

New Tools for Assessing Financial System Soundness

Macroprudential indicators—defined broadly as indicators of the health and stability of the financial system—can help countries assess their banking systems' vulnerability to crisis. In recent years, an increasing amount of work has been done on such indicators as part of efforts to strengthen the international financial architecture.

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THE INTERNATIONAL financial turmoil of the second half of the 1990s has provoked much reflection on ways to strengthen the global financial system. The international community has identified a number of priorities, including the need to enhance its own—and the markets'—ability to monitor the health of financial systems.

Financial Sector Assessment Program

The IMF has been called upon to assess financial system soundness in its member countries as part of its surveillance work, including through the preparation of Financial System Stability Assessments. This process is now well under way as part of the joint World Bank–IMF Financial Sector Assessment Program (FSAP), introduced in May 1999. Many other national and international institutions have also initiated or intensified monitoring work.

The ability to monitor financial sector soundness presupposes the existence of valid indicators of the health and stability of financial systems. These macroprudential indicators (MPIs) matter for several reasons. They allow for assessments to be based on objective measures of financial soundness. If MPIs are made publicly available, they enhance disclosure of key financial information to the markets. In addition, if the indicators are comparable across countries—which is possible if countries adhere to

internationally agreed prudential, accounting, and statistical standards—they facilitate monitoring of the financial system, not only at the national but also at the global level. The latter is crucial in view of the magnitude and mobility of international capital, and the risk of contagion of financial crises from one country to another.

The IMF has been building up experience with MPIs for some time as part of its surveillance and research, and more recently in the context of the FSAP. A consultative meeting on MPIs was held at IMF headquarters in September 1999. High-level experts from central banks, supervisory agencies, international institutions, academia, and the private sector discussed their experiences in using, measuring, and disseminating MPIs. The state of knowledge in these areas and proposals for further work were also discussed at a meeting of the IMF's Executive Board in January 2000.

What are they?

MPIs comprise both aggregated microprudential indicators of the health of individual financial institutions and macroeconomic variables associated with financial system soundness (see table). Financial crises often occur when both types of indicators point to vulnerabilities—that is, when financial institutions are weak and face macroeconomic shocks.

CAMELS framework. Indicators of the current health of the financial system are

derived primarily by aggregating data on the soundness of individual financial institutions. One commonly used framework for analyzing the health of individual institutions is the CAMELS framework, which looks at six major aspects of a financial institution: capital adequacy, *asset* quality, *management* soundness, *earnings*, *liquidity*, and sensitivity to market risk.

- **Capital.** Capital adequacy ultimately determines how well financial institutions can cope with shocks to their balance sheets. Thus, it is useful to track capital-adequacy ratios that take into account the most important financial risks—foreign exchange, credit, and interest rate risks—by assigning risk weightings to the institution's assets.

- **Assets.** The solvency of financial institutions typically is at risk when their assets become impaired, so it is important to monitor indicators of the quality of their assets in terms of overexposure to specific risks, trends in nonperforming loans, and the health and profitability of bank borrowers—especially the corporate sector.

- **Management.** Sound management is key to bank performance but is difficult to measure. It is primarily a qualitative factor applicable to individual institutions. Several indicators, however, can jointly serve—as, for instance, efficiency measures do—as an indicator of management soundness.

- **Earnings.** Chronically unprofitable financial institutions risk insolvency. Compared with most other indicators, trends in profitability can be more difficult to interpret—for instance, unusually high profitability can reflect excessive risk taking.

- **Liquidity.** Initially solvent financial institutions may be driven toward closure by poor management of short-term liquidity. Indicators should cover funding sources and capture large maturity mismatches.

- **Sensitivity to market risk.** Banks are increasingly involved in diversified operations, all of which are subject to market risk, particularly in the setting of interest rates and the carrying out of foreign exchange transactions. In countries that allow banks to make trades in stock markets or commodity exchanges, there is also a need to monitor indicators of equity and commodity price risk.

Indicators of market perceptions—such as the prices/yields of financial instruments and the creditworthiness ratings of financial institutions—are often used to supplement the information obtained through the CAMELS framework.

Macroeconomic indicators. The operation of a financial system depends on overall economic activity, and financial insti-

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tutions are significantly affected by macroeconomic changes. Recent analysis has shown that certain macroeconomic trends have often preceded banking crises. Assessments of financial soundness, therefore, need to incorporate the broad picture—particularly an economy's vulnerability to capital flow reversals and currency crises.

Among the relevant macroeconomic indicators are data on aggregate and sectoral growth, trends in the balance of payments, the level and volatility of inflation, interest and exchange rates, the growth of credit, and changes in asset prices, especially stock and real estate prices. Indicators should also cover variables affecting the vulnerability of financial systems to the transmission of crises across countries, including

correlations between financial markets, similar macroeconomic characteristics, trade spillovers, and contagion from investor behavior.

How should they be used?

MPIs are quantitative variables. But the assessment of financial system soundness also requires an ability to couple the analysis of MPIs with informed judgments on the adequacy of the institutional and regulatory frameworks. These frameworks include the structure of the financial system and markets; accounting standards and disclosure requirements; loan-classification, provisioning, and income-recognition rules, and other prudential regulations; the quality of supervision of financial institutions; the legal infrastructure (including those parts of it covering bankruptcy and foreclosure); incentive structures and safety nets; and liberalization and deregulation. The interpretation of MPIs is contingent on these institutional circumstances, and the monitoring of such indicators can only complement, not substitute for, institutional judgment.

Stress tests. Macroprudential analysis often uses a variety of stress-testing techniques to gauge financial systems' resilience to shocks. Selected macroeconomic indicators can be used to test quantitatively the impact of changes in those variables on financial institutions' portfolios and on the aggregate solvency of the financial system. Stress testing can also help analysts project likely future developments in MPIs using macroeconomic forecasts and observations on past relationships between macroeconomic and prudential indicators.

More generally, because the relevance of individual indicators may vary from country to country, MPIs cannot be used mechanically. Assessments need to be based on a comprehensive set of indicators, taking into account the overall structure and economic situation of a country and its finan-

Macprudential indicators

Aggregated microprudential Indicators		Macroeconomic indicators
Capital adequacy Aggregate capital ratios Frequency distribution of capital ratios	Liquidity Central bank credit to financial institutions Deposits in relation to monetary aggregates Segmentation of interbank rates Loan-to-deposit ratios Maturity structure of assets and liabilities Measures of secondary market liquidity	Economic growth Aggregate growth rates Sectoral slumps
Asset quality Lending institution Sectoral credit concentration Foreign-currency-denominated lending Nonperforming loans and provisions Loans to public sector entities Risk profile of assets Connected lending Leverage ratios	Sensitivity to market risk Foreign exchange risk Interest rate risk Equity price risk Commodity price risk	Balance of payments Current account deficit Foreign exchange reserve adequacy External debt (including maturity structure) Terms of trade Composition and maturity of capital flows
Borrowing entity Debt-equity ratios Corporate profitability Other indicators of corporate conditions Household indebtedness	Market-based indicators Market prices of financial instruments Indicators of excess yields Credit ratings Sovereign yield spreads	Inflation Volatility in inflation
Management soundness Expense ratios Earnings per employee Growth in number of financial institutions		Interest and exchange rates Volatility in interest and exchange rates Level of domestic real interest rates Exchange rate sustainability Exchange rate guarantees
Earnings and profitability Return on assets Return on equity Income and expense ratios Structural profitability indicators		Lending and asset price booms Lending booms Asset price booms
		Contagion effects Financial market correlation Trade spillovers
		Other factors Directed lending and investment Government recourse to banking system Arrears in the economy

Source: Evans, Leone, Gill, and Hilbers (2000).

cial system. Similarly, the complex reality of financial markets will be hard to capture in a composite indicator of financial system soundness. MPIs should be monitored to assess the soundness not only of the banking system but also—if they are systemically relevant—of nonbank financial institutions and securities markets.

How can they be measured?

The importance of reliable statistics for assessing the condition of the financial system is well established. So are the advantages of comprehensive collection, methodologically sound and accurate compilation, international comparability, and timely and informative public disclosure. Unfortunately, the available statistics are not always sufficiently timely or accurate to provide early and clear warnings of emerging difficulties.

Aggregated microprudential indicators are derived from individual banks' balance sheets and other detailed financial information. Some of the data required to compute these indicators are already collected as part of various financial statistics frameworks—monetary statistics, flow of funds accounts, or sectoral balance sheets—though often without the level of detail needed for macroprudential analysis. These frameworks can be augmented to obtain additional MPIs,

and because international standards already exist for them, such indicators could be easily comparable across countries. An important attribute of these frameworks is that they present specific sectors within the context of the overall economy and can be used to analyze financial sector dynamics and the transmission of financial stress across sectors. The IMF's forthcoming *Monetary and Financial Statistics Manual* will further promote the adoption of these harmonized frameworks.

Other MPIs are not, as yet, included in existing statistical frameworks and need to be compiled by aggregating information used by national supervisors to monitor individual banks. Some of these data can be meaningfully aggregated, but others may prove difficult to aggregate or be unsuitable for aggregation. Simple aggregation of data on individual banks can disguise important structural information, and it is often necessary to supplement the aggregate data with both information on dispersion and peer-group analysis. Also, as the experience of the FSAP shows, whereas comparison across countries is reasonably straightforward for macroeconomic indicators, data issues often complicate international comparison of aggregated microprudential indicators. These and other technical statistical problems—such as those described in the box—are challenging and will

Statistical challenges

- *Absence or diversity of prudential, statistical, and accounting standards.* The usefulness of MPIs for surveillance and public disclosure is hindered by incomparability across countries because of a lack of international standards, highly diverse national standards, and the failure of standards to keep up with rapid innovation in financial markets.

- *Poor data on asset quality.* Poor or misleading information on asset quality and on the holders of weak credits impairs the analysis of risks facing the financial sector. Specific data limitations include incomplete information on the full recoverable value of loans and securities, sectoral concentration of credit, and loan provisions and write-offs.

- *Use of national versus global consolidation.* Supervisory data are usually collected using a global consolidation that incorporates the worldwide activity of a bank into a single financial statement, which guarantees that all of its relevant activity is captured. In contrast, standard macroeconomic statistics use a national consolidation and therefore exclude affiliated units in other countries. The use of the two different consolidations can have important implications for the construction and interpretation of MPIs.

- *Derivatives and off-balance-sheet positions.* Financial derivatives and off-balance-sheet positions present special problems in evaluating the condition of financial institutions, because of the lack of reporting of positions, high volatility, and potentially large positions.

need to be addressed to permit the compilation of a meaningful set of MPIs.

Conclusion

Knowledge about MPIs is still limited. Broadly speaking, we need to acquire a better understanding of what determines financial system soundness and to identify which signals might help policymakers prevent financial crises. There is also a need for better indicators of developments in specific sectors and markets that have proved relevant in assessing financial vulnerabilities but that have been difficult to gauge in practice. These sectors and markets include real estate, the corporate and household sectors, nonbank financial institutions, and off-balance-sheet exposures of financial institutions and other institutional investors.

In parallel with the development of more comprehensive MPIs, more work is needed to define a smaller and more manageable subset of indicators to facilitate periodic monitoring and data dissemination. Such a subset would focus on core markets and institutions and be based on accepted analytical relationships, comparable across countries, and rele-



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vant in most circumstances. In addition, more research is needed to support the interpretation of MPIs. It may be possible, for instance, to develop quantitative benchmarks and norms for MPIs, such as regional averages or theoretically determined "optimal" values. Stress-testing techniques should also be further refined. The experience learned through the FSAP will be important in bringing about advances in these areas.

On the measurement front, a precondition for further work on the aggregation of prudential information is to determine the feasibility (given national legal and supervisory practices and statistical operations) of collecting data for the various MPIs that have been proposed. Along these lines, the IMF is carrying out a survey of national authorities and MPI users to ascertain their needs; data availability and gaps in coverage; dissemination practices; and the accounting, legal, and institutional standards that affect compilation of the data. The survey results and additional empirical and theoretical research will define the next steps in the development and disclosure of MPIs. **F&D**

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