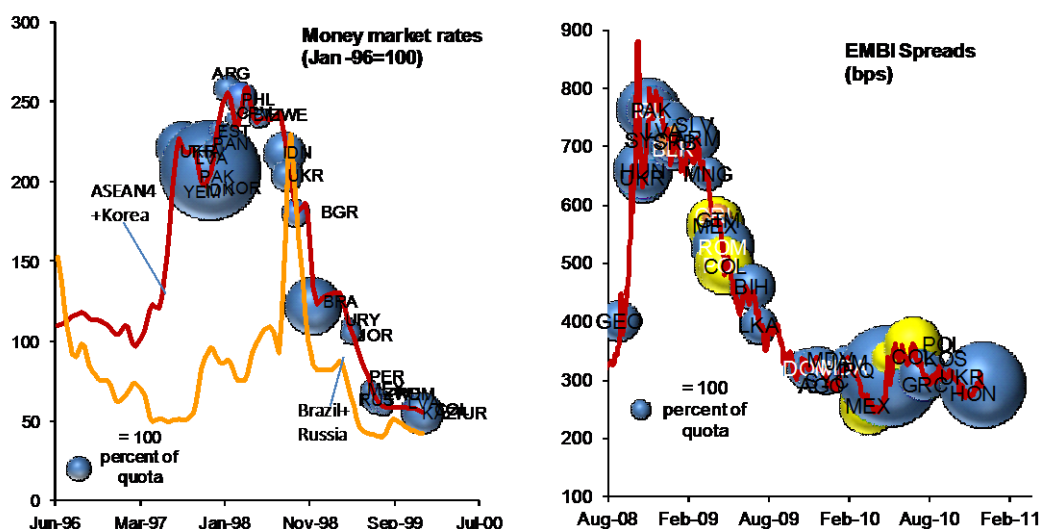
27. **Enhanced lending modalities in recent Fund arrangements have helped restore market confidence faster than in past crises.**³⁵ Fund financing during the global crisis was larger and more frontloaded, with precautionary arrangements approved at higher access levels (Figure 15). This large and upfront liquidity helped improve market conditions in less than a year, with stabilization of the spreads and net capital inflows to many emerging markets by spring 2009 (Figure 16). By contrast, smaller availability of liquidity at the onset of the Asian crisis contributed to market confidence being restored only after almost two years—after the subsequent Russian and LTCM crisis had also receded.

Figure 15. Frontloading and Access



Source: IMF staff calculation.

³⁵ Financing was also provided by other international financial institutions according to their specific mandates. See Appendix II in [Review of Fund Facilities—Analytical Basis for Fund Lending and Reform Options](#), IMF Policy Paper, February 2009, for a discussion of “Fund-type” facilities introduced during the global crisis by other international financial institutions, including the BIS and the World Bank.

Figure 16. Market Interest and Spreads

Source: Bloomberg, IFS and IMF staff calculations.

28. **Moreover, countries with Fund arrangements weathered the global crisis better than past crises, and in line with the strength of their policies and fundamentals.** For countries with Fund arrangements, the current account adjustment during the global crisis was smaller, despite substantially worse cyclical conditions than in past systemic events (Figure 17). The adjustment need was particularly small for crisis bystanders, notably those with FCL arrangements, even though some of them were exposed to significant spillovers from the crisis epicenter. Policy adjustment was well tailored to countries' macro-critical vulnerabilities by streamlined conditionality and, for the FCL cases, by the signaling value of ex-ante qualification. Indeed, policy responses, such as liquidity support coupled with Fund arrangements, are found to be particularly important determinants of spreads reduction during the recovery phase of the global crisis, based on a pooled regression of affected countries, even after controlling for initial external vulnerabilities (Table 2). As a result, during the recent systemic event, crisis bystanders with Fund arrangements experienced substantially lower output losses than in the past crises, and those with precautionary arrangements outperformed global developments in real GDP growth

Table 2. Determinants of the change in spreads from peak to trough during the global crisis

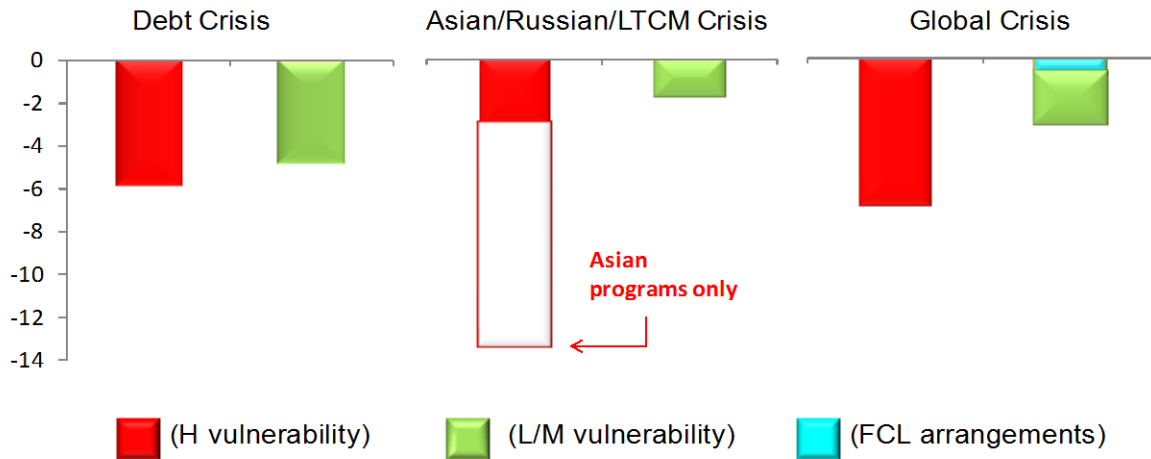
	(in basis points)	
Change in cyclically-adjusted primary balance (in percent of GDP)	115.26**	113.27*
Change in interest rate	94.92**	93.34*
Liquidity support: net official financing (in percent of GDP)	29.07*	31.28*
Interaction term: liquidity support*IMF program	106.72	104.74
Use of reserves (in percent of GDP)	-113.99	-116.58
External vulnerability indicator, Fall 2008		103.5
Constant	1017.3***	948.69***
R-squared	0.29	0.30
Obs.	28	27

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: VEE Fall 2008; WEO; Bloomberg; Fund staff calculations.

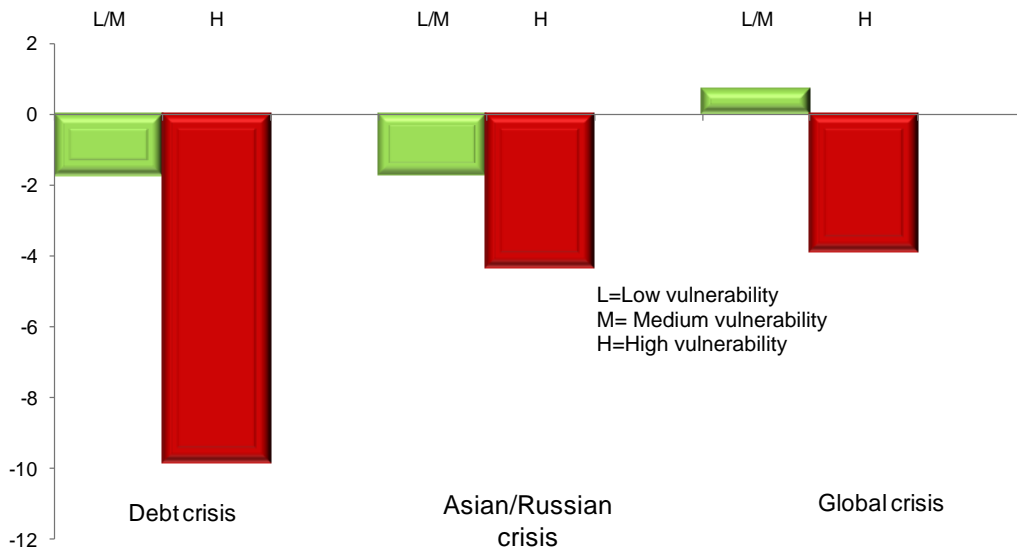
(Figure 18). Even among highly vulnerable countries with programs, output losses were more contained after controlling for differences in global conditions.

Figure 17. Peak-to-trough CA Deficit Adjustment by Crisis Episode
(Fund arrangements, average, in percent of GDP)



Source: WEO and IMF staff calculations.

Figure 18: EMs with Fund Arrangement: Median Output Loss by Vulnerability
(Peak-to-trough deviation from global growth, percent)

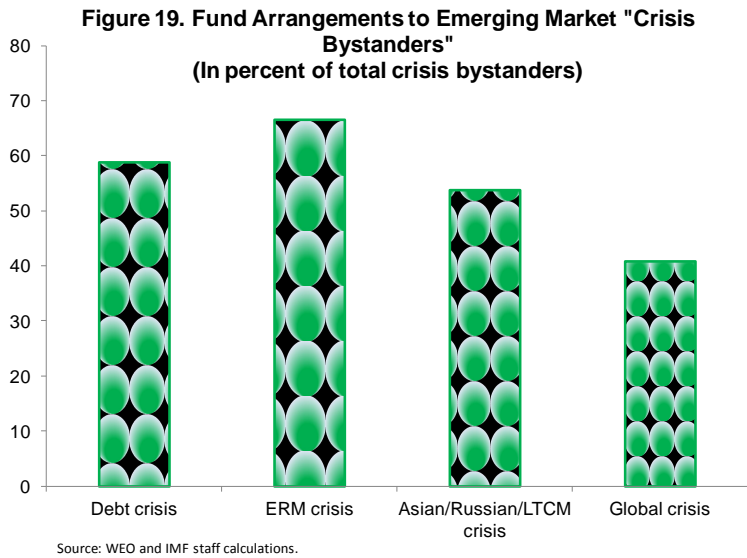


Source: WEO and IMF staff calculations.

29. **Still, there was further scope for the Fund to extend financing support to more crisis bystanders.** While countries with Fund arrangements were able to weather the global crisis better, benefiting from the enhanced lending framework, the IMF was able to ring-

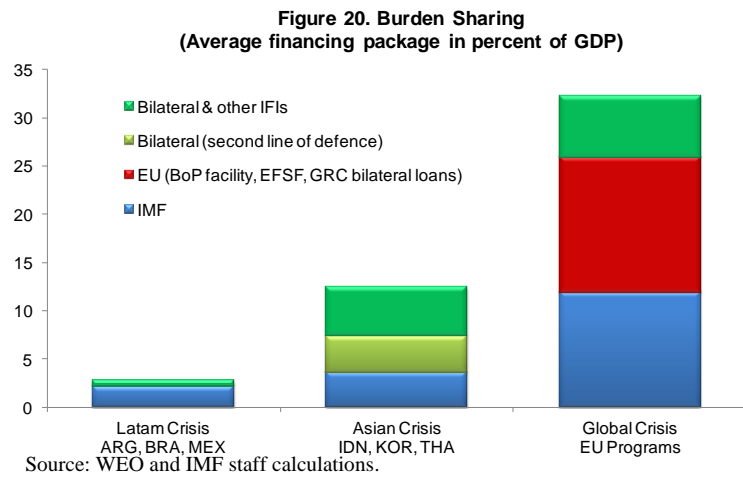
fence only a limited number of strong performing affected countries (Figure 19). Specifically:

- Only about 40 percent of crisis bystanders requested financing support from the Fund, compared with a 60 percent average in previous systemic events. This lower demand may reflect (i) reserve accumulation by many countries prior to the crisis, or (ii) the monetary policy coordination and liquidity swaps noted earlier. But, reserves may be costly to hold and the availability of swap lines in the future remains uncertain. Also, while the Fund’s lending reforms were helpful, they were lagged relative to when the crisis broke out.



Liquidity support from other official creditors and the private sector

30. **Official lending from bilateral and regional creditors has played a critical role complementing Fund financing in past systemic crises.** Support from bilateral and other official creditors has allowed effective burden-sharing of global liquidity needs with the Fund. The integral role of regional arrangements, brought to the forefront by the European financing response in the global crisis, highlights the benefits from joint programs between the Fund and RFAs in terms of resources, regional expertise, and program ownership



(Figure 20).³⁶ Given the rapidity with which liquidity pressures were faced by many member countries, regardless of fundamentals, further consideration is now being devoted to regional

³⁶ The ERM was endowed with liquidity support clauses, mostly through its Very Short Term

(continued...)

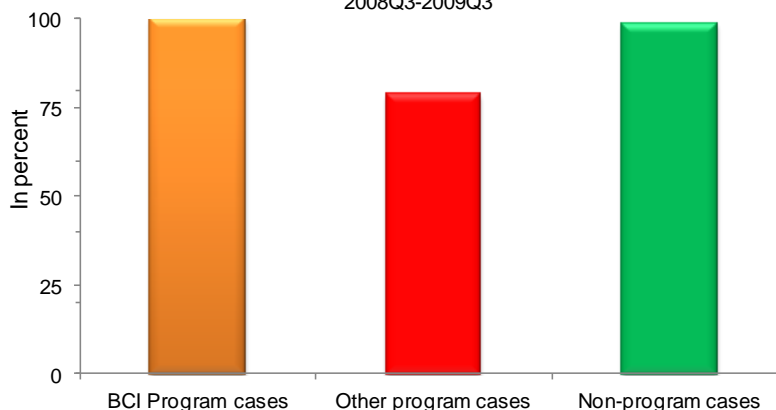
financing on a precautionary basis. These efforts can leverage, on a case-by-case basis, potential synergies with the Fund to ensure effective coordination across the different layers of the GFSN.³⁷

31. **Finally, liquidity commitments by the private sector have secured additional support for crisis resolution during systemic events.** Explicit private sector commitments to maintain their exposures

can help in some crisis resolution cases support the credibility of a country's official financing package, mitigate the shock to the real economy, and lower potential moral hazard. While the extent of committed liquidity support by the private sector has varied across crises depending on global and country-specific conditions, it has played an important role in most of them. The recent

European Bank Coordination Initiative during the global crisis was effective in securing continued exposures by participating banks in Fund-supported program countries, notably Bosnia, Hungary, Romania, and Serbia (Figure 21).³⁸ Still, the ability to successfully ensure continued private sector liquidity commitments ultimately depends on lending opportunities, loan performance and banks' overall liquidity situation, including in their parent country.

Figure 21. Rollover of Parent Banks' Exposures in CESE Countries
2008Q3-2009Q3



Source: BIS.

Financing Facility (VSTFF), which offered a defense to countries under unwarranted speculative attack. Nevertheless, although marginal interventions were in theory unlimited, the Bundesbank reserved the right to suspend interventions if threatening German price stability. The survival of the French Franc in the September 1992 speculative attack was largely due to the support given by the Bundesbank to the Banque de France. Liquidity support was instead limited for the U.K. and Italy, where realignment within the system was the favored strategy. Overall, the Bundesbank lent DM47 billion to its partner central banks, in addition to a similar amount of direct intervention (see Bini Smaghi and Ferri, 2001, and Henning 2002).

³⁷ See [The Fund's Mandate—Future Financing Role: IMF Policy Paper; March 25, 2010](#) and IMF Survey Article, "[IMF, Regional Financial Safety Nets to Create Stronger Links](#)", October 26, 2010.

³⁸ See Box 10 in [Review of Recent Crisis Programs: IMF Policy Paper; September 14, 2009](#) for further discussion of the Bank Coordination Initiative experience as well as "Agreement with Banks Limits Crisis in Emerging Europe", IMF Survey, October 28, 2009.

VI. KEY LESSONS AND IMPLICATIONS FOR THE GLOBAL FINANCIAL SAFETY NET

A. Lessons

32. The following key lessons can be drawn regarding systemic crises and the policy responses to restore market confidence:

- Systemic crises are highly contagious and globally costly events. Trade and financial linkages among countries, combined with herding behavior by investors, contribute to rapid crisis propagation. Countries with relatively strong fundamentals were not immune to the costs of systemic crises, although these costs were smaller than for the highly vulnerable countries.
- Timely domestic policy responses were important steps to restore credibility and market confidence. Adjustment in countries with high vulnerabilities was typically more than in countries with low or modest vulnerabilities, the latter having more room for accommodative policies. The experience of the global crisis suggests that the buildup of reserves was useful in preventing exchange rate pressure from affecting consumption, though usability of these reserves is questionable given their diminishing returns, holding costs, and guarded use.
- The multilayered approach to liquidity provision helped mitigate the effects of systemic crises, but only in a limited way.
 - i. The role of global liquidity support by major reserve-currency central banks—effective to restore market liquidity and confidence—has been uneven during systemic events, but justifiably dependent on domestic monetary policy and financial stability considerations, in line with their mandate;
 - ii. During the recent global crisis, the Fed swap lines played a crucial role in addressing elevated pressures on global dollar funding markets. However, the counterpart countries were selective, and their availability remains uncertain going forward. Moreover, the lack of automaticity and restrictions on its use could limit their flexibility and availability during systemic crises;
 - iii. Use of Fund resources in large and frontloaded amounts, and increased recourse to precautionary financing generally helped restore market access more rapidly than in past crises.³⁹ Still, Fund resources were tapped only with a lag and were not fully utilized to ring-fence countries with relatively strong fundamentals.

³⁹ See also Ramakrishnan and Zalduendo (2006) for evidence in support of Fund financing lowering the likelihood of crisis risk.

- iv. Official sector burden sharing increased during the global crisis, with prominent roles played by bilateral creditors and RFAs. The EU, in particular played a pivotal role in supporting the liquidity needs of the region. However, the focus of such regional financing has largely been on crisis resolution, not prevention.
- v. Liquidity commitments by the private sector remain a key component of the safety net for crisis resolution cases, further enhancing burden sharing, mitigating crisis costs, and lowering moral hazard risks. As with the official sector, however, private sector involvement was mostly for crisis resolution.

B. Implications for the Global Financial Safety Net

33. The above analysis suggests possible areas of reform complementing recent efforts to strengthen the Fund's financing role:

- i. Rising risks of systemic instability fuelled by growing trade and financial linkages and unpredictable investor behavior suggest the value of stronger surveillance over systemic risks and greater coordination in deploying crisis response policies; and
- ii. Even-handed and predictable availability of short-term liquidity targeted at countries with relatively strong fundamentals and policies that are hit by a systemic shock would help nip systemic crises in the bud, and may even preempt their occurrence by reducing investor uncertainty about the possible extent of contagion. Demand for existing Fund lending instruments and supply of central bank liquidity tend to lag during systemic crisis events.
- iii. In fact, while major central banks played a crucial role in the recent global crisis, such extraordinary actions cannot be taken for granted given the possibility that constraints from domestic mandates may interfere with decision-making for the global good. Moreover, while central banks may be best placed to alleviate interbank funding problems, they may not be well equipped to deal with funding pressures arising, for example, in sovereign bond markets.
- iv. As for the Fund, recent innovation in the lending toolkit has gone a long way in increasing its ability to respond in a flexible manner to various crisis circumstances. But, to be effective in a systemic crisis, actual short-term liquidity needs of all countries with relatively strong fundamentals and policies need to be met rapidly to cure the systemic shock (even better, to avoid that a large shock turns systemic). Such countries may require greater comfort and predictability on the availability of short-term liquidity to absorb temporary exogenous shocks.

34. These conclusions are corroborated by a growing academic literature. Many academics have argued for automatic provision of emergency liquidity assistance during financial instability, particularly in emerging markets (Annex III has a literature review).

Some argue that such assistance is needed in part because less-developed financial markets, weaker institutions, and lack of easily available information often make these emerging markets especially vulnerable to systemic risk (Mishkin, 2007, Fernández-Arias and Levy-Yeyati, 2010). Others reason that there is presently no mechanism to stabilize market conditions in a global systemic liquidity crisis, and they consider the Fund could play a key role alongside national central banks by providing liquidity (Obstfeld, 2010, Truman, 2010, and Cordella and Levy-Yeyati, 2010). However, the absence of an automatic trigger to access Fund lending, combined with its limited resources, may constrain such a role (Calvo, 2010 and Fernández-Arias and Levy-Yeyati, 2010).

35. There are others, however, who contend that excessive liquidity provision could create moral hazard. Indeed, contrary to the benefits to the liquidity injection in Mexico in 1994-95 described in Annex II, some have argued that such assistance provides incentives to investors to assume excessive risk that are counterproductive to global financial stability (Calomiris, 1998).

- A common moral hazard argument is that international “bailouts” insulate foreign creditors from losses during crises, resulting in excessive risk taking by private creditors. Domestically, the argument is that moral hazard problems could arise both in the official and private sector from the belief that loans from the lender of last resort would be forthcoming during a crisis.
- However, evidence suggests that moral hazard depends on the type of shock (exogenous or idiosyncratic) and whether there are instruments to mitigate the moral hazard behavior (such as conditionality).⁴⁰ Lane and Phillips (2000) and Jeanne and Zettelmeyer (2001) show that IMF resources or implicit subsidies in IMF lending are not large enough to create serious moral hazard.
- Moreover, effective prudential regulation and supervision of the financial sector can help lower moral hazard and reduce excessive private sector risk-taking (Fernández-Arias and Levy-Yeyati, 2010). Indeed, regulatory weaknesses and lack of a macroprudential policy framework led to failure to identify the build-up of systemic risk prior to the global crisis. Thus, efforts to strengthen financial regulation should go hand in hand with efforts to strengthen the international financial architecture (see below).

Where do we go from here?

36. First, minimizing potential systemic risks is the first line of defense to preserve global stability. Strengthening financial regulation—including to deal with systemically-important financial institutions via more effective supervision and credible cross-border

⁴⁰ See also Box 5 in [The Fund’s Mandate—Future Financing Role](#), IMF Policy Paper, March 2010, and references therein, for additional discussion of moral hazard.

resolution frameworks—is essential to prevent such crises, especially as more complex financial linkages across borders increase the risk of systemic crises.⁴¹ Likewise, strengthening policies and economic fundamentals through more effective bilateral and multilateral surveillance, in conjunction with sustained policy collaboration that places greater emphasis on policy spillovers and latent systemic risks, will also help lower crisis vulnerability and the ability to accommodate shocks without excessive adjustment and output loss. While these efforts would no doubt contribute to lowering the likelihood of systemic crises, history shows that the possibility of another systemic crisis cannot be ruled out. Thus, preparedness to respond effectively to the next systemic event is of paramount importance.

37. Enhancing the multilayered global financial safety net to create a mechanism to address threats to global stability would be another useful step. Specifically:

- **RFAs are gaining prominence as a critical layer of the GFSN, and are already making efforts to enhance their own frameworks.** European RFAs have led the way in providing large financing to crisis countries in Europe during the recent global crisis. They are also bolstering their surveillance framework. Concurrently, the ASEAN+3 members are strengthening their institutional frameworks for surveillance and crisis management, proactively developing operational guidelines under the Chiang Mai Initiative Multilateralization. In addition, there is also recognition that RFAs should expand their lending toolkit to incorporate financing for crisis prevention. While RFAs are an integral part of the GFSN, their lending during times of crises are limited to specific groups of countries which—while critical and useful at a regional level—may not be adequate to ensure even-handed and large coverage in a systemic crisis of truly regional or global dimension, given disparities in their resource availability and country coverage.
- **Additional efforts are also needed in the multilateral layer of the GFSN, and, on balance, there may be scope for a larger role for the Fund to address the gaps.** The Fund can deal with both idiosyncratic shocks and systemic shocks by pooling risks across its near universal membership and mobilizing large amounts of liquidity on a temporary basis. In particular:
 - If faced with a global liquidity crunch, the Fund can make liquidity available by allocating SDRs and extending bilateral financial assistance to allow policy adjustment while cushioning the impacts of the shocks.⁴² Financial assistance can be

⁴¹ Other measures under consideration include building sufficient capital and liquidity; instituting a macroprudential approach to supervision and addressing procyclicality; and expanding the perimeter of oversight to nonbank financial institutions. See FSB (2011), FSB, IMF, and BIS (2011), and [The Too Important to Fail Conundrum – Impossible to Ignore and Difficult to Resolve](#).

⁴² The forthcoming paper on “*The Case for a General Allocation of SDRs During the Tenth Basic Period*” will also examine the amount of SDRs relative to various metrics.

used flexibly to meet balance of payments needs arising from currency runs, bank runs, or for budget support if the government faces financing pressures. Moreover, policy signalling from ex ante or ex post conditionality provides an international seal of approval, helping play a catalytic role to mobilize private financing.

- As the analysis in this paper suggests, during systemic crises, even countries with relatively strong fundamentals could experience liquidity runs. Thus, more predictable provision of short-term liquidity to these countries could help not only mitigate the negative crisis impact, but also strengthen the Fund's catalytic role by boosting market confidence and perhaps even preventing liquidity runs in the first place. These benefits can be achieved by enhancing flexibility in the current toolkit to provide evenhanded and predictable short-term liquidity support to crisis bystanders during systemic crises.
- Any enhancement in the lending toolkit would have to be weighed against moral hazard concerns, as well as risks to the Fund. Mitigating such concerns and risks would require tailoring the form of assistance based on country fundamentals and the nature of financing shock. Countries with relatively strong fundamentals suffering an exogenously-driven liquidity shock could be eligible for short-term liquidity support based on qualification criteria (ex ante conditionality), while the financing needs of countries with weak fundamentals and longer-term financing needs would be better-suited for phased financing with ex post conditionality. Increasing the predictability of liquidity provision tailoring ex ante or ex post conditionality to countries circumstances would allow the Fund to make progress in responding effectively to systemic shocks in a way that minimizes the broader risks inherent to any lender of last resort.

VII. ISSUES FOR DISCUSSION

38. **Directors' views on the following issues would be welcome.**

- Do Directors agree with the broad conclusion that policy responses to past systemic crises have been unpredictable, reactive, and uncoordinated?
- Do Directors envisage a role for the Fund to alleviate liquidity needs, especially for crisis bystanders, during systemic crisis events?
- Do Directors consider the Fund's current lending toolkit could be enhanced to meet short-term liquidity needs during systemic events, especially to ring-fence crisis bystanders?

Annex I. Robustness Check of Systemic Crisis Identification

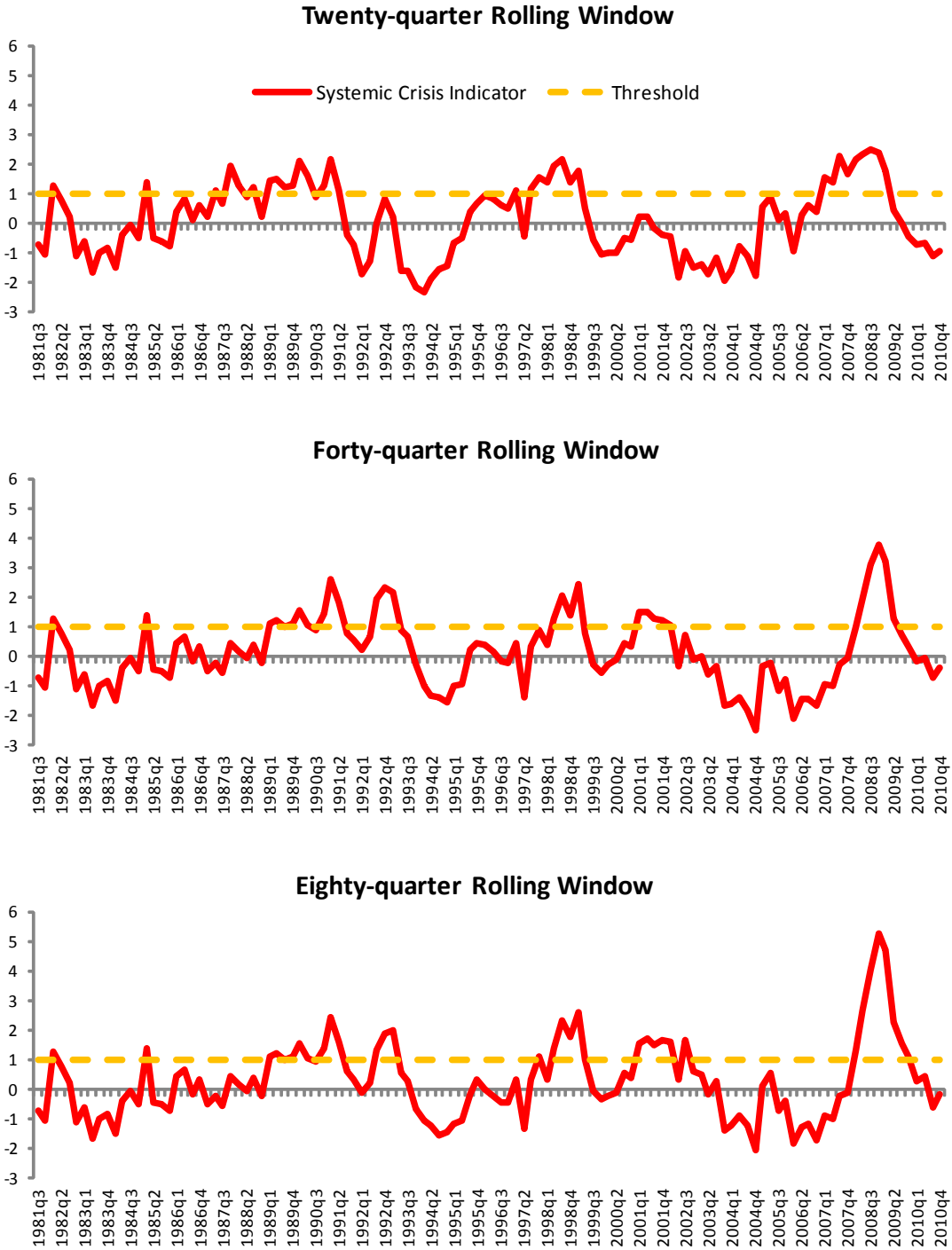
Rolling windows of mean and standard deviation for normalization do not alter the identification, as long as the windows are sufficiently wide (Figure 1).

- Rolling windows are useful, especially for real-time identification, by focusing on the recent developments of the indicator. However, if the rolling window is too narrow, the rolling average and standard deviation (SD) are larger (smaller) in turbulent (tranquil) periods, dampening (exaggerating) the systemic crisis indicator. As a result, false alarms could be sent in tranquil episodes (Type I error) and true systemic crises could be missed in turbulent periods (Type II error).
- As the rolling window widens, the systemic crises identified gradually converge to the baseline identification. Using a recursive window (i.e., all information available in the past) also does not change the identification (Figure 2). In both cases, however, the stress episode during the dot-com crash/September 11 terrorist attack in the U.S. lingers near the threshold. As discussed in Annex II, this event may have had the potential to become a systemic crisis but was perhaps averted by timely policy response.

Separating systemic-weighted indicators for advanced economies (AEs) and emerging markets (EMs) yields similar identification. As discussed in Section II, different indices (i.e., FSI and EMPI) are used to measure financial stress in AEs and EMs, respectively, due to data limitations. Recognizing such differences in data and their relative systemic importance, separate indicators are constructed for AEs and EMs (Figure 3). The 1980s debt crisis and the recent global crisis are clear systemic events. The Asian/Russian/LTCM crisis was also systemic in the EM world, but not in AEs though it also trends up from its trough in late 1996, reflecting stress buildup. As in the baseline identification, the 1990/91 episode and the ERM crisis are both borderline cases.

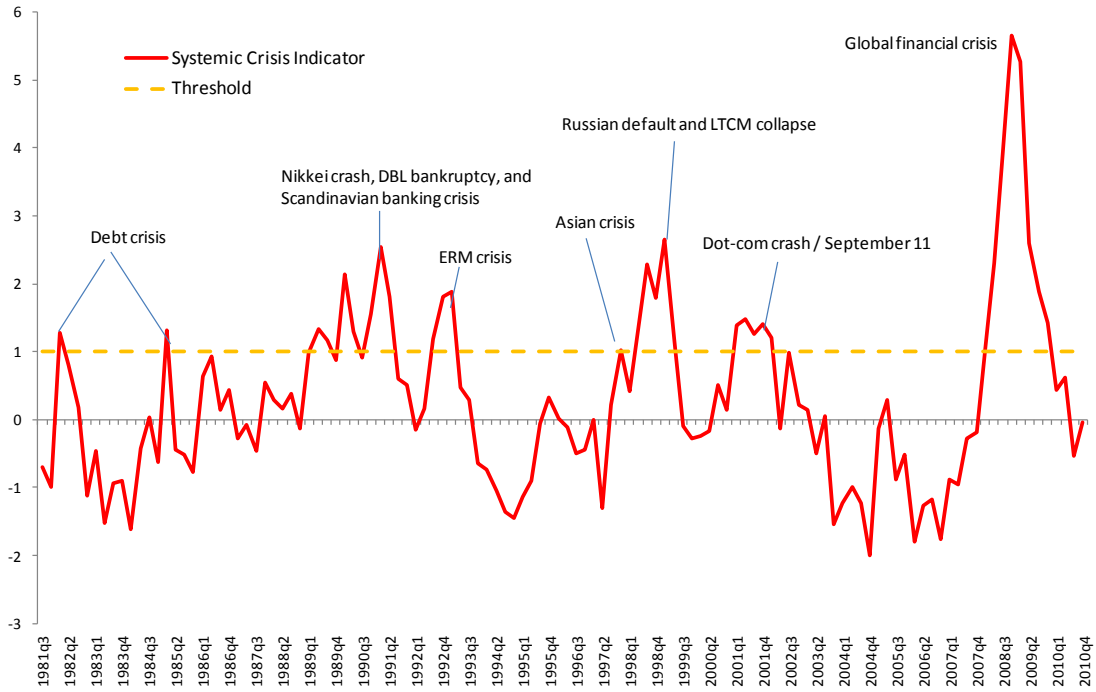
Robustness checks on threshold suggest one standard deviation to be appropriate. Higher thresholds (say, 1.5 or 2 SDs above mean), not surprisingly, reduce the number of systemic crises, as the ERM and the Asian/Russian/LTCM crises fall out. However, the number of affected countries does not change much, implying that these crises were highly contagious, and hence systemic. Moreover, in real-time identification, very high thresholds could seriously delay a globally-coordinated policy response. Thus, a one SD above mean is judged to be a reasonable threshold.

Figure 1. Identification of Systemic Crisis: Using Rolling Windows



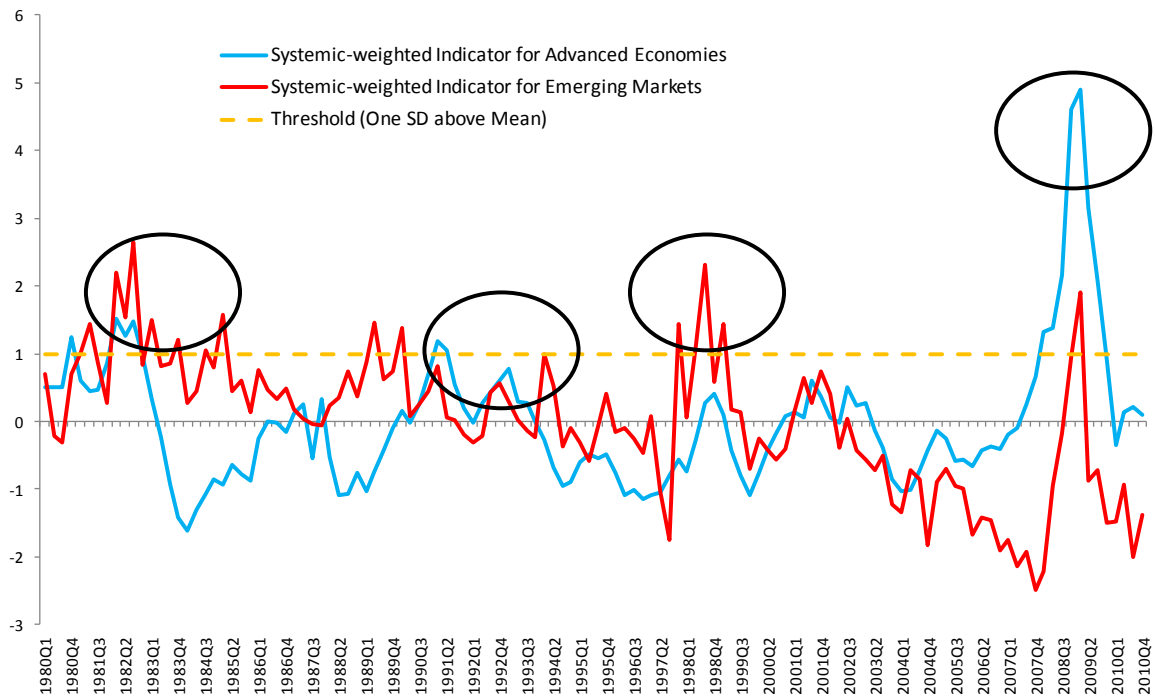
Source: IMF staff calculations.

Figure 2. Identification of Systemic Crisis: Using Recursive Window



Source: IMF staff calculations.

Figure 3. Identification Using Separate Systemic-weighted Indicators for Advanced Economies and Emerging Markets



Source: WEO database; IMF staff calculation.

Annex II. Crises That Did Not Become Systemic

A few distress episodes in the time period analyzed did not turn systemic due to decisive and timely policy responses, supported by a benign external environment and given the extent of the underlying idiosyncratic shock.

Example I. The 1994-95 Mexican crisis could be an illustration of the role of frontloading liquidity when fighting an incipient crisis. In January 1995, as in August 1982—notwithstanding the widely different domestic and external macroeconomic conditions—Mexico was facing severe sovereign funding stress. While the 1982 default evolved into a wave of debt crises sweeping through Latin America, the 1995 crisis—which originated in Mexico and spread to Brazil and Argentina—was resolved with limited regional contagion and without the global systemic consequences of the 1982 crisis.¹ The large and timely liquidity made available and its medium-term structure are generally viewed as the defining feature of the 1995 rescue package (Lustig, 1997 and Ortiz, 2002).² The Fund and U.S. assistance package of up to \$48.8bn was almost seven times larger than the US\$4.5 billion (\$7.2bn in constant 1995 dollars) provided in 1982. Market confidence was quickly restored and, as early as April 1995, the Mexican government regained access to international capital markets.

Stronger economic conditions in Mexico and elsewhere also helped contain the impact of the crisis. After a highly volatile decade, real growth in Mexico averaged around 4.5 percent between 1989 and 1994. Despite the increase in short-term foreign liabilities (from foreign purchase of *cetes*), external public debt was reduced to around 30 percent of GDP in 1994, down from nearly 50 percent in 1982. The external environment in 1995 was also much more benign than in 1982 when world interest rates were at record high levels and a U.S.-led global recession was plaguing Latin America with ever-spiraling public debt.

Example II. Reactions to the September 11, 2001 terrorist attacks provide yet another example of decisive and timely policy responses. The attack, coming on the heels of the March 2001 U.S. recession and spurts of corporate scandals beginning in 2000, could have resulted in significant global economic and financial distress. Indeed, investors immediately retrenched, bringing large capital inflows episodes to a sudden slow down in as many as 12 advanced economies.

¹ Despite not turning systemic, the “Tequila Crisis” was, however, considered a significant event in emerging financial markets because the crisis initiated an international debate about the sources of financial fragility in emerging markets, and about the possible need to redesign the so-called “global financial architecture” to make crises less likely (Calomiris, 1999).

² However, this massive package, particularly funded through the U.S., was controversial, and considered to have, in part, resulted in U.S. reluctance to provide bilateral support during the Asian crisis (Blustein, 2001).

In addition to public messages of confidence, the Fed also made a massive and timely liquidity injection to help avert a crisis. As a first response, the Fed made public statements that it was operational and ready to provide liquidity. The Fed used every existing vehicle such as the discount window and open market operations to inject liquidity into the economy. Direct lending to banks via the discount window soared from around \$200 million a day to \$45 billion on September 12. The Fed also established large swap lines with major central banks, and the federal funds rate was cut by 50 basis points at an unscheduled meeting. These measures combined led to unprecedented increase in liquidity and quickly restored market confidence.

Example III. The 2001-02 Argentine crisis provides an example of how characteristics of underlying shocks influence whether a crisis becomes highly contagious. The main cause of the crisis, as many have argued, was Argentina's persistent inability to reduce its high public debt, which reached nearly 65 percent of GDP in 2001. Most of the debt was dollar denominated, exposing the country to both interest rate and exchange rate risks. The shock was further amplified by the enormous currency mismatch, while adjustment options were constrained by the currency board regime—which was eventually abandoned with an asymmetric pesoization of bank balance sheets—and a relatively small tradable sector.³

The crisis quickly spread to Uruguay but did not reach other emerging markets, partly because of the idiosyncrasies of the shocks that had been largely anticipated. Like Argentina, Uruguay had a fixed exchange rate regime and a highly dollarized banking system, which took deposits from Argentina. The banking crisis was inevitable as soon as bank deposits in Argentina were frozen and Argentine citizens started pulling their funds out of Uruguay. The shocks remained confined to these two economies with interlinked and dollarized banking systems and fixed exchange rates that made adjustment difficult. In Brazil, past statements by then candidate Lula about debt repudiation, in the run-up to the presidential election in 2002—parallel with the Argentine default—created financial panic with a sudden hike in sovereign spreads and concerns about debt sustainability, given outstanding maturity and currency mismatches. However, the unprecedentedly large Fund-supported program (about \$30 billion), supported by commitment by all political candidates helped restore market confidence, avoiding any political contagion from the Argentine events.⁴

³ For details, see [Lessons from the Crisis in Argentina](#), IMF Policy paper, 2003.

⁴ See Williamson (2003) and Goretti (2005).

Annex III. Literature Review on the Need for an International Lender of Last Resort

There is an extensive literature on the need for an international lender of last resort (ILOLR), which gained momentum following the 1990s crises in emerging markets.

Arguments for an International Lender of Last Resort

Fischer (1999) states that capital flows are both extremely volatile and contagious to financial panics, and an ILOLR can help contain the ill-effects of such instability. *Obstfeld (2009)* sees a gap for an ILOLR because more complex and interconnected financial systems entail a higher degree of systemic risk than in the past and national central banks are not enough to cope with a more interconnected world through finance and trade, and the internalization of firms' financial operations has blurred the lines of responsibilities for the national lender of last resort (LOLR). In a situation of global distress, in fact, the action of an individual central bank may further destabilize world markets.

Calvo (2010) notes that central banks and the Fund are both small and limited. He notes that experience in the recent financial crisis suggests that a *global central bank* could have alleviated the impact on the world economy. He proposes creating an Emerging Market Fund (EMF) to stabilize bond prices and insulate countries from financial contagion as a first step in the direction of creating a full-fledged ILOLR.

Fernández-Arias and Levy-Yeyati (2010) argue that the GFSN, from an emerging markets perspective, has many remaining gaps, despite some fixes to the Fund's lending toolkit. They describe the main elements of an *effective and workable* ILOLR: (i) an automatic trigger to access the facility; (ii) unilateral country pre-qualification to the facility during Article IV consultations; and (iii) liquidity funded by the world's issuers of last resorts.

In the recent *Palais-Royal Initiative 2011* report, the authors argue that there are remaining gaps in international institutions' ability to cope with a future systemic liquidity crisis. While highlighting the important role of international coordinated response during the global crisis, including measures such as central bank swap lines and the increased resources to the Fund, as being effective, the report notes its ad-hocness.

Arguments against an ILOLR and moral hazard

Some have argued that Fund lending creates moral hazard, leading to excessive risk taking by countries and private investors. *Calomiris and Meltzer (1999)* point out that government safety nets and the Fund bailouts are a major part of those incentive problems. Similarly, *Calomiris (1998)*, in a critical assessment of bailouts in the 1990s, notes that the main influences of the Fund in the 1990s were to lend legitimacy to domestic bailouts by providing conditions that call for taxation of the domestic middle class to repay the bridge loans from the Fund and the U.S. government, and to insulate foreign banks from losses during these

crises. *Mishkin (2007)* notes moral hazard as a main challenge for an ILOLR, calling for prioritization of financial sector supervision and regulation. More generally, *Capie (1998)* argues that the Fund cannot be an ILOLR because it is unable to create money. A true lender of last resort should be able to rapidly create liquidity to stem a crisis. *Schwartz (2002)* builds on this argument to note that the Fund lacks the attributes to be an ILOLR, as central banks can create high-powered base money in their own national currency, act quickly, and usually independently. *Freixas (2000)* notes that automaticity of lending from an LOLR might generate moral hazard and some “constructive ambiguity” may be optimal.

Other academics consider some of these arguments to be overstated. *Kenen (2007)* argues that while there is truth to the moral hazard argument, the stigma/political cost of approaching the Fund for financing support helps lower that risk. Likewise, *Cline (2005)* states that after emerging markets’ defaults with large losses for creditors, it is hard to argue that the private sector would actually believe that lending to emerging markets could be risk-free due to Fund lending.

The role of the Fund as liquidity provider and crisis manager

Fischer (1999) highlights an ILOLR as a *crisis lender* and as a *crisis manager* with the responsibility to deal with actual or potential crises. He argues that given the Fund’s access to resources, and given its technical experience in dealing with crises, the question is if the Fund has sufficient resources to be a crisis lender. While noting a general allocation of SDR as an option, he dismisses it as not being effective when a crisis is not truly global.

Obstfeld (2009) proposes that the Fund could play a key role alongside national central banks as LOLR by providing financing from credit line arrangements with major central banks, à la the Fed’s swap lines with the ECB and other central banks. The advantage is that the provision of liquidity will not rely on the discretion of industrialized-country central banks.

Truman (2010) states that the Fund’s role as an ILOLR should be enhanced by a broader policy framework that would address the moral hazard issue facing all LOLR. He proposes a “comprehensive prequalification”, reducing the stigma associated with borrowing from the Fund. He proposes that the Fund should indicate the “policy terms for lending” to every member country potentially eligible to borrow from the Fund. He also supports Fund borrowing from international capital markets, permissible under the Articles of Agreement.

Cordella and Levy-Yeyati (2010) reason that the Fund can be an ILOLR if a lending window can be established through which pre-qualified countries can borrow to meet temporary foreign exchange liquidity needs at a higher premium over pre-crisis levels.

Appendix I. Countries Affected in Each Systemic Crisis¹

Debt Crisis	ERM Crisis	Asian/Russian/LTCM Crisis	Global Crisis
Advanced Economies	Advanced Economies	Advanced Economies	Advanced Economies
Australia	Austria	Czech Republic	Australia
Austria	Belgium	Denmark	Austria
Belgium	Canada	Estonia	Belgium
Canada	Denmark	Germany	Canada
France	Finland	Hong Kong	Czech Republic
Germany	France	Japan	Denmark
Iceland	Germany	Norway	Estonia
Italy	Iceland	Singapore	Finland
Netherlands	Italy	Slovak Republic	France
Spain	Japan		Germany
Switzerland	Portugal		Greece
United Kingdom	Spain		Hong Kong
United States	Sweden		Iceland
	Switzerland		Ireland
	United Kingdom		Italy
			Japan
			Netherlands
			New Zealand
			Norway
			Portugal
			Singapore
			Slovak Republic
			Spain
			Sweden
			Switzerland
			United Kingdom
			United States
Asia & Pacific	Asia & Pacific	Asia & Pacific	Asia & Pacific
China	India	India	India
India	Philippines	Indonesia	Indonesia
Indonesia	Vietnam	Korea	Korea
Korea		Malaysia	Malaysia
Malaysia		Philippines	Sri Lanka
Philippines		Thailand	Thailand
Sri Lanka		Vietnam	Vietnam
Thailand			
Vietnam			
Middle East & Africa	Middle East & Africa	Middle East & Africa	Middle East & Africa
Egypt	Algeria	Jordan	Kazakhstan
Jordan	Egypt	Kazakhstan	Morocco
Morocco	Jordan	Morocco	Pakistan
Pakistan	Morocco	Pakistan	Seychelles
South Africa	Pakistan	South Africa	South Africa
Tunisia	South Africa		Tunisia
	Tunisia		

¹ A country is considered to be affected by a crisis if its composite crisis indicator is one standard deviation above mean. This list also includes a few countries that were judged to be impacted by the crises, but were not reflected in the data, and includes countries with Fund-supported arrangements and/or Fed swap lines.

Emerging Europe	Emerging Europe	Emerging Europe	Emerging Europe
Hungary	Israel	Belarus	Belarus
Israel	Turkey	Bosnia & Herzegovina	Bosnia and Herzegovina
Romania		Bulgaria	Bulgaria
Turkey		Croatia	Croatia
		Hungary	Hungary
		Latvia	Israel
		Lithuania	Latvia
		Macedonia, FYR	Lithuania
		Romania	Macedonia, FYR
		Moldova	Moldova
		Russia	Montenegro
		Turkey	Poland
		Ukraine	Romania
			Russia
			Serbia
			Turkey
			Ukraine
Western Hemisphere	Western Hemisphere	Western Hemisphere	Western Hemisphere
Argentina	Argentina	Argentina	Brazil
Bolivia	Brazil	Bolivia	Chile
Brazil	Costa Rica	Brazil	Colombia
Chile	Dominican Republic	Chile	Costa Rica
Colombia	El Salvador	Colombia	Dominican Republic
Costa Rica	Guatemala	Ecuador	El Salvador
Dominican Republic	Honduras	El Salvador	Guatemala
Ecuador	Jamaica	Honduras	Honduras
El Salvador	Panama	Mexico	Jamaica
Guatemala	Paraguay	Panama	Mexico
Honduras	Peru	Paraguay	Paraguay
Jamaica	Uruguay	Peru	Venezuela
Mexico		Uruguay	
Panama		Venezuela	
Paraguay			
Peru			
Uruguay			
Venezuela			

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