Managing Risk for Development: International Risk Sharing

Joshua Aizenman
UC Santa Cruz

İnci Ötker-Robe
The World Bank
Risk sharing and pooling mechanisms at the international level

There are numerous direct and indirect international risk-sharing mechanisms. These include: self-insurance at the state level, market-based tools (such as hedging and insurance instruments, income associated with foreign assets, external borrowing from international markets, and current account adjustments), international labor mobility (such as through immigration and emigration), implicit hedges provided by macroeconomic flexibility, and transfers and access to credit from international financial institutions (IFIs), and bilateral swap arrangements. While the various risk sharing tools help in dealing with exposure to tail risks and transitory shocks, it does not provide a panacea for the need to adjust to permanent shocks. Table 1 summarizes some of the pros and cons associated with these international risk sharing tools.

**Self-insurance**

**Hoarding international reserves.** The importance of this mechanism has increased dramatically with the growing financial integration of emerging markets (EMs) in the 1990s. The growing currency and maturity mismatches induced down the road sudden stops and capital flight crises, validating Diaz-Alejandro’s 1985 conjecture ‘Good-bye financial repression, hello financial crash.’ These massive crises prompted adoption of precautionary policies, including adopting managed exchange rate flexibility, buffered by a large increase in international reserves. The ratio of international reserves to GDP more than doubled in most emerging markets in the last two decades (more than tripled in East Asia).

Debate on the cost and benefits of this mechanism continue. Evidence suggests that hoarding international reserves may be effective in reducing the probability and the severity of tail events in the form of financial and currency crises. Yet, the benefits of such self-insurance come with macroeconomic costs associated with sterilization needed to keep inflation at bay. The opportunity cost of sizable reserves hoarding is significant for countries with limited savings, where cheaper self-insurance may be accomplished also by prudential regulations and policies aiming at lowering external borrowing and balance sheet exposure. Sizable international reserves may induce also moral hazard, subsidizing external borrowing by the private sector in anticipation of lower future depreciations; profit from external borrowing remains private, yet hedging of the associated risk is socialized.

**Pooling international reserves.** Arrangements to pool international reserves are mostly regional (FLAR in Latin America, the Chiang Mai Initiative (CMI) in East Asia, etc.). As

---

1 See Kose et al. (2007) for an overview of the channels of risk sharing in the globalized economy.
3 See Aizenman and Genberg (2012) for overview of these issues.
4 FLAR is a Latin American International Reserve Fund, a financial institution whose purpose is to provide balance of payments assistance to the member countries by granting credits or guaranteeing loans to third
such, they are more effective in dealing with idiosyncratic shocks, and less with cushioning common regional shocks. The efficacy of these arrangements is challenged by governance problems associated with responding rapidly at times of peril without a stigma effect attached to it, while preventing exposure to moral hazard associated with cheap borrowing (a.k.a. the ‘common pool’ or the ‘tragedy of the common’ problem).

Table 1: The benefits and limitations of these mechanisms and tools

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>International reserves (IR)</td>
<td>- Liquidity, a safe store of value.</td>
<td>- Significant opportunity costs associated with monetary sterilization operations.</td>
</tr>
<tr>
<td></td>
<td>- Useful in reducing the exposure and the costs of sudden stops and capital flight crises.</td>
<td>- Inflation challenges if sterilization is limited.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Possible moral hazard implications: Anticipated use of international reserves may encourage riskier private sector borrowing.</td>
</tr>
<tr>
<td>Pooling international reserves</td>
<td>- Scale effects of pooling, reducing the cost of insurance premium.</td>
<td>- Common pool challenges: moral hazard and sovereign risk concerns associated with risk sharing across countries.</td>
</tr>
<tr>
<td></td>
<td>- Reduce the need for excessive reserves hoarding owing to incentives to avoid resorting to official financing.</td>
<td>- Limited efficacy in dealing with global shocks affecting pooling countries similarly.</td>
</tr>
<tr>
<td>Sovereign Wealth Funds</td>
<td>- Offering higher expected yield than international reserves; likely to be more conducive to large scale savings.</td>
<td>- Require proper coordination between the CB and Treasury. Lacking transparency of SWFs investments may create domestic and international concerns. Funds’ value tends to drop at times of global crises.</td>
</tr>
<tr>
<td>Remittances</td>
<td>- Provide risk pooling at the family level, allowing more direct and timely relief to cope with domestic shocks.</td>
<td>- Greater exposure to business cycle risks of the host country. Social costs of fractured households.</td>
</tr>
<tr>
<td>Counter cyclical emigration</td>
<td>- Shock absorber at times of deep crises.</td>
<td>- Comes with the complex costs/benefits of selective brain drain.</td>
</tr>
<tr>
<td>Hedging risks in the global financial market</td>
<td>- Useful but limited insurance services for short-intermediate term exposure to volatile commodity prices.</td>
<td>- Countries may be ‘too big to be hedged effectively:’ insuring against country’s terms of trade shocks entails exposure to counterparty (liquidity/sovereign) risks.</td>
</tr>
<tr>
<td>Current account adjustments and international capital flows</td>
<td>- Income flows associated with global diversification provide insurance against domestic shocks.</td>
<td>- Constrained by accessibility to the capital market, and is limited by sovereign risk, capital controls, and other counter party risks.</td>
</tr>
<tr>
<td></td>
<td>- Accumulation or decumulation of net external assets via the current account facilitates risk sharing.</td>
<td></td>
</tr>
<tr>
<td>Institutional transfers and</td>
<td>- Works as the ‘lender of last resort’ at times of peril. Helps dealing with</td>
<td>- Not suitable to deal with long-term development challenges. Access is on an ad</td>
</tr>
</tbody>
</table>
Sovereign Wealth Funds (SWFs). SWFs are large pools of saving managed by sovereign states, invested mostly in diversified foreign assets. SWFs are rapidly gaining importance among commodity exporters and countries running large current account surpluses (for example, Singapore and China). The funds allow meeting the saving needs of future generations, possibly providing a higher average yield than international reserves, while providing access to liquidity at times of stress. But there is no free lunch: the expected higher return associated with a diversified portfolio raises the risk that a fund’s value will sink precisely when it’s needed the most, as was the case during the global crises of 2008-9. Efficient management of SWFs hinges on the quality of institutions, and coordination with the Central bank and Treasury. Insufficient transparency of SWFs may also bring domestic and international political challenges.

Factor mobility

Remittances. The importance of this mechanism varies across countries. It increased in the decades prior to the global crisis (for instance in Mexico and Central American countries, the Philippines). The decentralized nature of this mechanism provides an effective insurance at the family level, although it comes with the social cost of fractured families and growing dependence on the business cycle of the host country.

Counter-cyclical emigration. Emigration may act as a shock absorber at times of domestic crises (for example, the experiences of Argentina and Ireland in the 2000s). While it helps the young generation mitigate its exposure to adverse tail events at home, it comes with the complex cost and benefits considerations of a selective brain drain.

Market insurance: Market-based risk sharing mechanisms

Hedging risks in the global market. Derivatives provide useful but limited insurance services for short to intermediate-term exposure to volatile commodity prices. Yet, hedging and insuring long-term exposure is also limited because of missing and non-liquid markets for long-term insurance. Hedging exposure to ‘unknown unknowns’ remains elusive (as in the mostly unknown actual exposure to global warming). Moreover, countries may be ‘too big to be hedged effectively’ (for example, Chile’s exposure to copper prices or Chinese exposure to oil shocks). Hedging a country’s exposure to volatile terms of trade entails exposure to counterparty risks (such as liquidity and sovereign risks)—there are no credible ways to insure fully global macro exposure.

Capital market channel. Risk sharing through international income flows associated with global diversification of assets provides insurance against domestic shocks. Income on assets that domestic residents own abroad is less exposed to local shocks—akin to the impact of SWF, at the household level. As such, it may provide effective diversification, provided households yet have access to the capital market. The possibilities are limited for the poor, compared with the wealthy and the upper middle class.

Risk sharing by current account adjustments. Countries can diversify risk by selling assets (or borrowing) in bad times, and by accumulating assets (paying debt) in good times. It works as long as a country has access to the capital market, but is limited by sovereign risk.
The practical efficacy of risk sharing by current account adjustments for emerging markets is mixed—in recent decades faster growing emerging markets ended up running large current account surpluses, lending to the rich, mostly in the form of large hoarding of international reserves. A recent intriguing trend has been the emergence of complex FDI and partnerships as a mechanism for reducing a country’s exposure to commodity terms-of-trade shocks (growing involvement of the Chinese in Africa and LATAM, and the Golf countries investment in long term land leases are some examples), and the growing outward FDI of India and other emerging markets.

**Self-protection or natural hedge via structural flexibility and proper macro policies**

Deeper sectoral diversification, higher accumulation of human capital, lower barriers to new investment, and greater internal mobility of factors provide a natural hedge against shocks for a country. This may be facilitated by taking a position in the middle ground of the economic trilemma (managed flexibility of the exchange rate and managed capital mobility). Improving competitiveness at times of peril by exchange rate depreciation and by borrowing externally may help to deal with country specific shocks, though the potency of this mechanism is limited at times of global recession. Greater flexibility of internal adjustments provides a natural hedge against adverse shocks (see Korea’s adjustment to the 1997 crisis).

**Official insurance: Institutional transfers and credit lines**

Transfers and funding from, and access to relatively cheap credit and swap lines of, IFIs may serve as the lender of last resort following adverse economic shocks or natural disasters. Ex post transfers and help in kind are important in dealing with natural disasters, such as earthquakes and tsunamis, but not sufficient in dealing with long term development challenges. The involvement of NGOs has been increasing in importance, combining help in kind transfers with the provision of foreign onsite managerial services to deal with local bottlenecks (for example, the Gates Foundation and other NGOs).

Another recent development has been the greater use of swap lines aiming at emerging-markets during the global crisis of 2008-9. For the first time, the US Federal Reserve extended swap lines for four emerging markets during the critical phases of the crisis. China provided more modest CY swap lines to several emerging markets. However, these developments may remain the exception rather than the rule, and subject to the motivation of the suppliers of swap lines. The provision of swap lines and other arrangements for emerging markets continues to be subject to sovereign risk and moral hazard considerations (Aizenman and Pasricha (2010)).

IFIs have also introduced new tools in response to the global financial crisis and increased frequency of natural disasters. The IMF and World Bank initiated new credit arrangements, reflecting the new challenges facing emerging and developing countries in the aftermath of the global crisis of 2008-9 as well as increasingly more frequent natural disasters. The IMF’s Flexible Credit Line (FCL) provides an example of the new tools that allow for greater flexibility in the provision of institutional risk sharing. Aiming at dealing with the stigma

---

5 Korea, Mexico, Brazil and Singapore were offered US FED swap lines of 30 billion each. Two countries, Korea and Mexico, used these lines at the peak of the 2008-09 crisis.
effect, the IMF encourages countries with very strong economic fundamentals and policy track records to apply for the FCL when faced with potential or actual balance of payments pressures. However, as of September 2012, only three countries (Poland, Mexico and Colombia), had accessed the FCL, and none of them has yet used it (IMF (2012)). The cautious attitude in access to the FCL likely reflects the stigma effect associated with IFIs credit lines, although the ex-ante qualification in part reduces the stigma of the qualifying country. Similarly, the World Bank provides contingent financing to rapidly fund financing requirements due to an unexpected shortfall in resources (e.g., IBRD deferred drawdown option—a committed line of credit—to provide immediate access to financing following a natural disaster and the declaration of a state of emergency, provided that countries have a disaster risk management framework in place).

Risk-pooling and sharing mechanisms in dealing with natural hazards: the role of the international community

The international community, in particular IFIs, has an important role in facilitating improved ex-ante risk pooling and sharing for developing countries exposed to natural disasters. The IFIs also help ex-post in coordinating and facilitating the help needed to prevent the natural disaster from triggering lost decades of growth associated with moving a country to a poverty trap.

Over the past decades, the global community witnessed a sequence of catastrophic natural disasters, including the earthquake and tsunami in South-East Asia in 2004, the Haiti earthquake of 2010, and the Japan tsunami of 2011. In relative terms, the earthquake in Haiti in 2010 was one of the most lethal natural disasters in modern history as nearly 3 percent of the national population perished. The growing population density put to the fore the challenge to upgrade the capacities dealing with natural disasters. This is pertinent especially to developing markets owing to a number of reasons.

Dealing with natural disasters poses considerable challenges. On the demand side, cognitive biases may cause households to underestimate ex ante the cost of rare calamities that were not experienced in their memory, and hence to underinsure against these events. Exposure triggered by unprecedented probabilistic changes in the underlying structure, like global warming, imposes daunting challenges, both to the public and the policy makers (see Noy (2012), Pindyck (2011), and the references therein). The distribution of disaster damages is highly skewed (‘fat tail’), with the presence of extreme disasters, whose costs (in terms of mortality, morbidity, and/or physical destruction) are significantly higher than the average

---

6 The FCL allows qualified countries the flexibility to draw on the credit line at any time within a pre-specified window, or to treat it as a precautionary instrument. The qualified countries have large and up-front access to IMF resources with no ongoing conditions. The aim is to use the FCL as a renewable credit line, which at the country’s discretion could initially be used for either one- or two-years with a review of eligibility after the first year. If a country decided to draw on the credit line, repayment should take place over a 3¼ to 5 year period. There is no cap on access to IMF resources, and the need for resources will be assessed on a case-by-case basis. The lending rate is tied to the IMF’s market-related interest rate.

7 The proportion of world population living in flood-prone river basins has already increased by 114 percent in the past 30 years, while that living on cyclone exposed coastlines has grown by 192 percent (UNISDR, 2012).
disaster costs.\(^8\) Policy makers tend to ignore the risks since the probability that such a catastrophic event will occur is relatively small in comparison to other challenges they face in the short run. Thus, catastrophic events would be associated with small probabilities in common risk assessments of a typical developing country, but are nevertheless quite common occurrences worldwide, as experienced in recent years.

There are important political economy factors associated with managing disaster risks. The possibility of greater frequency of extreme weather events, rising sea levels, and the continuation of demographic pressure in most developing countries tends to increase the frequency of ‘rare but very costly’ tail events. As the counterfactual is not known, the political reward for well-funded and costly hazard prevention is limited. Thus, the public sector tends to underinvest in preventing these catastrophic events, while the public rewards policy makers for efficient post-disaster aid. The gap between the ex-ante underinvestment in risk mitigation, and the ex-post need to spend on emergency help, imposes challenges especially to public policy making in poorer countries. In richer countries, the public sector readily spend on post-disaster reconstruction and aid. Poor countries are in the worst position, spending less on disaster provision ex-ante, and trapped into under spending ex-post in recovery efforts due to resource scarcity and capacity bottlenecks.

The disproportionate impact of disasters on developing countries reflects a range of factors. While the potential damage caused by disasters is related to the physical intensity of the event, the economic, social, and political characteristics play a key role in determining the ex-ante vulnerability, and the ex-post recovery patterns. Direct damages of disasters present a greater challenge to poorer countries, constrained both by poverty and limited institutional capacities.\(^9\) Indeed, Kahn (2005) argues that lower level of economic development increases a country’s susceptibility to the impact of natural disasters. Most of the human and economic damages caused by natural disasters were in developing countries. In 1990, a poor country with less than $2000 per capita GDP experienced on average 9.4 deaths per million people per year as the direct consequence of natural disaster, while a richer country (with per capita GDP of at least $14,000) would have had only 1.8 deaths.

This gap is likely due to the greater amount of resources spent on prevention efforts and legal enforcement of mitigation rules (e.g., building codes). Large developed countries can more easily absorb output shocks from natural disasters originating in certain regions of the country (Auffret (2003)). Better institutions (more stable democratic regimes with strong governance, better implementation capacity, and greater security of property rights and infrastructure) help reduce disaster impact. Poorer and more unequal societies tend to have fewer resources spent on prevention, as they are unable to resolve the collective action problem of implementing preventive and mitigating measures (Kahn (2005) and Anbarci et al. (2005)).

\(^8\) The Haiti earthquake of January 2010, led to a mortality that was far greater than earthquakes of similar magnitude.

\(^9\) Following ECLAC (2003)’s terminology, direct damages include the mortality and morbidity that are a direct consequence of the natural phenomenon, harm to fixed assets and capital, and damages to raw materials and extractable natural resources.
Less visible, but quantitatively important, are indirect damages propagated by natural disasters. This includes the direct damage to physical infrastructure, production that will not take place because of the harms inflicted by the disaster, the possibility that reconstruction pulls resources away from production, the additional costs incurred because of the need to use alternative and costly means of production, and distribution for the provision of normal goods and services. As poorer countries face difficulties conducting a counter-cyclical fiscal policy and their insurance and re-insurance markets are significantly shallower, they have difficulty financing reconstruction. These challenges increase the odds that a natural disaster may trigger enduring decline in the income of the affected region, and in extremely large disasters, led to large negative effects lasting beyond the short run. Growth in developing countries is more sensitive to natural disasters—more sectors are affected and the magnitudes are non-trivial (see Loayza et al. (2009) and Cavallo et al. (2011)).

Ex-ante international risk sharing/pooling tools and mitigation efforts

Insuring exposure to catastrophic nature event (such as, extreme weather, floods, and earthquake damages) is complicated by moral hazard, adverse selection and other agency problems. Ex-ante, the provision of the insurance may induce higher investment and lower prudential steps, leading to higher ex-post liabilities. Furthermore, changes in stochastic patterns (new fault lines exposed by earthquakes, increase in intensity of weather patterns, etc.) put the insuring agency at peril. Thereby, the viability of such markets rests on the ability of the suppliers of disaster insurance to hedge their exposure, reselling it in a liquid and sufficiently deep market. This in turn exposes the buyer to counterparty risk, basis risk, and the like.10

Ideally, exposure to natural disasters may be insured by event-linked bonds, which pay off on the occurrence of a specified event. Such event-linked bonds, AKA as catastrophe bonds (or CAT bonds), have been issued and linked to catastrophes such as hurricanes and earthquakes (see Swiss Re 2006, 2009, 2001). The first successful CAT bond was issued by Hannover Re in 1994 (Swiss Re 2001).11 The payoff on the CAT bond is triggered when estimated wide losses from an event exceed a specified threshold. These bonds may be potentially attractive to investors, as catastrophic events have low correlations with returns from securities markets and hence are valuable for diversification purposes (Litzenberger, Beaglehole, and Reynolds (1996)). Yet, their viability depends on the availability of reputable catastrophe indices, and the viability of liquid mechanisms allowing the supplier of the bond reinsurance options.12

---

10 Counterparty risk is also known as "default risk". It is the risk that the counterparty will not live up to its contractual obligations. Basis risk is the risk that a hedging strategy aiming at risk diversification will fail. This may be the case if offsetting investments, in a hedging strategy, will not experience price changes in entirely opposite directions from each other, frustrating ex-post the attempt to diversify the ex-ante risk.

11 More than 170 CAT bonds were issued between 1997 and December 31, 2010, with a strong growth trend in recent years. See Michel-Kerjan et al. (2011).

12 Ideally, such an index should have the following characteristics: “(1) transparency, i.e., observable, quantifiable, and clearly defined; (2) simplicity, that is, sufficiently simple so that users can gauge the risk/benefit of the contract; (3) released promptly following covered events; (4) accurate and reliable, that is, subject to minimal revision; (5) consistently available over time to help users analyze correlations between the index and past events, and (6) be published by an independent and credible provider to reduce moral hazard and increase reliability.” See Cavallo and Noy (2010) and Cummins (2012) for further discussion and overview of CAT bonds trends.
Despite the relative infancy of the CAT bond market, Cummins (2010) provides an upbeat assessment:

“The CAT bond market is thriving and seems to have reached “critical mass.” The market achieved record bond issuance in 2007, and 2010 had the second highest issuance amount on record. Bond premiums have declined significantly since 2001, and the bonds now seem to be priced competitively with catastrophe reinsurance.”

Thus, the future looks bright for the CAT bond market, and CAT bonds, sidecars, and other innovative capital market solutions will play an increasingly important role in providing risk finance for large loss events. Event-linked bonds are also being used increasingly by primary insurers for lower layers of coverage. However, it remains to be seen whether CAT futures and options will play an important role in catastrophe risk management in the years to come. Basis risk and counterparty credit risk are the primary impediments to the success of these contracts.”

The World Bank and other IFIs may facilitate the formation of new markets and institutions for risk sharing. The up-front investment as well as the provision of expertise needed to establish these institutions is well beyond the capacities of most developing countries, yet having them in place allows dealing with coordination failures. A key role of the IFIs include curbing possible agency costs associated with such institutions, a process that needs mentoring and monitoring until the institutions mature into a viable and functioning facility.

By means of illustration, the World Bank facilitated the diffusion of CAT bonds in a pioneering project with Mexico. The MultiCat Mexico 2009 is the result of the joint work of the World Bank Treasury and the Mexican Ministry of Finance. The aim was to create and develop a new type of financial transaction that would facilitate ex-ante more effective public catastrophe risk financing. Michel-Kerjan et al. (2011) summarize the experience noting that:

“In the case of Mexico, the World Bank Treasury acted as arranger in a MultiCat transaction and also mentored a dedicated team in the Mexican government by working with them on the transaction. Through such a capacity building, the government stayed in control of the whole process, and subsequently used the MultiCat program on its own. This type of knowledge transfer in an area of sovereign debt markets, where most governments may not have in-house expertise should be seen as a framework for action that has proven benefits.
As the cost of disasters has been significant in recent years and exposure to future catastrophes continues to increase, many more countries around the globe will soon have to develop properly designed catastrophe risk financial protection solutions (or redesign them).”

Prime examples of the challenges facing developing countries are the Caribbean countries. By virtue of geography, these are mostly small island economies, with limited sectoral diversification of production, yet high exposure to hurricanes and earthquakes (on average, one to three Caribbean countries are affected by a hurricane or an earthquake each year). The smallness of the islands, their significant debt, and the history of exposure to calamities compelled the Heads of Government of the Caribbean Common Market and Community (CARICOM) to ask for World Bank assistance. This led to the establishment of the Caribbean Catastrophe Risk Insurance Facility, CCRIF. CCRIF allows member countries to

---

13 The Caribbean Community in forming the Caribbean Catastrophe Risk Insurance Facility is a joint reserve facility funded by participating countries and donor partners, which offers liquidity coverage to 16 Caribbean
purchase liquidity coverage that provides immediate budget support after a major earthquake or hurricane, giving them time to mobilize additional resources for longer-term reconstruction activities. The Facility acts as a joint reserve mechanism backed by the international reinsurance markets. The Facility provides coverage at a significantly lower cost than Caribbean governments could obtain individually from the insurance market.

**Disasters and risk avoidance: common pool, governance and political economy challenges**

Ex-ante risk mitigation and avoidance and a viable mechanism for reducing the ex post damages associated with natural disasters remain underinvested. The December 26, 2004 Indian Ocean earthquake triggered a massive tsunami, resulting in more than 230,000 fatalities. It was a wake-up call, inducing countries in the Indian Ocean region to invest and implement Tsunami Warning Systems. Such systems are technologically viable, yet they require the upfront investment in setting them, and continuous investment in maintenance and upgrades. Their ultimate usefulness hinges on the integration of the early warning system with efficient transmission of this alert to residents of coastal areas, and effective monitoring, evacuation enforcement systems.

Similar considerations apply to storm early-warning systems (EWS). Such systems are feasible and viable, and their precision has increased overtime. They are already implemented in several disaster-prone countries, such as Bangladesh and Cuba, where EWSs are connected to a web of public shelters. Both countries are relatively poor and undiversified, and heavily exposed to lethal floods due to tropical storms. Subbiah et al. (2008) calculated very high benefit/cost ratios for early warning storm-induced floods in Bangladesh. While debate about the precise methodology for evaluating these benefit/cost ratios for EWSs will likely continue, the evidence shows the presence of ‘low hanging fruits’ needing greater attention of the World Bank, the UN, and other international agencies.

The need for a massive disaster to trigger a wake-up call is not unique to developing countries. Cognitive biases towards overlooking exposure to rare events, especially those that have not been experienced by the “living memory” of the public play a role (even in advanced countries)—particularly with ‘acts of nature’ or ‘acts of God.’ In addition, the short termism of a typical policy maker implies underinvestment in preventive steps dealing with rare natural disasters, and the absence of ex-ante pressure of the public to deal with the exposure to these rare tail events. While ex-post accountability may happen, it’s frequently too late, and has a limited ability to induce investment by future policy makers. The supply

---

14 “Using the damages and losses of the severe 2007 floods (in Bangladesh), the case study estimates the avoidable damages and losses due to increased lead time of three to seven days, over a longer period of 10 and 30 years based on return period information. The technology to provide this long-lead forecast information is already operational at the Flood Forecasting and Warning Center of the Bangladesh Water Development Board, and is called the CFAB technology. The cost-benefit study reveals that, over a ten-year period, for every $ 1 invested in EWS, there is a return of $558.87 in benefits.”

15 The considerable political gain associated with an efficient ex-post response to natural disaster generates a moral hazard paradox: prudential steps like enforcing strict zoning regulation in coastal areas may have little political support ex-ante, while the hopes of ex-post rescue and relief may encourage greater population density
of global monitoring systems, aiming at alerting costal-regions about events triggered by
earthquakes hundreds and thousands of miles away, may be limited due to the inherent
“common pool” problems associated with it. Taking a global perspective, there is ample
room for further global investment in disaster risk reduction through deeper coordination and
investment in EWSs. Indeed, recent studies suggest favorable cost/benefit ratios. Moving
forward on these issues remains a desirable goal. Beyond financial support, the World Bank
may play a key role in providing the needed technical expertise and coordination.

Regional risk sharing as part of risk pooling arrangements

The stigma effect associated with receiving assistance from IFIs, the growing regional trade
among fast-growing emerging markets, and the rapid increase in international reserves of
most emerging markets in recent decades increased the interest in regional reserves-pooling
arrangements, and the use of regional swap lines.

Accumulation of large amounts of reserves may indeed induce competitive hoarding and
competitive ‘real exchange rates wars’ with regional spillover effects (Cheung and Qian
(2009) and Aizenman and Lee (2008)). Similarly, Basu et al. (2010) points out that a
country’s reserve accumulation decisions affect not only its own production and
consumption, but also its trading partners’ consumption through terms of trade effects. In a
world subject to sudden stops and capital flight shocks facing emerging markets, higher
international reserves of a country signals lower vulnerability to crisis compared to a
neighbor, increasing the odds that during a regional capital flight of hot money propagated by
a global shock (like flight to quality), the outflows will impact the country less.

Competitive hoarding therefore induces negative externalities and excess accumulation of
costly liquidity. In these circumstances, international reserves pooling may serve as a
coordinating mechanism, improving welfare by mitigating excessive international reserves
accumulation, and reducing the vulnerability of each country to costly capital flight. These
considerations explain the renewed interest in deeper regional risk-sharing arrangements.
Yet, at times of global crisis impacting emerging markets, these arrangements would not
suffice to deal with a global shortage of liquidity (see below).

How to better manage risks at the global level? The role of the global community
and IFIs

The risk-sharing arrangements discussed above have limited ability to deal with large global
shocks of the type observed in 2008-9. The resultant global excess demand for dollar
liquidity, propagated by flight to quality and deleveraging, left the United States as the only
viable supplier of this liquidity. While higher international reserves helped countries to
cushion their exposure, even large initial reserves were not enough to prevent financial panic.

in exposed areas, when alternative options are available. The exposure to calamities is magnified in developing
countries, as the ex-post rescue and relief resources are more limited, and the poor populations that are on
average more exposed, may be underrepresented in the political discourse.

16 Hallegatte (2012) provides a cost benefit analysis of extending the hydro-meteorological information
and early warning systems to developing countries, concluding that the benefit-cost ratios are between 4 and 36.
As in the crisis of 1997-8, Korea served as bellwether in the 2008-09 crisis. Despite its relatively large initial reserves, it was not deemed enough to stabilize the economy in the presence of massive flight to quality and deleveraging. Intriguingly, Korea opted for the US Fed swap line instead of IMF help, given the stigma effect. Furthermore, it was not helped by the regional pooling mechanism, the CMI. Observers credited the US Fed swap line as the key step in halting the financial panic in Korea during the 2008-9 crisis (see Park (2009)).

Short of returning to financial autarky (or holding international reserves to match most of the balance sheet exposure of a country—an expensive insurance that may nullify the gains from the exposure in the first place), the flight to quality leads to a large excess demand for ‘safe haven’ assets. Global instability and financial panic trigger rush to liquidation, when holders of assets aimed at swapping them with ‘safe haven assets,’ even at a deep discount. The logic of the Diamond–Dybvig model, framed for a close economy, applies globally: at times of peril, the financial system is exposed to multiple equilibria. Indeed, the unprecedented swap arrangements of the US Fed (unlimited swaps with the ECB and several key OECD Central Banks, and limited swaps with 4 emerging markets), the IFIs policies, and the swap arrangements that followed (the ECB, Bank of China and Bank of Japan offering swap lines of their currencies) were instrumental in mitigating the recessionary effects of the global crisis. Yet, anticipation of this service by the market may induce large moral hazard costs, leading economists to call for redesigning the global financial system.

These observations suggest the need for greater coordination of the global provision of liquidity at times of peril. Observers credit the US with providing the bulk of the global lender of last resort during the 2008-9 crisis (Gourinchas et al. (2010)). This is consistent with the dual role of the US as the supplier of the dominant key reserve currency, and being the epicenter of the financial meltdown of 2008. Yet, there is no reason for the next tail events to follow the same script, and there is no reason to expect that the US will be eager to provide similar services in future crises.

**Global financial safety nets and the future of international financial integration**

Recent discussions have focused on the need for a global financial safety net (GFSN) to deal with future crises, in a multipolar world. The continuation of growth trends in the last two decades suggests converging to a tri-polar universe. These trends imply that future coordination of the global lender of last resort will be more complicated, and possibly a greater role for the IFIs as agents of coordination and of co-financing the GFSN. While deeper international reserves-pooling arrangements and swap lines offer significant benefits, these arrangements are only the first line of defense, as they are constrained by past hoarding. Advocates of a robust GFSN support a greater role of a global lender of last resort supplied by IFIs.

Finding an efficient design for the GFSN remains a work in progress. It should balance the concerns about moral hazard subsidizing risk taking, with the ex-post benefits of preventing global liquidity crisis from becoming a global solvency crisis. A possible blue print along

---

17 The American pole (dominated by US, with a greater role for LATAM, led by Brazil); the European pole (dominated by Germany); and the Asian pole (dominated by China, with the growing importance of India). See World Bank (2011) for discussions on convergence towards a multi-polar world.
these lines may extend the logic of the IMF’s Flexible Credit Line, both at the regional and global levels. The design of such a system may follow the design of unsecured credit lines to households and businesses (credit cards, etc.). Such credit lines allow a pre-approved access to borrowing, subject to a strict limit and pre-set costs. Both the credit limit and the cost of the credit lines are adjusted periodically, and the suppliers of the credit line frequently monitor in real time the users’ activities. In rare circumstances, the supplier of the credit line may terminate the access. To a degree, the design of the FCL follows these principles, wherein the supplier of the credit line has access to global funding designed and provided by the IMF ‘shareholders.’ Related schemes may extend the logic of the FCL, stipulating an automatic trigger allowing access to pre-approved global liquidity facility (thereby mitigating stigma effects), unilateral country pre-qualification to the facility during IMF Article IV consultations, and liquidity funded by the world’s ‘issuers of last resort.’

Looking forward, the earlier discussion supports the notion that a global fund dealing with disaster risk reduction is desirable. Yet, as in the case of any global fund pooling resources, the fund should balance the incentives of the local participants in ways that will curb moral hazard, adverse selection, and agency problems. Noy (2012) proposes applying the design of the Flexible Credit Line to the design of the Global Fund for Disaster Risk Reduction:

“The lessons the IMF learned, in terms of avoiding perverse incentives—e.g., moral hazard and adverse selection—and leading countries to adopt ex-ante sound policies, are as relevant to natural disasters. In particular, a global fund for disaster risk reduction that operates not unlike the IMF’s Flexible Credit Line may create the right incentives for the establishment of a robust mechanism. Essentially, the idea is that countries would be constantly evaluated for their disaster risk reduction plans, and given ‘seals of approval.’ A country whose plans are favorably evaluated will have access to support for disaster risk reduction projects from the global fund and in addition will have access to an emergency disaster fund should it be required (as part of the global fund, one can establish triggers that automatically provide affected countries access to pre-specified sums as grants or concessional loans). Tying a GF-DRR with Insurance Markets, an additional positive externality would be to enable countries who receive this ‘seal of approval’ for their disaster risk reduction plans to more easily insure themselves explicitly (with re-insurers) or implicitly by issuing Catastrophic Bonds (CAT bonds) and further enable multi-year insurance.”

Risk aversion

The World Bank and other international agencies have been engaged in these dialogues concerning international community engagement, and in tangible resource transfers and managerial support of funds and projects aiming at ex-ante risk mitigation, and ex-post stabilization following economic or natural disasters. However, a recent OECD (2012) report stresses that a too risk-averse attitude of the donor community may jeopardize the attempt to stabilize economies in transition, including those with fragile and conflict situations:

“International engagement in fragile and transitional contexts presents significant risks for donors and implementing partners but holds the potential for even higher rewards in terms of improved

---

18 This similarity may not be accidental. Evolutionary logic suggests that the design of credit lines (Visa, Master Cards, etc.) is the outcome of learning by doing, converging to a design stable enough to survive the exposure to moral hazard and adverse selection challenges inherent in unsecured credit.
results and outcomes. Importantly, the risks of failing to engage in these contexts outweigh most of the risks of engagement.

Devices for transferring and sharing risk, particularly pooled funding mechanisms, have potential that is not yet being realized. A more differentiated approach to risk management is required, allowing fund managers to balance disbursement risk against opportunity costs. Real progress in this area may depend on more collective approaches to managing risk, a better balance of high- and low-risk forms of engagement, and more realistic mutual expectations between donor governments and their implementing partners.”

A common challenge to the donor community is that the counterfactual is not self-evident. While the risks of failing to engage in these contexts may indeed outweigh most of the risks of engagement, designing a principal-agent contract that will incentivize the donor institutions and their development partners to take more risks is a challenging task, even with the best intention and execution of donors’ help. Limited information on behalf of the principal (that is, the donor, or their implementation partners), and the unrevealed actions of the agents (countries) makes reaching the first best, full information allocation, impossible. These constraints imply that there is no clear way to assign responsibility for the ex-post success or failure of the aid effort in ways that will illicit ex-ante the optimal full information donor effort. Indeed, the role of risk aversion in hindering the gains from principal-agent partnerships has been the focus of vigorous literature. Grossman and Hart (1983)’s seminal paper concluded that:

“We have shown that a decrease in the quality of the principal's information ... increases welfare loss. When there are only two outcomes, welfare loss also increases when the agent becomes more risk averse.”

These conclusions are in line with the OECD (2012)’s report. Yet, finding the needed structural modifications that deal properly with finding the ‘optimal degree of risk aversion’ remains elusive. After all, the expected efficiency of the ex-post outcomes is determined by the interaction of the manager’s risk aversion with the reward structure. One may encourage greater risk taking either by hiring less risk-averse managers, or by reducing the effective penalty associated with failure. Such organizations frequently may benefit by delegating the riskier missions to departments whose mandate, management and incentives are especially tailored to deal with the complexity and profile of the risk, costs and benefits of their tasks. In these circumstances, the proper heterogeneity of design of incentives and missions helps in facilitating achieving the overall goal of the organization.¹⁹

---

¹⁹ The design of large financial institutions frequently follows heterogenous patterns—fixed income funds are managed by a unit that differs from the one managing equity or derivative funds. Each unit may have a different design in terms of the risk tolerance and evaluation.
References


