2 *The Role of Financial Insurance and Hedging (and of Multilateral Development Banks) in Reducing Volatility*

While governments, firms, and individuals in developing countries can reduce their exposure to exogenous shocks somewhat through better policies, they can also use financial instruments and hedges to mitigate the effects of those shocks, as shown in Table 2.1, which summarizes the actions that governments can take to deal with the three types of exogenous shocks discussed in chapter 1.

First, of course, governments can always do nothing: just wait for the shock to happen and then cope with it. If the shock is large, coping may require large and costly current account, exchange rate, and procyclical fiscal adjustments, which may significantly amplify the effects of the shock. For some countries, and to some extent, aid flows may come to the rescue.

Second, governments can "self-protect" through prevention measures. Such measures reduce their exposure to shocks. As examples, export diversification (by products and markets) is the main prevention measure to reduce exposure to real exogenous shocks, and zoning and building codes and their enforcement are the main prevention measures to reduce exposure to natural disasters. Prevention measures against capital flow shocks include keeping debt levels low and avoiding currency and maturity mismatches in government and corporate balance sheets. These measures also mitigate the effects of real shocks as long as they contribute to reducing the procyclicality of capital flows, which usually amplifies the effects of real shocks, as well

Table 2.1. Dealing with high volatility: An insurance framework

Shock \ Action	Coping after the fact	Prevention	Self-insurance	Market insurance/ hedging
Terms of trade	Current account and (procyclical) fiscal adjustment	Export diversification	Stabilization funds	Commodity price futures, forwards, and options
	Aid			Indexed debt (terms of trade, commodity prices)
Natural disasters	Aid	Zoning and building codes	Emergency funds	Insurance and reinsurance
	Fiscal adjustment			Catastrophe bonds
Capital flows	Current account and (procyclical) fiscal adjustment	Debt level and composition	International reserves	Contingent credit lines
	Aid	Domestic Capital market development		Currency and interest forwards, swaps, and options
		Dedollarization		Indexed debt (GDP)
				External debt in domestic currencies

Source: Adapted from the framework developed by Erlich and Becker (1972); Gill and Ilahi (2001); and Packard (2002).

as balance sheet effects that might arise as a consequence of compensatory currency devaluations.

As discussed, to enable governments and firms to reduce currency mismatches, it is necessary to develop deep domestic currency capital markets. When domestic currency capital markets are deep and long-term, governments and firms can optimize the currency composition of their debt, weighing relative costs, maturities, and risks. Although some developing countries have succeeded in developing deep and long-term domestic currency capital markets, this task normally takes time because it requires, among other things, achieving low inflation and monetary policy credibility, adequate legal (creditor and minority share property rights, in particular) and prudential regulatory frameworks, sound corporate governance and credit information systems, and suitable market infrastructure. Developing deep domestic currency capital markets is especially hard for countries that have high de facto financial dollarization as a consequence of previous flawed policies.[1]

1. High de facto financial dollarization is usually a consequence of hyperinflation episodes that have led to a distrust of the local currency as a store of value, or of episodes of deposit confiscation that have eroded confidence in local financial systems. In such cases, countries usually have allowed the development of domestic dollar deposits and credit or the operation of large offshore systems, to develop credit

Third, governments can "self-insure": they can save in good times for bad times. Typical self-insurance policies include creating stabilization funds to mitigate the effects of volatility of commodity prices and, more generally, enacting countercyclical fiscal policies to mitigate the effects of real exogenous shocks and output volatility. Policies also include establishing emergency funds for natural disasters and hoarding international reserves to mitigate the effects of capital flow shocks and volatility.

The accumulation of international reserves can also reduce the probability of a capital flow shock. A sudden stop normally occurs when financiers realize that there is not enough liquidity to cover outstanding debt service commitments in the event of a credit crunch and so refuse to roll over debt, provoking a self-fulfilling liquidity crisis.[2] Thus hoarding international reserves serves as both a prevention measure and a self-insurance policy. More generally, all prevention and self-insurance actions can reduce perceived default risk and hence limit the probability of self-fulfilling liquidity crises. For the same reason they can facilitate cheaper ex ante finance, thus potentially leading to higher growth rates.[3] Obviously, however, self insurance can carry significant financial and investment opportunity costs. The benefits and costs of self-insurance policies are not linear, and there is generally an optimal level of self-insurance beyond which marginal costs exceed marginal benefits.

Finally, governments can buy market insurance or hedges. Financial instruments available to deal with real exogenous shocks include commodity price futures, forwards and options, and, less frequently, structured indexed debt. There have been important developments in the catastrophic risk insurance and reinsurance industry, including the issuance of catastrophe bonds. And there is a limited set of instruments to reduce liquidity and currency risks, including contingent credit agreements, currency and interest rate forwards, swaps and options, and some forms of structured indexed debt. As with self-insurance, market insurance and hedging, by reducing default risk, can also reduce the probability of capital flow shocks and volatility and lead to higher ex ante flows, investment, and growth. But it also comes with its own costs, whether high upfront fees or the opportunity cost of giving up the upside in the case of hedges. The following chapters discuss in some detail the availability of such instruments and why their use by developing countries is uncommon currently.

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markets, albeit inducing wide currency mismatches of debtors. The propensity to peg the exchange rate as an anchor for inflation has also contributed to high dollarization levels as this policy appeared to offer implicit insurance against currency risk (and, indeed, governments often compensated debtors after large forced devaluations through caps and "pesification" of dollar debts, as happened in Argentina in 2002). See, for example, Ize and Levy Yeyati (2003). Countries with high de facto financial dollarization have proven to be more exposed to capital account shocks (see Calvo and Talvi 2005). Some countries have adopted full, legal substitution of foreign currency for their domestic currency. In these cases, the issue is how to develop flexible financial contracts that can protect governments and firms from the effect of adverse external shocks that require real exchange rate corrections (see De la Torre and Schmukler 2006).

2. Chamon 2007; Chang and Velasco 1999.

3. See Levy Yeyati (2006a).

Finally, better prevention policies (and better institutions and policies in general) can also increase access to market insurance and hedges and help develop domestic currency and swap markets. Thus, the policy options outlined in table 2.1 should not be seen as independent alternative courses of action: there can be considerable synergies and complementarities, especially among prevention and market insurance options, in both directions.

The "optimal" mix of policies for reducing volatility

The natural questions arise: when, for what type of risks, and to what extent is it better to prevent, to self-insure, to hedge or pay for market insurance, or just to wait and cope? Ehrlich and Becker's seminal contribution to the economics of insurance[4] sheds considerable light on these questions. The analysis that follows applies their results, and some recent extensions,[5] to government options to deal with exogenous shocks and macro-financial volatility.

The optimal theoretical response depends on the nature of the risks. More specifically, it depends on the expected frequencies and costs of shocks. For rare and low-expected-cost events, it normally does not pay to incur the costs associated with full prevention, self-insurance, or market insurance and hedging. Better to wait for the unlikely event and cope because the expected cost of coping is low. In the case of high-frequency and high-expected-cost events, the emphasis should be on prevention: for example, in areas with frequent large flooding it pays to build expensive dams and other public works or resettle populations. When high frequency is coupled with low expected costs the optimal response is a combination of self-insurance and prevention.

But for rare and costly shocks, the optimal response should in theory focus on market insurance: just waiting and coping may turn out to be too costly, savings would have to be very high and disproportionately costly for such an unlikely event, and full prevention costs might also be very high to cover a low-probability event. In contrast, this is precisely when pooling of risks through market insurance may pay in principle: as long as individual risks are not highly correlated, required collective savings will be several orders of magnitude lower than the sum of what individuals would have to save to cover their own rare but costly risk. Thus, premiums can be lower than the financial costs for individual savers. This is why most people voluntarily take market insurance against major accidents, theft, health events, and fire—as long as such insurance is available and fees are reasonable—but not against minor accidents, petty theft, common colds, or the effects of frequent rainfall on houses. And this is also why most people in developing countries would like to take market insurance against

4. Erlich and Becker 1972.
5. Gill and Ilahi 2001.

unemployment, violent attacks, or natural disasters, but usually find none available. For, as discussed in the next chapter, market failures are a very common feature in many insurance markets.

Second, because most risks come with a continuous distribution that includes both high-frequency and low-cost events as well as upper tails of low-frequency and high-cost events, the optimal response requires a careful design in which market insurance is geared for the upper tails, but not for the more frequent low-cost outcomes. This is commonly achieved either through deductibles or exclusions in insurance contracts.

Third, there are both substitution effects and complementarities among actions. Usually, market insurance and self-insurance are substitutes. If I am fully insured against a potentially high-cost risk, then I do not need to save for its eventual occurrence. But if I find no market insurance for a rare but costly risk, I may have no option but to engage in either very costly coping (for example, dealing ex post with a currency crisis or the effects of a major earthquake) or self-insurance (for example, hoarding apparently "excessive" international reserves or setting aside very large emergency funds). Nonetheless, on occasion some self-insurance can make market insurance more accessible

Conversely, market insurance and prevention can be substitutes or complements, depending on the design of insurance fees and payments. Thus, poorly designed insurance contracts may lead to moral hazard: if I am fully and cheaply protected against a costly risk I may do nothing to prevent it. However, if the insurance fees and payments are contingent on my taking adequate prevention measures, contracting market insurance may induce me to undertake more prevention measures. Thus, fire insurance fees are normally more costly for wooden houses, and one may lose eligibility if there are no fire extinguishers on the property. In the other direction, prevention (and good policies and institutions in general) normally increase access to international market insurance and hedging and help the development of domestic insurance markets.

Fourth, individual welfare increases when there are more options from which to choose. This obvious conclusion, and the existence of significant market failures and externalities in insurance, lead to a potential role for government with respect to insurance options for individuals and firms, and for multilateral institutions, with respect to insurance options for developing countries, as discussed in the next subsection. This is the main economic rationale behind social security (universal health insurance, unemployment and disability insurance, and mandated and noncontributory pensions systems) as discussed in several World Bank publications.[6] Virtually everywhere the emergence of these types of insurance, or their universal coverage, required significant government intervention. This is also the rationale for government support for the development of catastrophe insurance, as happens in most industrial countries (see chapter 6).

6. De Ferranti and others 2001; Gill, Packard, and Yermo 2005; Baeza and Packard 2006.

Fifth, there are risks that cannot be fully or substantially diversified at the national level, especially in small countries and economies, and that require international diversification. Pooling of risks within a country may lead to limited savings in some cases, while worldwide pooling may lead to very considerable savings. Thus, catastrophic risk insurance normally requires reinsurance abroad. And there are, naturally, risks that are essentially undiversifiable at the national level, but substantially diversifiable at the global level: this is precisely the case of macroeconomic risks derived from exogenous shocks such as those discussed in the previous chapter. International financial markets offer an increasing variety of instruments to deal with these risks, but market failures are as important here as in domestic financial markets, as is discussed in the following subsection, leaving a significant potential role for multilateral institutions.

Sixth, official failures are also common, whether through omission of action, excessive reach, or poorly designed interventions. Thus, social security regulations are fraught with inefficiencies such as public health insurance that covers events that should not be insured (common flu) and leaves out some that should be (catastrophic illnesses), as well as excessive administrative costs and fees. Social security institutions and regulations are also plagued by poor incentives for individuals, leading to problems of moral hazard and adverse selection.[7] But they also often fail by omission: thus, in most developing countries the poor go essentially unprotected against the risks of old age, health, and unemployment.[8] In the same vein, bilateral and multilateral agencies may indulge in inefficient interventions and fail by omission. An example of inefficiencies is aid that comes after a natural disaster or an external shock hits a poor country or region. Such ex post aid creates a particular sort of moral hazard: it induces countries to underinsure and, perhaps, even to underinvest in prevention. Aid could be better used to subsidize or reduce the costs of prevention measures and to purchase market insurance for countries. This topic is discussed in subsequent chapters.

Finally, as the potential costs of shocks increase with the level of development, and the opportunity costs of saving normally decline (because discount rates are lower), it is to be expected that demand for insurance will increase. This is one reason high-income countries have higher penetration of insurance against all types of risks; the other is, of course, better institutions and policies. For the same reasons middle-income countries tend to demand more insurance than low-income countries. Middle-income countries are also more exposed to some types of risks, such as capital flow shocks, as discussed in chapter 1. As a consequence, these topics have come more to the attention of multilateral institutions as they have attempted to devise a "middle-income countries strategy" or agenda. However, it would be a mistake to think that these issues are unimportant for low-income countries: as discussed in chapter 1, low-income countries are on average more exposed to real external shocks and natural

7. Perry, Maloney, and Arias 2007.
8. Perry, Maloney, and Arias 2007.

disasters than middle-income countries. And, contrary to expectations, aid currently behaves almost as procyclically as private capital flows, as already mentioned.

Financial market failures and the role of multilateral development banks

Several financial instruments have been designed to reduce, mitigate, or transfer risk, in particular, liquidity, currency, commodity price, and natural disaster risks. Some of them are relatively mature products, with deep and liquid markets in industrial countries, while some are relatively new and have had only incipient market development. As shown in the following chapters, use or access to such products by developing countries is generally quite limited for various reasons.

Before examining the types of products available, it is useful to discuss briefly the difficulties and market failures that normally affect financial innovations. First, when a new product is launched there is considerable uncertainty about how it will perform, and pricing is a problem. In particular, the initial market will not be liquid, and there may be considerable uncertainty about how deep and liquid markets will be at different moments in the future. These characteristics will lead investors to demand a high premium.

As a consequence, the first issuers will have to pay a high premium and face substantial risks. These "first mover" costs and risks are sharply reduced for later investors and issuers, as experience is gained and market liquidity develops. Thus, the first issuers and investors incur high market-development costs that yield market-development benefits (positive externalities) for all subsequent market players. Because the financial sector is highly competitive, successful innovations are copied almost immediately without incurring these development costs, and there are normally no patents or other forms of intellectual property rights protection for financial innovations. Thus, a major appropriability problem arises that constrains the pace of financial innovation.[9]

These problems, which affect all types of financial innovation, are far more severe for products that require global reach to attain their full risk-diversification potential. Currency, output, and natural disaster risks can be greatly diversified through global pooling. Cross-correlations of such risks may be high among neighboring or similar countries, but tend to be low when all countries are included. Therefore, pooling these risks globally substantially reduces the cost of market insurance. But until global pools are achieved, investors will not benefit from much risk diversification, and premiums for early participants will be much higher. There is thus a major coordination problem for the efficient development of these markets.

These first-mover or market-development costs and coordination problems that affect many financial innovations often result in market failures. Thus, this is a potential area for official action, especially when global coordination issues arise. Many

9. Shiller 2003; Claessens 2007; Costa, Chamon, and Ricci 2008.

important financial innovations were developed with help from governments[10] or official international assistance, as in the case of the consolidation of emerging-market bonds as an asset class after the Brady restructuring deals.[11] Multilateral development banks can in principle assume the first-mover or market-development costs and risks of products that may be of special interest to developing countries, by piloting or promoting them and helping develop market liquidity. Global development banks, such as the World Bank, or associations of regional development banks, are especially well placed to help solve the coordination issues arising in developing efficient coverage of currency, output, and natural disaster risks.

Finally, in many instances the low use of risk-management products by developing countries also arises from domestic problems: either lack of technical capabilities, which are required to manage the potential benefits and risks associated with complex financial products, or political economy problems, or both. Political economy problems arise from the fact that insurance requires paying fees upfront to cover risks that may never materialize or that may do so well into the future. Cash-constrained governments with short political horizons are seldom motivated to incur the financial and political costs associated in the short term with taking insurance and may instead leave a significant accumulation of risks for their successors. Hedging might avoid the financial and political costs associated with upfront insurance fees, but it leaves officials exposed to eventual accusations of malfeasance related to the fact that hedging implies "giving up the upside." Multilateral development banks are again well placed to help overcome both of these technical limitations and political economy constraints, as is discussed below. Further, many risk-management products are sensitive to credit risk. Thus, countries or firms with high credit risk are essentially rationed out of these markets or can access them only at very high costs. This suggest a further potential role for multilateral development banks in intermediating the access of developing country governments and firms to risk-management product markets, by retaining credit risk and allowing market participants to take only other risks (such as currency or commodity price risks).

The following chapters illustrate these general points with respect to specific risks and potentially valuable financial instruments. For clarity of exposition, instruments or financial policies whose primary function is to help reduce or mitigate liquidity, currency, commodity price, output volatility, and natural disaster risks are dealt with individually, but it should be clear that instruments designed to reduce the exposure to a particular risk indirectly help reduce or mitigate other risks. This is largely because of the procyclicality of capital flows, which tends to amplify the effects of real shocks and to convert them into serious liquidity risks, and partly because balance sheet currency and maturity mismatches tend to increase the probability of liquidity shocks and amplify the real effects of all exogenous shocks.

10. Shiller 2005b.
11. Calvo and Mendoza 2000.