Macroeconomic Volatility and Welfare in Developing Countries: An Introduction

Norman V. Loayza, Romain Rancière, Luis Servén, and Jaume Ventura

Macroeconomic volatility, both a source and a reflection of underdevelopment, is a fundamental concern for developing countries. Their high aggregate instability results from a combination of large external shocks, volatile macroeconomic policies, microeconomic rigidities, and weak institutions. Volatility entails a direct welfare cost for risk-averse individuals, as well as an indirect one through its adverse effect on income growth and development. This article provides a brief overview of the recent literature on macroeconomic volatility in developing countries, highlighting its causes, consequences, and possible remedies. It then introduces the contributions of a recent conference on the subject, sponsored by the World Bank and Pompeu Fabra University, Barcelona.

On almost any standard measure of macroeconomic volatility, developing countries have topped the charts over the last four decades. Among the most volatile are not just small economies (Dominican Republic and Togo) but also large ones (China and Argentina). Many are predominantly commodity exporters (Ecuador and Nigeria), but some are also rapidly industrializing economies (Indonesia and Peru). The empirical connection between macroeconomic volatility and lack of development is undeniable, making volatility a fundamental development concern. What is behind this relationship? Is volatility a source or a reflection of underdevelopment? What precise underdevelopment characteristics put poor countries more at risk? Through what mechanisms does volatility affect welfare?

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To help answer these questions, the Development Economics Vice-Presidency of the World Bank and the Center for International Economic Research of Pompeu Fabra University, Barcelona, organized the conference "The Growth and Welfare Effects of Macroeconomic Volatility." Taking place in Barcelona on 17–18 March 2006, it gathered researchers and policymakers from around the world to discuss more than a dozen original papers on the topic. A selection of those papers is published in this issue of the *World Bank Economic Review*.[1] This short introduction reviews the literature on macroeconomic volatility and welfare in developing countries and highlights the contributions of the Barcelona conference.

I. Why Do We Care about Macroeconomic Volatility in Developing Countries?

The welfare costs of macroeconomic volatility in developing countries are particularly large. They come, first, from the direct welfare loss of deviating from a smooth path of consumption, optimal for most people, who are naturally risk averse. Macroeconomic volatility, summarized by output volatility, is reflected disproportionately in consumption volatility for developing countries (figure 1).[2] The welfare gains from reducing consumption volatility can be substantial. Based on the approach of Athanasoulis and van Wincoop (2000), the World Bank (2000) estimates potential welfare gains of up to 5–10 percent of consumption in various Latin American countries, while these gains seldom reach 1 percent in developed economies.

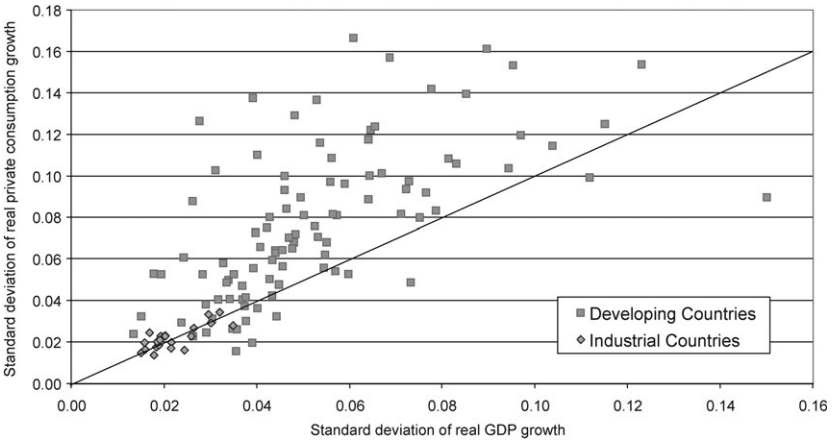
No less important, macroeconomic volatility has a negative impact on output growth and thus on future consumption (see figure 2 for a simple illustration). Volatility has this negative effect through its links with various forms of uncertainty (economic, political, and policy-related) and with the tightening of binding investment constraints (when volatility reflects large negative fluctuations). Aizenman and Pinto (2005) and Wolf (2005) review these mechanisms and the related literature.

The negative volatility–growth link was first documented empirically in Ramey and Ramey's seminal paper (1995) and further analyzed in Fatás (2002), Acemoglu and others (2003), and Hnatkovska and Loayza (2005). These studies show that volatility's indirect welfare cost through reduced economic growth is magnified in countries that are poor, financially and institutionally underdeveloped, or unable to conduct countercyclical fiscal policies. Hnatkovska and Loayza (2005) estimate that a one-standard-deviation increase in macroeconomic volatility (the difference between the output-gap variance of

1. All the papers are available on the conference website, www.cepr.org/meets/wkcn/1/1638/papers/

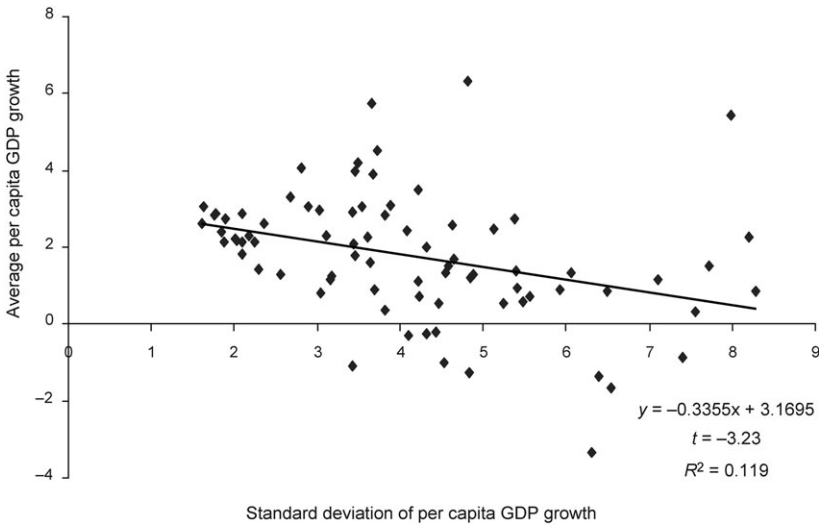
2. The factors behind this seeming "excess volatility" of consumption in developing countries are examined by Aguiar and Gopinath (2007).

FIGURE 1. Output Volatility and Consumption Volatility



Source: Authors' analysis using World Development Indicators data, cross-country sample, 1970–2001.

FIGURE 2. Macroeconomic Volatility and Economic Growth



Source: Authors' analysis using World Development Indicators data, cross-country sample, 1960–2000.

Indonesia and the United Kingdom) results in an average loss of 1.28 percentage points in annual per capita GDP growth.[3]

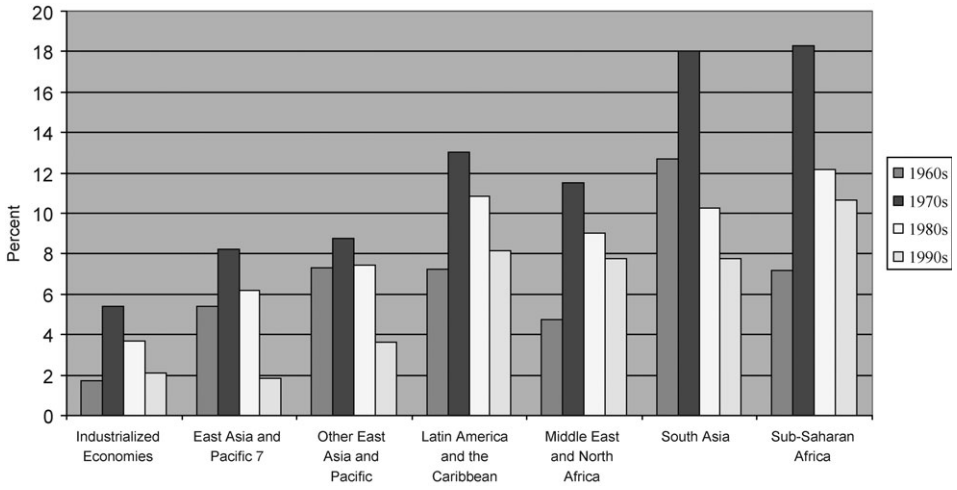
3. This estimate of the growth effect of volatility is derived from a regression model that exhibits conditional convergence: that is, as the level of per capita GDP increases, its growth rate declines, and as the level of GDP per capita decreases, its growth rate increases. So the negative effect of volatility on growth will gradually fade away as per capita GDP declines.

II. Why Are Developing Countries More Volatile?

Not only are the effects of volatility larger in developing countries but these countries also face more macroeconomic volatility than do industrial countries (see figure 1). This seems to stem from three sources. First, developing countries receive bigger exogenous shocks. These may come from financial markets in the form of "sudden stops" of capital inflows, for instance. Or they may come from goods markets, especially from abrupt and large changes in the international terms of trade. Industrial economies have consistently experienced smaller shocks in terms of trade growth (calculated as the standard deviation of the logarithmic change) over each of the four decades in 1960–2000, while developing countries in all regions except East Asia have encountered terms of trade volatility at least three times as large (figure 3).

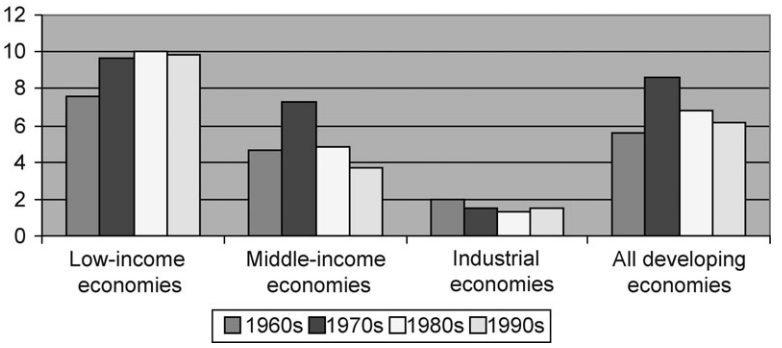
Second, developing countries seem to experience more domestic shocks, generated by the intrinsic instability of the development process and self-inflicted policy mistakes. This intrinsic instability has been studied in connection with the development of financial systems and the risk associated with new projects (Gaytán and Rancière 2006; Kharroubi 2007). It has also been studied in connection with the structure of production. Comparative advantage leads developing countries to specialize in industries that use traditional technologies operated by unskilled workers. Kraay and Ventura (2007) argue that these industries are more volatile and that this pattern of specialization can explain a substantial fraction of the difference in volatility between developed and developing countries.

FIGURE 3. Volatility of Terms of Trade Growth (regional medians)



Source: Authors' analysis using World Development Indicators data.

FIGURE 4. Volatility of Public Consumption Growth (medians by group)

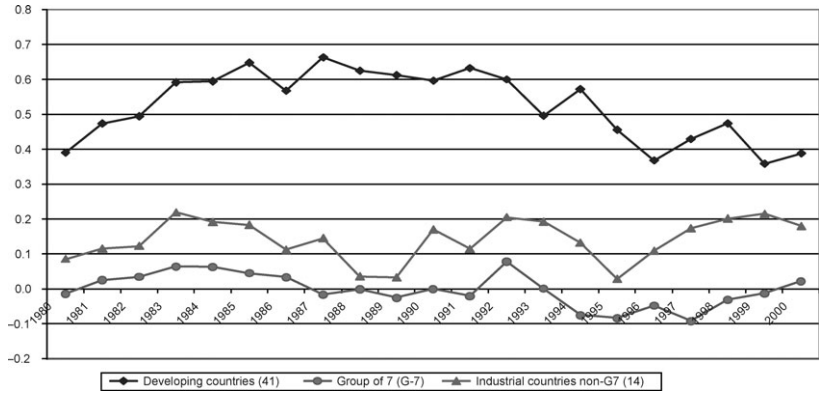


Source: Montiel and Servén 2005.

Domestic shocks also come from self-inflicted policy mistakes. Governments often instigate macroeconomic volatility by conducting erratic fiscal policy and, even worse, by financing it at times through similarly volatile inflationary monetary policy. The volatility of public consumption growth for countries at different income levels suggests that developing countries conduct more volatile fiscal policy (figure 4). Using more formal analysis, Fatás and Mihov (2006*) arrive at the same conclusion, establishing a negative connection between fiscal volatility and economic growth. More generally, Raddatz (2007) finds that in low-income countries domestically induced shocks—related to social conflict, economic mismanagement, and political instability—account for the bulk of fluctuations in GDP per capita. For this group of countries, external shocks linked to terms of trade, foreign aid, international finance, and climatic conditions contribute a significant but small portion of their overall macroeconomic volatility.

Third, developing countries have weaker "shock absorbers," so external fluctuations have larger effects on their macroeconomic volatility. The literature has traditionally identified two elements as shock absorbers: financial markets to diversify macroeconomic risk and stabilization policies to counter aggregate shocks. Both are deficient in developing countries, where financial markets are shallow, drying up in moments of crisis when they would be most useful and failing to provide adequate instruments to diversify away the risk of external shocks (World Bank 2000). And macroeconomic policies, far from providing a stabilizing force, often amplify volatility in developing countries. Fiscal policy is generally procyclical, expanding in booms and contracting in recessions (Gavin and Perotti 1997). For the typical developing country the correlation between public consumption growth and GDP growth is around 0.5, but for the Group of Seven countries it fluctuates around 0 (figure 5).

FIGURE 5. Fiscal Procyclicality: Procyclicality of Public Consumption (15-year rolling windows, group medians)



Source: Montiel and Servén 2005.

Analysis of shock absorption has traditionally focused on macroeconomic policy. More recently, however, microeconomic policy has also been found important (figure 6). The heavy microeconomic regulation in developing countries hampers adjustment to shocks by restricting the economy's ability to reallocate resources in response. (For an analysis of these mechanisms see Caballero and others 2004; Bergoeing, Loayza, and Repetto 2004). There is mounting empirical evidence that tighter barriers to microeconomic reallocation and firm dynamics boost aggregate volatility (see Loayza, Oviedo, and Servén 2005).[4]

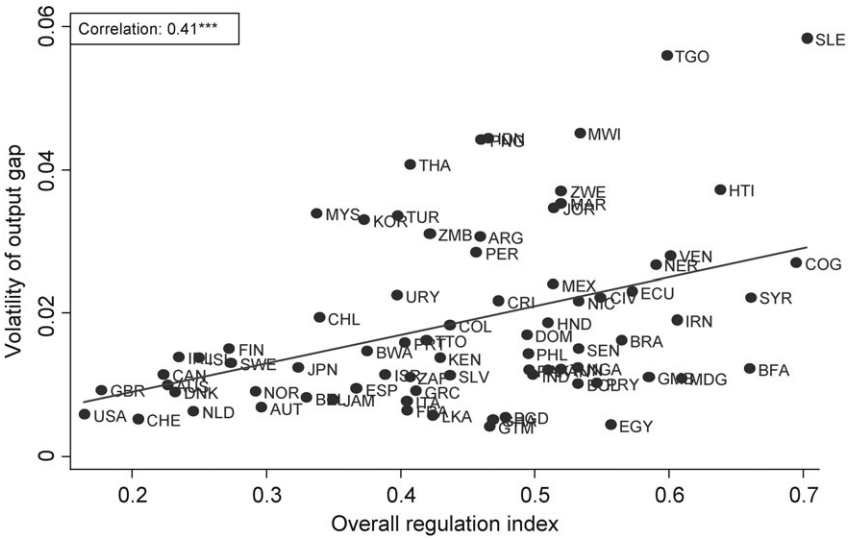
III. VOLATILITY AND CRISIS

Does the negative impact of volatility reflect the harmful effect of sharp negative fluctuations ("crisis" volatility) rather than the impact of repeated but small cyclical movements ("normal" volatility)? The literature on irreversible investment and incomplete financial markets under imperfect competition emphasizes the nonlinear effects of uncertainty and volatility on economic outcomes. Large adverse shocks contract investment, make liquidity constraints binding, and eventually lead to asset destruction (Caballero 1991; Caballero and Hammour 1994).

Hnatkovska and Loayza (2005) study the different impacts of normal and crisis volatility on economic growth. They divide the standard deviation of each country's per capita GDP growth (total volatility) into fluctuations within a

4. The overall regulation index in figure 6 encompasses a broad array of regulatory dimensions relevant to firms' economic activity: firm entry, trade, finance, contract enforcement, bankruptcy, labor, and taxation. Except for taxation, they are all highly correlated and show a similar link with macroeconomic volatility.

FIGURE 6. Microeconomic Regulation and Macroeconomic Volatility



Source: Loayza, Oviedo, and Servén 2005; cross-country sample, 1990–2000.

specified band (normal volatility) and outside it (extreme volatility).[5] Crisis volatility is the extreme volatility that corresponds to large negative fluctuations. Figure 7 illustrates this decomposition for Argentina in 1960–2005. What harms the economy's long-run performance is not the volatility due to normal fluctuations but the volatility due to crises. The effect of a one-standard-deviation increase in crisis volatility is almost twice as large as that of one in total volatility—a loss of 2.15 percentage points of per capita GDP growth.

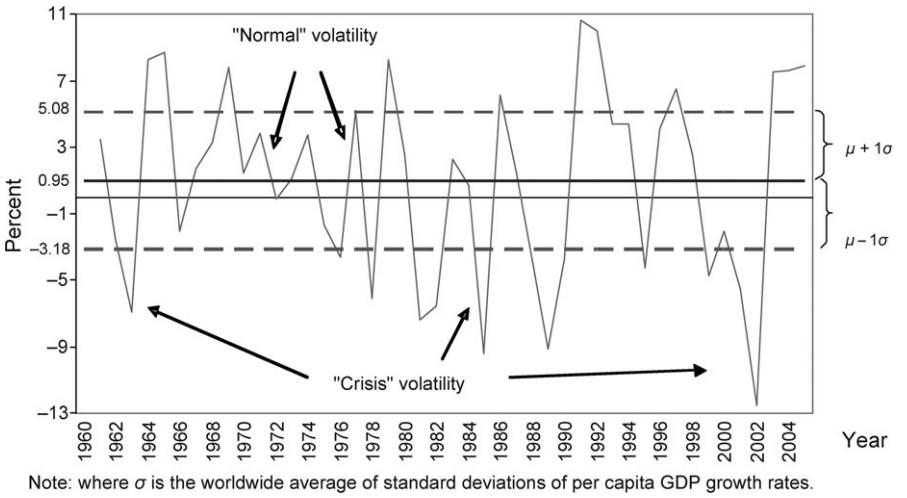
This distinction is important for macroeconomic management, particularly in developing countries where high volatility largely reflects extreme adverse outcomes. Although a majority of developing countries saw a decline in total volatility in the 1990s, Montiel and Servén (2005) report the worrisome trend that crisis volatility increased in the 1980s and further in the 1990s (figure 8). The high incidence of extreme events across the developing world in the 1990s—growth collapses, sudden capital stops, banking crises, exchange rate crashes—was doubtless behind this trend.

IV. MANAGING MACROECONOMIC VOLATILITY

The three main sources of macroeconomic volatility just outlined suggest the need for a three-part strategy to manage it. The first part of such a strategy is

5. The band is the country's mean GDP growth rate plus or minus the world mean of standard deviations of GDP growth. Thus the width of the band is common to all countries, which promotes cross-country comparability. The results are robust to changes in the common width of the band.

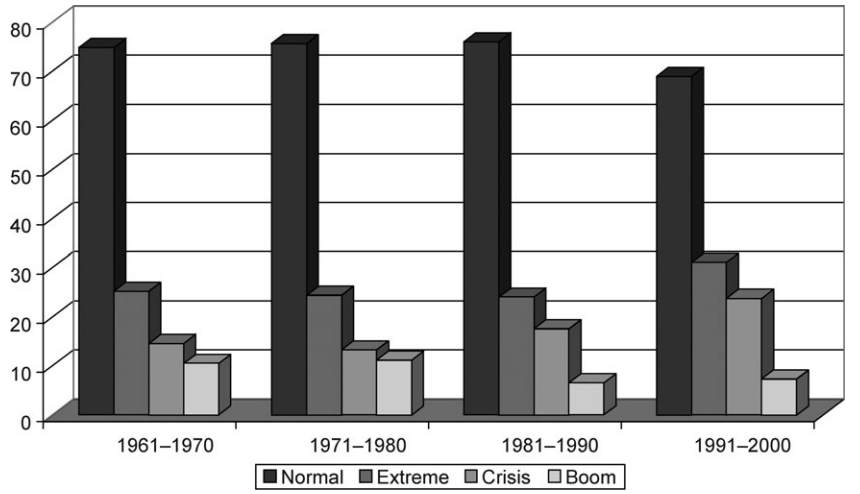
FIGURE 7. Normal and Crisis Volatility: Argentina, 1960–2005 (GDP per capita growth rate)



Note: where σ is the worldwide average of standard deviations of per capita GDP growth rates.

Source: Hnatkovska and Loayza 2005.

FIGURE 8. Normal and Extreme GDP Growth Volatility (percentage of total volatility, average of 77 developing countries)



Source: Montiel and Servén 2005.

to reduce domestic policy-induced macroeconomic volatility by controlling the level and variability of fiscal expenditures, by keeping inflation low and stable, and by avoiding price rigidity (including that of the exchange rate), which eventually leads to drastic adjustments. The best way to ensure these outcomes is to develop institutions that can support them. An autonomous central bank

has proved very successful in managing monetary policy, controlling inflation, and inducing fiscal discipline; indeed, many countries around the world have adopted one for these purposes. Similarly, some countries are implementing fiscal rules and programs that tie fiscal policy more to the country's long-run needs and reduce the scope for discretionary policy, a major source of aggregate volatility (Fatás and Mihov 2006*).

The second part of the strategy is to strengthen the economy's shock absorbers. The ability to conduct countercyclical fiscal policies is crucial, and it depends largely on the ability of the authorities to reduce public indebtedness to internationally acceptable levels, establish a record of saving in good times to provide for bad times, and develop credibility that forestalls perceptions of wasteful spending and default risk. But the financial sector has the greatest potential as a shock absorber. To enhance its effectiveness, both its volume of intermediation and variety of risk-diversification instruments must expand significantly. A precondition for financial depth is reducing intrinsic fragilities in the financial system, particularly those from mismatches in banking assets and liabilities.

Governments can reduce financial fragilities and deepen financial markets by eliminating implicit insurance schemes (such as fixed exchange rate regimes) and credit restrictions that distort the valuation of financial assets and liabilities. They can also protect creditor and shareholder rights in the law and its judicial implementation. Firms and other microeconomic agents should have the flexibility to adjust to shocks through reallocating resources across production plants, geographic areas, and economic sectors. Competition and trade provide the incentives and mechanisms for such reallocations. And governments can facilitate reallocation by reducing the burden of regulations, limiting bureaucratic requirements, and streamlining its own operations.

The third part of the strategy is to manage external shocks. Following Ehrlich–Becker's (1972) classic "comprehensive insurance" framework, three possible options can be identified:

- Self-protection (reducing the exposure to risk through, for instance, limited trade and financial openness).
- Self-insurance (transferring resources across time through, for example, accumulating foreign reserves during tranquil times).
- Full hedging and insurance (transferring resources across "states of nature" through, say, securing contingent credit lines or trading commodity-linked options).

Self-protection has potentially large efficiency costs because it may prevent the economy from accruing the static and dynamic advantages of global integration. Moreover, closing the economy to external trade or financial flows may increase the likelihood of policy-induced distortions that eventually result in large domestic shocks.

Self-insurance seems the most popular option among developing countries. Many have simple commodity-stabilization funds and are accumulating massive foreign reserves to smooth terms-of-trade shocks and reversals (sudden stops) in capital-account flows. Indeed, the ratio of foreign reserves to imports has more than doubled in emerging market economies over the last 15 years. Self-insurance is certainly better than the extremes of isolation or no protection, and it seems to reduce the economy's vulnerability to external disturbances (see Aizenman 2006; García and Soto 2006). But liquidity hoarding, with its large opportunity cost in forgone investment, is clearly less effective than hedging through contingent financial instruments. In the world's current state of financial development perfect hedging is not available to developing countries. Financial markets do, however, provide some hedging opportunities preferable to self-insurance. For sudden capital stops, Caballero and Panageas (2006) show that using derivatives linked to the volatility of mature stock markets or to commodity prices can be a big improvement over accumulating foreign reserves.

V. Lessons from the 2006 Barcelona Conference

The papers for the conference cover a broad range of issues related to volatility, growth, and welfare. This section reviews their contributions to the four questions just discussed.

The Welfare and Growth Costs of Fluctuations

In an influential set of lectures Lucas (1987) argued that the costs of fluctuations are small. An important strand of the literature has questioned this finding, however, and Reis (2006*) adds to this discussion more refined calculations of these costs.[6] Lucas's calculations assume that consumption shocks are serially uncorrelated, a convenient but empirically untenable assumption: in the United States lagged consumption shocks account for 84 percent of the variability of current consumption. Reis shows that taking this high persistence into account can bring the welfare costs of fluctuations up to 5 percent of per capita consumption, or about 100 times more than the estimates of Lucas (1987).[7] Using a consumption and savings model, Reis also points out that an increase in precautionary savings and a reduction in risky investment provide supplemental channels for fluctuations to reduce welfare. Although Reis's model has been calibrated using the U.S. economy, it seems likely that the welfare costs of fluctuations will be even larger in developing economies where shocks, according to Calderon and Fuentes (2006*), are much more persistent.

Reis's calculations might even underestimate the welfare costs of volatility, because they consider only the effects of aggregate volatility, assuming no

6. The asterisk (*) indicates papers associated with the Barcelona conference.
7. See also van Wincoop (1999) for an analysis of the role of persistence in this context.

idiosyncratic (individual or household) volatility, which has also increased substantially in the United States in the last decade. Primiceri and van Rens (2006*) explore the source of this increase by examining the consumption behavior of a large panel of individuals, finding that their behavior is consistent with an increase in the persistence of individual income shocks. When hit by a shock, individuals understand that it is likely to be permanent and so adjust their consumption.

An important related issue is the connection between aggregate and idiosyncratic volatility. Comin and Mulani (2006*) analyze the effects of firm volatility on aggregate volatility and the converse. Somewhat surprisingly, they show that increases in firm volatility are positively associated with research and development spending and that increases in that spending reduce aggregate volatility.

Why Are Developing Countries More Volatile?

Loayza and Raddatz (2007*) analyze how financial openness and trade openness, as well as product-market flexibility, factor-market flexibility, and domestic financial development, influence the impact of terms of trade shocks on output. Using semistructural vector autoregressions on a panel of countries, they find that financial openness and labor market flexibility appear to mitigate the consequences of external shocks. In contrast, they find that trade openness magnifies the output consequences of terms-of-trade shocks, particularly when domestic financial markets are not well developed. These findings are consistent with the theoretical results of Broner and Ventura (2006*), who, in a model of endogenously incomplete markets, study how trade integration can lead to financial instability. They show that trade integration can have different effects depending on domestic financial markets. If those markets are deep, trade integration allows for better risk-sharing, thus raising welfare. If they are thin, trade integration destroys risk-sharing and lowers welfare.

Tackling this issue empirically, Giovanni and Levchenko (2006*) find that countries more open to trade tend to be more volatile. They argue that this is the outcome of counteracting forces. Two mechanisms lead to a positive relationship: traded sectors are more volatile than nontraded ones, and trade leads to specialization in fewer sectors. But traded sectors are less correlated with the rest of the economy and so can act as hedging activities.

The arguments and evidence in the foregoing papers might seem to contradict the notion of trade openness as shock absorber, as proposed by Martin and Rey (2006) and Cavallo and Frankel (2004) for financial shocks. The issue is not settled, awaiting more research on the role of openness in macroeconomic volatility.

Two additional papers provide further insight into the relationship between development and volatility. Koren and Tenreyro (2006*) argue with substantial empirical evidence that as development proceeds, countries choose technologies that are more resilient to shocks and thus allow for lower aggregate volatility.

Kharroubi (2007*) proposes an explanation for the negative relationship between growth and volatility observed in developing countries based on the shortcomings of their financial systems. Moral hazard generates a bias toward short-term debt contracts, increasing the risk of liquidity crises and macroeconomic volatility. Kharroubi develops a theoretical model and provides some empirical evidence supporting his proposed mechanism.

Volatility and Crises

Gaytán and Rancière (2006*) propose a theoretical explanation for the more frequent banking crises in middle-income countries, along with larger benefits from financial intermediation. Banks choose to be either covered from or exposed to crises. Covered banks tend to hold excess liquidity but are crisis proof, while exposed banks are less constrained in their investments but can face severe losses in crises. The conclusion of the paper is that banks in middle-income countries have more incentives than those in low- and high-income countries to remain exposed to crises. So the higher propensity for crises in developing countries may reflect an optimal development strategy.

Lorenzoni (2006*) develops a theory of credit booms and financial fragility in credit-constrained economies, with two useful conclusions. First, as in Gaytán and Rancière (2006*), some degree of financial fragility can be optimal and should not be avoided. Second, agents in general do not fully internalize the aggregate consequences of excessive borrowing, and this creates room for welfare-improving prudential regulation.

Managing Macroeconomic Volatility

Fatás and Mihov (2006*) show that policy volatility exerts a first-order negative impact on long-term economic growth, even controlling for the institutional framework. To obtain their measure of policy volatility, the authors construct a measure of exogenous policy decisions unrelated to the state of the economy and take the standard deviation of this measure as a proxy for policy volatility.

One limitation in Fatás and Mihov (2006*) analysis is that their estimates are reduced form, so the transmission mechanisms from volatility to growth remain unspecified. In contrast, the other papers reviewed here focus on specific interactions between institutions, policies, volatility, and growth. Galindo and Micco (2007*) find that bankruptcy law is an important determinant of credit access and macroeconomic volatility. They find that higher legal protection for creditors significantly reduces credit volatility and the potential impact of exogenous shocks. Aghion and others (2006*) offer empirical evidence that exchange rate volatility generally reduces growth for countries with relatively low financial development but that there is no significant effect for financially advanced countries. Therefore, growth considerations are largely irrelevant for the choice of an exchange rate regime for financially developed economies but quite important for developing countries.

Prati and Tressel (2006*) present evidence that foreign aid volatility increases trade balance volatility and depresses exports through a Dutch-disease mechanism. They argue that these effects could be mitigated by actively managing the central bank's net domestic assets. Levchenko and Mauro (2007*), concerned with the detrimental effects of sudden stops, show that countries with a more diversified portfolio of foreign liabilities and a higher share of foreign direct investment tend to fare better during capital-flow reversals.

To conclude, a comprehensive theoretical and empirical analysis of the intricate connection between volatility and welfare tailored to all the key features of developing countries is still missing. Even so, the literature and the lessons from the Barcelona conference reviewed here can provide some elements of sensible policy recommendations and identify areas where research is especially needed.

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