

INTERNATIONAL MONETARY FUND

Financial Soundness Indicators: Policy Paper

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Executive Summary

The International Monetary and Financial Committee (IMFC) and the Group of Seven (G-7) have highlighted the importance of assessing vulnerabilities in financial systems. In its communiqué of April 29, 2001, the IMFC noted progress in implementing Fund initiatives on financial sector surveillance, and the continued need to focus on “helping member countries to develop sound financial sectors in order to protect against vulnerability.” Similarly, in its communiqué of April 28, 2001, the G-7 noted that the Fund “should further its work in building up and publishing macroprudential indicators for the financial sector.”

The development of financial soundness indicators (FSIs), or macroprudential indicators,* and of methods of macroprudential analysis aims at responding to these recommendations and thereby meeting the growing demand for improvements in techniques for the assessment of financial system risks and vulnerabilities, and their use in the day-to-day work of the Fund and its member governments.

Macroprudential analysis complements early warning systems and other analytical tools—currently in use or under development at the Fund—to monitor vulnerabilities, identify corrective pre-emptive action, and prevent crises. Early warning systems generally focus on external vulnerabilities, using macroeconomic indicators as key explanatory variables. Macroprudential analysis focuses on vulnerabilities in domestic financial systems, using FSIs as the most significant statistical building block, and relates countries’ financial sector soundness to macroeconomic, external and capital account developments.

Key proposals and work priorities

- This paper proposes a “core set” and an “encouraged set” of FSIs. The core set comprises 15 indicators for the banking system that are found to be analytically significant; useful, as revealed by the responses to the survey on macroprudential indicators; relevant in most circumstances; and generally available. The encouraged set includes additional indicators for banks as well as data on other sectors and markets that are relevant in assessing financial sector vulnerabilities.
- Of the encouraged set, enhanced compilation of financial indicators of the corporate sector and real estate markets is a matter of high priority in light of their empirical and analytical significance.
- It is proposed that more systematic data compilation, with a focus on the core set, be undertaken in cooperation with the authorities in the FSAP/FSSA process and in those Article IV consultations that include in-depth financial sector assessments. The proposed approach is designed to provide flexibility in the selection of indicators that are most relevant to assessing vulnerabilities in a particular country, so as to avoid a one-size-fits-all approach.
- The work on FSI-related issues proposed for the remainder of FY2002 and, more broadly, for the medium-term includes activities in five areas: (1) support of compilation efforts by national authorities; (2) provision of guidance to member countries on compiling FSIs; (3) theoretical and empirical work on measuring and analyzing FSIs; (4) enhanced monitoring of FSIs as a key component of the FSAP/FSSA process and of in-depth financial sector assessments in regular Article IV consultations; and (5) encouragement of dissemination by national authorities.

* The expression “financial soundness indicators” and “macroprudential indicators” will be used interchangeably. This paper was originally submitted to the Board under the title “Macroprudential Indicators: Policy Paper.” The title was changed in response to Board recommendations.

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I. INTRODUCTION

1. **Recent episodes of turmoil in the international financial markets have underscored the need for better tools to monitor financial risks and vulnerabilities.** The Fund has been called upon to strengthen its assessment of financial system soundness as part of its surveillance work, including through the preparation of Financial System Stability Assessments (FSSAs) for members who have agreed to participate in the joint Bank-Fund Financial Sector Assessment Program (FSAP) introduced in May 1999. Many other international and national institutions have initiated or intensified financial sector monitoring work.

2. **Monitoring of financial vulnerabilities is best done on the basis of objective measures of financial system soundness as well as methods to analyze these measures. These are referred to as financial soundness indicators (FSIs), or macroprudential indicators, and macroprudential analysis, respectively.** The International Monetary and Financial Committee (IMFC) and the Group of Seven (G-7) recently highlighted the importance of assessing vulnerabilities in financial systems. In its communiqué of April 29, 2001, the IMFC noted progress in implementing Fund initiatives on financial sector surveillance, and the continued need to focus on “helping member countries to develop sound financial sectors in order to protect against vulnerability.”¹ Similarly, in its communiqué of April 28, 2001, the G-7 noted that “the Fund should accelerate its work in developing and publishing indicators of national balance sheet and liquidity risk” and “should also further its work in building up and publishing macroprudential indicators for the financial sector.”² Also, in the Executive Board Meeting on the FSAP in December 2000, Directors encouraged the staff to press ahead with the work being undertaken in the context of the FSAP to develop FSIs and stress testing.³

3. **The Fund has been building up experience in the areas of macroprudential analysis and FSIs as part of its surveillance, technical assistance and policy development work, and more recently in the context of the FSAP.**⁴ A consultative

¹*Communiqué of the International Monetary and Financial Committee of the Board of Governors of the International Monetary Fund*, April 29, 2001, paragraphs 8 and 13.

²*Statement of G-7 Finance Ministers and Central Bank Governors*, April 28, 2001, paragraph 8.

³*IMF Reviews Experience with the Financial Sector Assessment Program (FSAP) and Reaches Conclusions on Issues Going Forward*, Public Information Notice No. 01/11 (www.imf.org/external/np/sec/pn/2001/pn0111.htm). .

⁴Other organizations have also focused on macroprudential analysis. For instance, the topic of the October 2000 Bank for International Settlements (BIS) annual meeting of central bank economists was *Marrying the Macro- and Micro-prudential Dimensions of Financial*

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meeting on macroprudential indicators was held at Fund 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 indicators of financial system soundness. The state of knowledge in these areas and proposals for further work were discussed at a Board meeting in January 2000.⁵ FSI-related issues were also discussed in recent Board papers on the Special Data Dissemination Standard (SDDS) and on the FSAP.⁶ An initial, broad set of indicators was identified in this earlier work, comprising aggregated microprudential indicators of the health of financial institutions, macroeconomic variables associated with financial system vulnerability, and market-based indicators.

4. **Discussions at the January 2000 review highlighted the need for more research and analysis to improve understanding of what determines financial system soundness and to deal with the considerable conceptual and statistical difficulties that arise in defining and compiling indicators of financial system soundness.** Directors recommended that the Fund conduct a survey of member countries on their needs and practices related to macroprudential indicators. They also concurred on the need for better indicators on developments in specific sectors and markets that have proven to be relevant in assessing financial sector vulnerabilities, but that have been difficult to gauge in practice. These include nonbank financial institutions, the corporate sector, households, and real estate markets. Moreover, the Board pointed to the need to select a smaller and more operationally useful “core set” of indicators, intended to serve as a basis for structuring data work in support of financial system monitoring, including through the FSAP, and as a focal point for efforts by the Fund to encourage compilation and dissemination of macroprudential information by national authorities.

Stability (www.bis.org/publ). At the European Central Bank (ECB), the Working Group on Macroprudential Analysis of the Banking Supervision Committee received in 2000 a mandate to prepare semi-annual reports on macroprudential analysis in Europe. These analyses, which are not made public, serve as input to discussions on financial stability issues in the ECB Governing Council. The Asian Development Bank has a program to collect and disseminate FSIs and related macroeconomic series for a group of Asian-Pacific countries.

⁵The papers submitted for Board discussion were published as Evans, Leone, Gill, and Hilbers, 2000, “Macroprudential Indicators of Financial System Soundness,” IMF Occasional Paper No. 192.

⁶*Third Review of the Fund’s Data Standard Initiatives* (www.imf.org/external/np/sta/dsbb/2000/index.htm), and *Financial Sector Assessment Program: A Review—Lessons from the Pilot and Issues Going Forward* (www.imf.org/external/np/fsap/2001/review.htm).

5. **Since the January 2000 review, staff has substantially advanced the work on FSIs and macroprudential analysis, including through activities in the context of the FSAP and the IMF *Survey on the Use, Compilation, and Dissemination of Macroprudential Indicators*.** Efforts have been directed, in particular, to gauge the usefulness of specific indicators; identify analytically relevant definitions of these indicators; appraise compilation and dissemination practices among member countries; and explore methods of macroprudential analysis.

6. **At the request of Executive Directors at the January 2000 Board meeting, this paper presents the outcomes of further experience and analysis with regard to FSIs, as well as the lessons learned from the survey on macroprudential indicators.** With this background, the paper makes proposals for the selection of a “core set” and an “encouraged set” of FSIs and for future Fund work on FSIs and macroprudential analysis. Further efforts in this area should be seen in the context of a broader framework of vulnerability assessments currently under development at the Fund to prevent crises. Such a framework includes, in addition to macroprudential analysis, external vulnerabilities assessments, early warning systems, and the related analyses of reserve adequacy and debt sustainability.

7. The organization of this paper is as follows. Section II summarizes evidence on the usefulness of specific FSIs for assessing the soundness and stability of financial systems and discusses stress testing as a key component of macroprudential analysis. Background material on this section is contained in *Macroprudential Analysis: Selected Aspects*, which is being issued as a supplement to this paper. The experience with macroprudential analysis and indicators gained through the FSAP and the related FSSAs is described in Section III. Section IV presents the results of the survey on macroprudential indicators, which are described in more detail in the background paper on *Results of the Survey on the Use, Compilation and Dissemination of Macroprudential Indicators*, which is being issued as a supplement to this paper. Proposals for a core set of indicators to be used for the purpose of periodic monitoring, and for compilation and dissemination by national authorities, are discussed in Section V. Section VI focuses on issues related to the dissemination of FSIs. Proposals for future Fund work on FSIs are the subject of Section VII. Section VIII contains issues for discussion.

II. INDICATORS FOR MACROPRUDENTIAL ANALYSIS

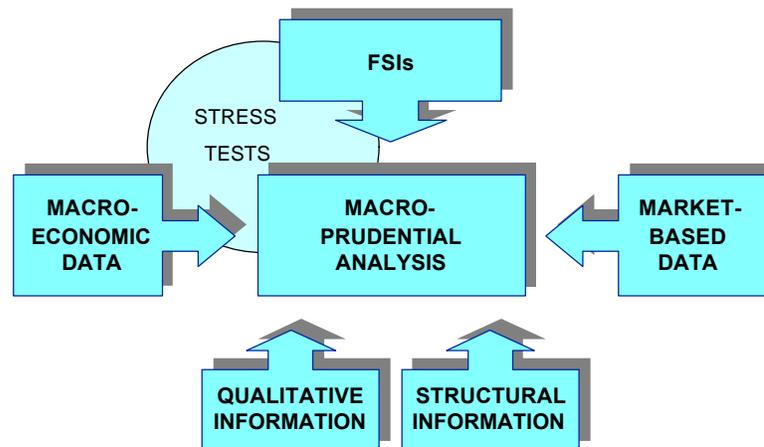
8. **Macroprudential analysis is a key building block of any policy framework for vulnerability analysis.** It is a methodological tool that helps to quantify and qualify the soundness and vulnerabilities of financial systems.⁷ It uses aggregated microprudential data to obtain direct information on the current health of financial institutions; stress tests and

⁷Macroprudential analysis focuses on the health and stability of financial systems, whereas microprudential analysis deals with the condition of individual financial institutions.

scenario analysis to determine the sensitivity of the financial system to macroeconomic shocks; market-based information—such as prices and yields of financial instruments and credit ratings—as complementary variables conveying market perceptions of the health of financial institutions; and qualitative information on institutional and regulatory frameworks to help to interpret developments in prudential variables. Structural data—including on the size of the main segments of the financial system, ownership structure and concentration—typically supplement the analysis (Figure 1).

9. **Of these broad categories of information, the focus of this paper is on aggregated microprudential data and to some extent on selected market indicators.** There is no universally accepted definition of financial soundness, or macroprudential, indicators. Broad definitions include all possible indicators related to financial system soundness, including relevant macroeconomic indicators (such as exchange and interest rates, and balance of payments data) and market-based indicators (such as stock prices of financial institutions, credit spreads, and credit ratings). This paper adopts a somewhat narrower definition, which includes mainly aggregated microeconomic indicators of the health of financial institutions and indicators of the health of the major clients of financial institutions (the corporate and household sectors). Indicators of key developments in markets in which financial institutions operate—such as the breadth and depth of the money and capital markets, and developments in, and bank exposure to, the real estate markets—are also included.

Figure 1. Components of Macroprudential Analysis



10. **Macroprudential analysis closely complements and reinforces early warning systems and other analytical tools—currently in use or under development at the Fund—to monitor vulnerabilities and prevent crises.** Early warning systems generally focus on vulnerabilities in the external position, using macroeconomic indicators as key

explanatory variables.⁸ Macroprudential analysis and the associated stress testing focus on vulnerabilities in domestic financial systems, using FSIs as the most significant statistical building block, and relate countries' financial sector soundness to macroeconomic, external and capital account developments. While FSIs and these analyses primarily aim to predict banking crises, they also provide an important input to more general vulnerability analyses and early warning systems. Their usefulness for these purposes will depend on the resolution of measurement and/or availability problems, which have so far made it difficult to incorporate them in vulnerability analysis systematically.⁹

A. Typology and Coverage

11. **FSIs for the banking system are primarily derived by aggregating indicators of the health of individual banks.** The so-called CAMELS framework is a useful way to organize them. It involves the analysis of six groups of indicators: Capital adequacy, Asset quality, Management soundness, Earnings, Liquidity, and Sensitivity to market risk. One important caveat in using this framework is that management soundness is difficult to capture with quantitative indicators. While this aspect is key to bank performance and, to some extent, is reflected in the institution's financial records, its evaluation is primarily a qualitative exercise (and an integral part of banking supervision). This was a clear conclusion of the consultations that preceded the issuance of the survey on macroprudential indicators.¹⁰

12. The variety of risks to which banks are exposed justifies looking at the aspects reflected in the CAMELS framework. **Typically, a portfolio is vulnerable to credit risk, liquidity risk, and market risk** (including interest rate, exchange rate, equity price, and commodity price risks). Shocks affect the portfolios of financial institutions either directly

⁸See in particular Berg, Borensztein, Milesi-Ferretti, and Patillo, 1999, "Anticipating Balance of Payments Crises—The Role of Early Warning Systems," IMF Occasional Paper No. 186, and *Debt- and Reserve-Related Indicators of External Vulnerability*, Public Information Notice No. 00/37 (www.imf.org/external/np/sec/pn/2000/pn0037.htm).

⁹For the purpose of estimation of a robust early warning system, a variable must be reasonably comparable over time and across countries. See Berg, Borensztein, Milesi-Ferretti, and Patillo (1999).

¹⁰During March and April 2000, consultations on the survey were held with the Asian Development Bank, the Bank for International Settlements, the Basel Committee on Banking Supervision, the Committee on the Global Financial System, the European Central Bank, the Financial Stability Forum, the International Association of Insurance Supervisors, the Organization for Economic Cooperation and Development, and the World Bank. Consultations were also held with central banks and supervisory offices in selected countries and with representatives from the private sector—commercial and investment banks, rating agencies, investment research firms, and real estate market research firms.

through changes in the value of financial assets that are marked-to-market, or indirectly through changes in the financial position of debtors that reduce the credit quality of loan portfolios. Financial system vulnerability increases when shocks hit portfolios that are not liquid, hedged or diversified enough, and when there is insufficient capital to absorb the shocks.¹¹

- **Capital adequacy** and availability is key to the robustness of financial institutions to shocks to their balance sheets. Aggregate risk-based capital ratios (the ratio of regulatory capital to risk-weighted assets) are the most common indicators of capital adequacy. Ratios based on capital elements—such as Tier 1, Tier 2, and Tier 3 capital, which have varying availability and capability of absorbing losses—often complement this measure.
- Risks to the solvency of financial institutions most often derive from impairment of assets. Monitoring credit risk involves looking at the **quality of bank assets and off-balance sheet positions**—their repayment performance and capacity to pay, diversification by individual borrower, by sector, and by country, and currency composition (notably in countries that allow domestic lending in foreign currency).
- As weak profit performance can ultimately threaten bank solvency, it is important to monitor **bank profitability**, which is often related to poor asset quality and unsustainable asset/liability management. Accounting data on bank margins, income and expenses are the most widely used indicators of bank profitability. Common operating ratios include net income to assets—also known as “return on assets” (ROA)—and net income to equity—also known as “return on equity” (ROE).
- Even solvent financial institutions may suffer **liquidity** problems, such as those resulting from shocks to depositor or investor confidence—hence the need to look at aspects of bank liquidity. As the liquidity of bank assets and liabilities depends on a country’s liquidity infrastructure, including access to and depth of external and domestic money and capital markets, it is also important to monitor systemic liquidity. **Systemic liquidity** can be captured by indicators of the tightness and depth of key markets, such as bid-ask spreads and turnover ratios, and relevant sectoral balance sheet indicators (e.g., reserve adequacy, funding volatility) that influence bank and market liquidity.
- Banks are increasingly involved in diversified operations that make them **sensitive to market risks**. Interest rate risk can be monitored through indicators of the interest rate mismatch of bank assets and liabilities, such as durations or repricing periods. Net open positions can be used to assess exchange rate and other price risks.

¹¹See the background paper on macroprudential analysis, Chapter II.B.

13. Indicators of the health of financial systems should not simply look at the banking sector. There is strong evidence that **risks to financial system stability can derive from developments in nonbank financial intermediaries (NBFIs), the corporate sector, households, and the real estate market.**

14. **NBFIs—including finance companies, securities firms, collective investment schemes, and insurance companies—and associated markets can build up substantial vulnerabilities and risks that can go undetected, partly owing to disclosure and oversight practices which are often less transparent and adequate than for banks.**¹² The collapse of NBFIs during the Asian turmoil, for instance, contributed directly or indirectly to systemic financial crises. In many countries, NBFIs already play a large enough role to be considered systemically important; elsewhere their rapid growth implies that they may be systemically important in the near future. NBFIs and banks often have ownership and investment linkages that make each subsector vulnerable to adverse developments in the other. In addition, growing consolidation in the financial services industry calls for growing monitoring of intersectoral linkages and the distribution of risks between banks and nonbanks. The systemic risks arising from a particular class of NBFIs—the highly leveraged financial institutions—were highlighted by market turmoil following the near-failure of a large hedge fund in 1998. Moreover, different regulatory treatment of NBFIs raises concerns in terms of bank competitiveness and risk propensity within the system. While this highlights the need for better monitoring of the condition of NBFIs, data availability remains a key constraint. Information about the NBFI sector is generally difficult to obtain and assemble in a way that is consistent and comparable across countries.¹³ While indicators exist that can capture the size and importance of NBFIs in the economy (such as the share of NBFI assets in total financial assets or GDP), more research and analysis is needed to develop a set of FSIs that captures the specific attributes of these intermediaries.

15. **The quality of financial institutions' loan portfolios is directly dependent upon the financial health and profitability of the institutions' borrowers, especially the nonfinancial corporate sector.** The key role played by corporate borrowers in recent episodes of financial sector distress demonstrates the importance of monitoring developments in this sector. The corporate sector is typically exposed to shocks that affect its future cash flow and value of collateral—such as falls in asset prices, increases in interest rates, or a slowdown in growth. There is strong evidence that levels of corporate leverage, in particular, influence the ability of firms to withstand these shocks. The more leveraged and the less liquid the corporate sector, the more vulnerable it is to shocks. Corporations' foreign currency exposures also expose firms to risks, as the Asian crisis has shown. Prolonged distress in the corporate sector negatively affects firms' repayment capacity and

¹²See the background paper on macroprudential analysis, Chapter III.A.

¹³The Fund's recently published *Monetary and Financial Statistics Manual* provides a framework for the collection and presentation of statistics from the nonbank financial sector.

creditworthiness, and will result in a worsening of bank asset quality and ultimately in higher nonperforming loans (NPLs).

16. **Measures of corporate health—notably focusing on leverage, cash flow adequacy, profitability, and foreign currency exposure— have been developed. Analysis shows that their monitoring can be valuable in detecting potential bank problems at an early stage.**¹⁴ Since banks frequently only book NPLs after a period (often three months or more) of nonpayment, direct indicators of corporate health can be more timely indicators of banking problems than figures on NPLs. However, data availability remains limited at best. Data drawn from the national accounts are available only in a few countries. More ad hoc compilations of corporate data tend to vary widely in coverage (particularly for nontraded companies) and timeliness.

17. **While banks are often more exposed to companies than to households, their exposure to the latter can be substantial.** This applies particularly in the most advanced economies, where household sector loans are often a significant part of bank portfolios. Moreover, household consumption behavior has a strong effect on banks' main credit customers—the corporate sector—and household asset allocation decisions have important implications for bank liabilities (customer deposits) and asset prices. The vulnerability of households may be assessed through the use of sectoral balance sheets, flow of funds data, and other macro and micro data. Financial institutions' vulnerability to households may be assessed through data on credit outstanding to the sector. Monitoring of households, however, is again constrained by data availability.

18. **In many countries, unbalanced real estate market developments have contributed to financial sector distress.** Rapid increases in real estate prices—often fueled by expansionary monetary policies or by large capital inflows—followed by a sharp economic downturn, can have a detrimental impact on financial sector profitability by affecting credit quality and the value of collateral.¹⁵ Notwithstanding the importance of real estate markets from a macroprudential standpoint—both directly, through mortgage lending and lending to the building sector, and more indirectly through lending based on real estate collateral—data on developments in the sector (demand, supply, prices and links to the business cycle) as well as financial institutions' exposure to the sector remain poor. Few major national or international databases provide consistent data series on real estate prices or other indicators of developments in real estate markets. Similarly, the usefulness of data on loans outstanding to the real estate sector is often limited by insufficient disaggregation or unclear definitions—for instance, to distinguish loans for real estate purchases (commercial or residential), loans to the construction sector, and loans backed by real estate as collateral—as different types of real estate-related loans have different risk characteristics.

¹⁴See the background paper on macroprudential analysis, Chapter III.B.

¹⁵See the background paper on macroprudential analysis, Chapter III.D.

19. **While FSIs are typically derived from summations of balance sheets and income statements of individual institutions, simple aggregation can disguise important structural information.** For instance, focusing on average capital adequacy values may be misleading as the mean can be affected by outliers—e.g., one very well-capitalized bank can more than offset many undercapitalized banks. Moreover, even for marginal institutions a single high profile crisis can potentially undermine confidence in the entire system. Hence, it is often important to supplement the aggregate data with information on dispersion or peer group analysis.¹⁶

B. Stress Testing of Financial Systems

20. **Stress testing is a key element of macroprudential analysis that helps to monitor and anticipate potential vulnerabilities in the financial system.** It adds a dynamic element to the analysis of FSIs—that is, the sensitivity of FSI outcomes in response to a variety of (macroeconomic) shocks and scenarios.¹⁷ By anticipating the potential impact of specified events on selected FSIs, stress tests also help to focus on financial system vulnerabilities arising from particular banking system, macroeconomic, and sectoral shocks, and to identify the necessary corrective pre-emptive action.

21. The type and range of indicators used in stress tests depend on model specification. In simple models, the impact of changes in a macroeconomic variable (such as a slowdown in GDP, which increases credit risk) is measured in terms of the resulting changes in the indicator capturing banks' exposure to that risk (such as nonperforming loan ratios). In more sophisticated models, the impact of shocks is measured in terms of changes in capital adequacy ratios. The channels through which shocks ultimately affect capital adequacy would usually involve indicators of bank sensitivity to market risks, asset quality and provisioning, liquidity, and profitability. The results of stress tests provide information on the elasticity of a given FSI to macroeconomic shocks, and such elasticity can itself be used as an indicator of bank vulnerability to individual risks or a combination of risk factors.

22. Stress tests can be conducted on individual or aggregate bank balance sheets. Individual portfolio stress tests aim at assisting in the process of managing risks within a firm and ensuring the optimal allocation of capital across risk-taking activities.¹⁸ **More relevant**

¹⁶Descriptive statistics of data dispersion are discussed in Appendix II of the background paper on macroprudential analysis.

¹⁷Commonly tested shocks include a slowdown in economic growth, balance of payments shocks, and changes in inflation, interest and exchange rates. Equity and security price shocks may also be important, particularly in the most advanced countries where banks and bank borrowers have significant capital market exposures.

¹⁸The Committee on the Global Financial System (CGFS) has recently undertaken a census of stress tests in use at major financial institutions. See CGFS, 2001, "A Survey of Stress

for macroprudential analysis are aggregate stress tests—i.e., measures of the exposure of a group of institutions to a specified stress scenario. Ideally, stress tests at the aggregate level should also be able to capture contagion among financial institutions within the system—both among banks, and between banks and nonbank financial intermediaries—by helping to capture the transmission mechanisms and second round effects of shocks from one set of institutions to another. For instance, a system may be vulnerable to simultaneous attempts by firms to reduce exposures—a cumulative effect on market liquidity usually not captured by individual portfolio stress tests. However, further analytical work on stress tests is necessary to obtain adequate specifications of these contagion effects.

23. **Stress testing of financial systems presents methodological challenges.** First, it is difficult to define the scope of the test and clearly delineate aggregate portfolios that are systemically important. Second, aggregation of stress tests may be accomplished either by compiling the results of stress tests of individual portfolios (although these tests may not be comparable if they were conducted using different methodologies) or by applying a common stress test to an aggregate portfolio, which may suffer from incorporating less detailed information on the individual institutions. Third, while the aim of an aggregate stress test is to identify structural vulnerabilities, overall risk exposures and the channels of contagion within a financial system, the tools for quantifying these effects in a simple measure are not yet well developed. Bearing in mind these limitations, a variety of approaches exist that can be used in conducting assessments of financial system soundness and stress tests are a standard component of financial system stability assessments through the FSAP. Data availability and the sophistication of the financial system largely determine the approach to be used in each country with respect to each relevant risk.

C. Qualitative Aspects

24. In carrying out financial sector assessments, **it is important to evaluate how risk is managed by risk-taking units and how risk management is governed by regulatory authorities.** Different financial institutions have different risk appetites. Moreover, the level of risk-taking is strongly influenced by the particular institutional and regulatory framework of the financial system. Regardless of how this framework evolved, its particular characteristics shape the incentive structure in the financial system and can substantially affect the system's performance measures and potential vulnerabilities.

25. **As absolute risk levels may not by themselves indicate fully financial institutions' or a system's vulnerabilities, an implicit concept of "net risk" is often applied to the assessment of these vulnerabilities.** This concept allows combining the quantitative and

Tests and Current Practice at Major Financial Institutions.” In April 2000, the CGFS Working Group on Macro Stress Testing published a report on “Stress Testing by Large Financial Institutions: Current Practice and Aggregation Issues.”

qualitative aspects of financial vulnerability.¹⁹ The “net risk” approach involves quantitatively evaluating all risks faced by financial institutions (including the direction of the risk assumed) and qualitatively adjusting for institutional characteristics to assess the extent to which the risks are adequately managed through market discipline and internal governance in an institution, and through regulatory and supervisory frameworks in the system as a whole.²⁰ Such analyses can be synthesized into an overall risk assessment for individual institutions, and an overall stability assessment for the financial system, which evaluate the quantity of all risks against the quality of the institutional arrangements. However, by definition, combining qualitative and quantitative aspects of risk is not an exact method and requires judgment.

26. Many institutional characteristics of a financial system need to be considered for qualitative adjustments to gross risk. The nature of government subsidies and taxes, payment culture and insolvency regime, prudential and accounting standards (including provisioning and income recognition rules, and the measurement of bank capital), the quality of supervision, credit and deposit guarantees, the legal framework, moral hazard, corporate governance, and management quality all affect the overall incentive structure of a financial system and need to be taken into account in qualitative adjustments.

27. Assessments of observance and implementation of relevant financial sector codes, good practices and standards help to capture key qualitative aspects of financial system stability, and are needed to supplement quantitative assessments carried out in macroprudential analysis.²¹ Such assessments capture how financial system risk is managed through regulatory and supervisory frameworks by analyzing the extent to which observance of existing standards helps to address the identified vulnerabilities and risks. Such analyses are routinely carried out as part of the FSAP/FSSA process.²² In this context, they have

¹⁹For a description of a “net risk” approach to risk assessment in the context of dynamic banking supervisory practices, see Office of the Superintendent of Financial Institutions, 1999, *Supervisory Framework* (Ottawa).

²⁰This approach is routinely followed in the context of the FSAP and the related FSSAs.

²¹Standards and codes assessed as part of the FSAP/FSSA process have included the Code of Good Practices on Transparency in Monetary and Financial Policies, the Basel Core Principles for Effective Banking Supervision, the Core Principles for Systemically Important Payment Systems, the International Organization of Securities Commissions (IOSCO) Objectives and Principles of Securities Regulation, and the International Association of Insurance Supervisors (IAIS) Insurance Supervisory Principles.

²²While FSAP reports provide detailed assessments of strengths and vulnerabilities, observance of standards, institutional structures, and overall stability and developmental needs, the focus of FSSAs is on financial system stability issues of significance for

(continued)

helped countries to focus on key operational and supervisory risks and to identify needed corrective actions and institutional strengthening plans. A high degree of observance of relevant standards contributes to the stability of financial systems that are integrated into global financial markets and face a variety of financial innovations and shocks.

III. FSIs IN THE CONTEXT OF THE FSAP

28. Macprudential analysis is the basis for assessments of the soundness of financial systems that are carried out in the context of the FSAP and the related FSSAs.

Financial sector assessments typically begin with an analysis of the macroeconomic environment and a description of the structure of the financial system. Within the financial system, the health of the banking sector is analyzed by looking at levels and trends in selected FSIs—typically of capital adequacy, asset quality, profitability, liquidity and exposure to market risks—and the linkage between these indicators and changes in the macroeconomic environment. In this sense, FSIs play a key role in FSSAs, whose focus is on financial stability issues and macro-financial linkages. Banking sector data, along with information on the rest of the financial system, bank borrowers (most commonly the corporate sector), and—when data availability allows—price trends and exposures to real estate markets, typically serve as the basis for quantifying the vulnerability of the financial system. The combination of data analysis and other qualitative information (see above) is used to produce an overall assessment of the stability of the financial system.

29. The range of FSIs used in FSSAs has varied somewhat depending on the particular country case, but most typically has followed some adaptation of the CAMELS framework. An analysis of the indicators used in the FSSAs issued as of end-April 2001 (Table 1) shows that the most commonly used FSIs include, in order of frequency of use, the following: (1) profitability indicators such as returns on assets and on equity, interest margin ratios, and noninterest income and expenses ratios; (2) asset quality indicators, notably nonperforming loan (NPL) ratios and provisions; (3) capital adequacy ratios, in particular the ratio of regulatory (Basel) capital to risk-weighted assets; (4) sensitivity to market risk indicators, notably open exposures to exchange rate risk; and (5) liquidity ratios. A limited

macroeconomic performance and policies. FSSAs are prepared by Fund staff in the context of Article IV consultations, by drawing on the FSAP findings, for discussion in the IMF Executive Board. They include summary assessments of compliance with financial sector standards and codes. In the World Bank, the FSAP reports provide the basis for formulating financial sector development strategies. For details, see *Financial Sector Assessment Program: A Review—Lessons from the Pilot and Issues Going Forward* (www.imf.org/external/np/fsap/2001/review.htm). Summary assessments of compliance with financial sector standards and codes from the FSAP/FSSA process are also issued as Reports on Observance of Standards and Codes (ROSCs). See *Standards and Codes—The IMF's Role* (www.imf.org/external/np/exr/ib/2001/042701.htm).

Table 1. FSIs used in FSSAs

	Cameroon	Canada	Colombia	El Salvador	Estonia	Hungary	Iceland	India	Iran	Ireland	Kazakhstan	Lebanon	Peru	Poland	South Africa	Yemen
Capital Adequacy																
Regulatory capital to risk-weighted assets 1/		X	X	X	X		X	X		X		X	X	X	X	X
Tier 1 capital to risk-weighted assets 2/		X				X	X	X		X	X	X				
Capital to assets	X		X	X		X		X			X	X				X
Asset quality																
<i>(a) Lending institutions</i>																
Loans (or credit) by sector		X	X	X		X	X			X				X		
Large exposures to assets (or capital)						X	X		X							X
NPLs to gross loans (or to total assets) 3/	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
FX NPLs to gross FX loans					X								X			
Provisions (plus collateral values) to NPLs		X	X	X	X	X		X		X		X	X	X	X	X
Provisions to gross loans	X	X								X	X	X	X			
NPLs net of provisions ratios 4/								X								X
Loans to collateral values			X													
<i>(b) Borrowing institutions</i>																
Total debt to equity		X	X	X												
Return on average equity (ROE)			X	X												
Earnings to debt service			X													
External debt to total debt						X								X		
Earnings																
Return on average assets (ROA) 5/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Return on average equity (ROE)	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Interest margin ratios 6/		X	X	X		X	X	X		X	X	X	X			
Noninterest income ratios 7/		X	X			X	X	X		X	X	X	X			
Noninterest expenses ratios 8/			X			X		X	X		X	X	X	X	X	
Personnel cost ratios 9/			X									X	X	X		
Liquidity																
Liquid asset ratios 10/		X	X	X	X	X				X	X	X	X			X
Loans (or deposits) to total assets	X	X	X								X	X	X			X
Loans to deposits	X	X			X	X				X	X	X	X	X		X
Loans and/or deposits by currency		X	X			X	X				X	X	X	X	X	
Central bank credit to total bank liabilities						X			X		X			X		
Volatility ratio 11/								X				X				
Interbank turnover ratio and bid/ask spread						X						X				
Sensitivity to market risks																
Duration of assets and liabilities			X	X								X				
Net open FX position		X	X	X		X			X		X	X	X			

1/ In one case, capital net of provisioning gap (NPLs—provisions) was calculated as a share of risk-weighted assets. 2/ In one report, Tier 1 and 2 were expressed in domestic currency levels rather than as a ratio. 3/ In two cases, foreclosed assets or restructured loans were added to the NPL figure. 4/ Ratios to loans, or Tier 1 capital, or gross income. 5/ One report looked at the risk-adjusted return to capital (RORAC), defined as ratio of interest margin to assets multiplied by the potential loss. 6/ Ratios to total interest income, or total average assets, or average net assets, or interest earning assets. 7/ Ratios to total income, or average net assets, or interest income. 8/ Ratios to total noninterest expenses, or average net assets. 9/ Noninterest income per employee; profits per employee; loans per employee; and deposits per employee. One report looked at profits per branch. 10/ Ratios of liquid assets to total assets, to deposits, to short-term liabilities, to total liabilities. 11/ Calculated as total volatile liabilities (total borrowed funds) net of liquid assets to total assets net of liquid assets.

number of FSSAs also looked at indicators of vulnerability in the corporate sector and one of the FSSAs included a more detailed analysis of the financial position of households (net worth, net financial assets, and stocks to total assets). Two reports included data on real estate (nonperforming mortgage loans, real estate collateral values, and real estate prices).

30. **The selection and use of FSIs reflect several limitations.** First, data for compiling indicators appeared to be often unavailable or available with only short consistently collected histories. For example, the time series used in most FSSAs were limited in length. Second, compilation practices for FSIs varied significantly across countries, due to differing prudential, accounting, and statistical standards, therefore limiting the usefulness of cross-country comparisons. Nonetheless, some reports present cross-country comparisons—with the usual caveat that not all indicators are strictly comparable—in an attempt to benchmark FSIs to those in other countries at similar levels of financial development. Despite the limitations, FSIs were generally considered useful as a way of organizing the analysis and potentially fostering better data collection and quality in the future.

31. **With varying complexity, all FSSAs included stress testing of financial institutions' resilience to macroeconomic shocks.** Commonly used shocks included a slowdown in economic growth, balance of payments shocks, and changes in inflation, interest and exchange rates. In some of the more sophisticated models, asset price developments and contagion effects were used as channels through which shocks are transmitted to financial institutions.

IV. RESULTS OF THE SURVEY ON MACROPRUDENTIAL INDICATORS

32. ***A Survey on the Use, Compilation, and Dissemination of Macroprudential Indicators was undertaken jointly by STA and MAE in mid-2000.*** It was designed in consultation with national authorities, international organizations, and the private sector. The consultations led to the inclusion of a list of 56 macroprudential indicators, grouped according to the CAMELS framework.²³

33. The first part of the survey, the User Questionnaire, gathered information from financial supervisors, policy analysts within the central bank or government, and the private sector regarding their needs for macroprudential information. These users of macroprudential information were asked to rate the indicators by their usefulness and to identify the periodicity and timeliness with which they needed them. The quantitative results regarding the usefulness of macroprudential indicators were supplemented by a series of open-ended questions about the analytical framework applied in each country to monitor the indicators, national research programs on them, and special issues that might affect macroprudential

²³This list and other details on the survey are contained in the background paper on the survey.

analysis within the country. Users were also asked to suggest additional indicators not included in the survey. The second part of the survey, the Compilation and Dissemination Questionnaire, covered information on the types of macroprudential indicators currently compiled, the availability of components used to construct them, accounting and statistical practices affecting them, and practices in disseminating them to the public.

34. **The survey covered indicators for the depository corporation subsector, which corresponds roughly to the banking sector.**²⁴ The subsector includes all major divisions of depository corporations, including commercial banks, branches and subsidiaries of foreign banks, money market funds that issue deposit-like shares, international banking facilities, investment banks, mortgage banking institutions, specialized banks, and others.

35. The survey was sent to the central banks of Fund member countries, regional central banks, and the central banks of several other jurisdictions (mostly offshore financial centers) with a request that the User Questionnaire be distributed, as the central bank felt most appropriate, to supervisors, policy analysts, and the private sector. The Compilation and Dissemination Questionnaire was to be completed by the relevant office, either in the central bank or a supervisory authority.

36. The response rate to the survey was very good (Table 2). A total of 122 responses (74 percent of total survey recipients) covering 142 countries and other jurisdictions was received and processed. **The strong response to the survey indicates the importance being attached worldwide to monitoring financial system stability and to indicators of financial soundness as a key tool in this effort.**

Table 2. Summary of Responses to the Survey

	All Economies		Industrial Economies		Emerging Economies		Developing Economies	
	No. of responses	Percent of total survey recipients	No. of responses	Percent of respondents in area	No. of responses	Percent of respondents in area	No. of responses	Percent of respondents in area
Total responses	122	74	24	100	53	88	45	56
<i>of which: SDDS</i>								
<i>Subscribers</i>	46	96	20	100	26	93	--	--
Africa	24	60	--	--	4	100	20	56
Asia-Pacific	26	76	3	100	14	82	9	64
Europe	40	87	19	100	15	94	6	55
Middle East	6	43	--	--	5	71	1	14
Western Hemisphere	26	83	2	100	15	94	9	69

²⁴The sectoral classification and terminology used in the survey were based on those presented in the Fund's newly issued *Monetary and Financial Statistics Manual*.

37. **The wide range of information collected revealed areas of both strength and weakness in the compilation and dissemination of macroprudential indicators.**

Importantly, however, the survey results support the identification of a group of accessible, highly rated indicators judged to be useful by a broad range of respondents, and the identification of gaps in the compilation and dissemination of these indicators.

A. User Needs

38. **High usefulness ratings were given to most of the 56 indicators, which suggests that users are seeking a fairly broad range of indicators of financial sector vulnerability.** Among the indicators considered most useful were bank capitalization and profitability, as well as the level of nonperforming loans. Another important result was the overall consistency of ratings across types of users, geographic areas, and types of economy, which supports the identification of a specific set of FSIs that has general applicability.

39. Users were also asked to indicate the desired frequency of indicators. **Quarterly data were most often preferred** with monthly data also often advocated. Annual data were generally considered satisfactory for those indicators covering the condition of households and the corporate sector.

40. The User Questionnaire included supplementary questions on methods of macroprudential analysis, the institutional coverage of such analyses, and users' preferences on modes of presentation of macroprudential indicators. The responses indicate that users typically analyze conditions of both the banking sector and individual banks, and some (mostly supervisors) analyze the conditions of different banking categories or peer groups. Users often supplement prudential data with macroeconomic and market-based information (especially on the evolution of asset prices) and they assess credit, interest, foreign exchange liquidity, and macroeconomic risks. The CAMELS framework, descriptive statistics such as correlations and trends in key indicators (e.g., credit growth, asset quality), and early warning models are the typical methods of analysis. As regards specific benchmarks for the indicators, a slight majority of respondents reported not using them. Some respondents noted their preference for relative rankings within peer groups. Those that did report using benchmarks suggested that they might be constructed using historical averages, prudential thresholds, cross-country comparisons, and parameters from econometric studies.

41. **In addition to information on banks, information on NBFIs and financial markets was considered important to the analysis of financial system soundness. Borrower data was also deemed highly useful,** on the grounds that it provides indications of emerging credit quality trends.

B. Compilation and Dissemination Practices

42. **With a few exceptions, compilation of FSIs is limited, and dissemination—especially outside the industrial countries—is very limited. However, the components needed to construct many of the indicators were reported as widely available,** and it is likely that modest additional effort could bring about compilation and dissemination of many FSIs in the short term. The following specific points are noteworthy:

- *Compilation of FSIs*—Only five out of the 56 indicators are compiled by over half the respondents. Twenty-four indicators are compiled by one-quarter to one half of the respondents, and 27 indicators are compiled by less than one-quarter of all respondents.
- *Compilation of components of FSIs*—Components needed to construct the indicators (such as the numerator and denominator of ratios) are compiled much more commonly than the indicators themselves. Components of 27 of the indicators are compiled by half or more of the respondents. Hence 60 or more countries could potentially compile a large number of FSIs in the near term. The compilation of components is broadly based within industrial, emerging, and developing economies. However, the compilation of components is far from complete. Components of 29 indicators were compiled by less than half of the respondents. This suggests that many countries may need to develop underlying data sources prior to compilation of a substantial number of FSIs.
- *Dissemination of FSIs*—No indicators are disseminated by more than half of the respondents.²⁵ Twelve of them are disseminated by one-quarter to one-half of respondents, and forty-four are disseminated by less than one-quarter of respondents.

43. **The response to the survey by subscribers to the Special Data Dissemination Standard (SDDS) was strong,** with 46 out of the 48 subscribers responding.²⁶ The results regarding usefulness were nearly identical to the overall results. Also, the SDDS subscribers compile and disseminate macroprudential indicators similarly to the global pattern.

C. Summary of Survey Results

44. **The survey revealed a strong, widespread, and largely unmet demand for FSIs.** Demand for many of the indicators could probably be addressed quickly by using information already collected by many countries. However, statistical development work appears to be needed to compile the full range of highly rated FSIs in all countries.

²⁵Even among industrial countries, only five FSIs (which were all related to capital adequacy or profitability) were disseminated by more than half of the 24 industrial country respondents.

²⁶For details, see Table 8 of the background paper on the survey.

45. Table 3 shows the 40 indicators rated very useful (Group I) or useful (Group II) by users, together with survey information on their compilation, the compilation of their components, and their dissemination. Some key observations are:

- The 13 indicators in the highest rated group indicate that key elements of the condition of the financial sector are the amount of capital available within the system, the level of profitability to sustain the capital base, the level of nonperforming loans (the highest rated indicators in terms of usefulness) and the sectoral distribution of credit, and bank liquidity.
- Compilation of components of all the Group I indicators and a number of Group II indicators is widespread, which suggests that many countries could begin compilation of a significant number of indicators relatively quickly.
- Conversely, special effort might be needed to encourage compilation of those highly rated FSIs for which components are far from universally available—such as indicators of sensitivity to market risk, and of the health of the corporate sector.

V. PROPOSALS FOR A CORE AND AN ENCOURAGED SET OF FSIS

46. Empirical and analytical evidence on the usefulness of specific FSIs as well as the results of the survey on macroprudential indicators were used to propose a small and operationally useful “core set” of FSIs. **Six criteria were applied to arrive at the core set:**

- focus on core markets and institutions;
- analytical significance;
- revealed usefulness;
- relevance in most circumstances (i.e., not country-specific);
- availability;
- parsimony.²⁷

47. **Ideally, indicators included in the core set should also be comparable across countries**—which would be possible if countries adhere to internationally agreed prudential, accounting, and statistical standards—to facilitate monitoring of the financial system, not only at the national but also at the global level. The latter is important in view of the magnitude and mobility of international capital, and the risk of contagion of financial crises from one country to another. Advancing international comparability of FSIs and convergence toward best practice remains, however, a medium-term goal. In the near term,

²⁷This criterion aims at achieving the maximum information content with a limited number of FSIs.

Table 3. Highly Rated Indicators: Usefulness, Compilation, and Dissemination

FSI	Average usefulness score 1/	Percentage compiling FSI	Percentage compiling components of FSI	Percentage Disseminating FSI
GROUP I (Average usefulness ratings of 3.5 and above)				
Basel Capital Adequacy Ratio 2/	3.7	91	85	57
Basel Tier 1 Capital to risk-weighted assets	3.6	87	87	47
Distribution of loans, by sector	3.6	82	82	65
Distribution of credit extended, by sector	3.5	49	57	38
Total large loans to capital	3.5	31	56	9
Gross nonperforming loans to total assets	3.9	45	86	30
Nonperforming loans net of provisions to total assets	3.8	42	75	24
Profits to period-average assets (ROA)	3.6	45	81	31
Profits to period-average equity (ROE)	3.6	47	80	33
Net interest income to total income	3.5	42	88	25
Spread between reference lending and deposit rates	3.5	27	57	17
Liquid assets to total assets	3.5	40	81	22
Liquid assets to liquid liabilities	3.5	40	77	24
GROUP II (Average usefulness ratings of 3.0 to 3.4)				
Basel Tier 1 + II Capital to risk-weighted assets	3.4	85	85	46
Basel Tier 1 + II + III Capital to risk-weighted assets	3.0	39	39	24
Distribution of Capital Adequacy Ratios (Number of institutions)	3.3	23	23	12
Total on-balance sheet assets to capital	3.2	37	83	18
Distribution of on-balance sheet assets, by Basel risk-weight category	3.4	83	83	35
Loans for investment in commercial real estate	3.2	44	44	32
Loans for investment in residential real estate	3.2	55	55	43
Distribution of credit extended, by country or region	3.1	45	52	30
Credit to related entities to total credit	3.4	28	68	8
Corporate debt to equity	3.4	18	37	10
Corporate profits to equity	3.3	16	42	10
Corporate debt service costs to total corporate income	3.2	14	33	10
Corporate net foreign currency exposure	3.2	6	19	2
Household debt to GDP	3.0	14	27	8
Trading and foreign exchange gains/losses to total income	3.3	32	69	17
Operating costs to net interest income	3.4	41	66	23
Staff costs to operating costs	3.2	40	84	23
Average maturity of assets	3.4	19	34	5
Average maturity of liabilities	3.4	19	37	5
Customer deposits to total (noninterbank) loans	3.2	35	85	15
Gross foreign currency assets to own funds	3.1	26	77	10
Net foreign currency position to own funds	3.4	27	76	12
Average interest rate repricing period for assets	3.0	18	18	3
Average interest rate repricing period for liabilities	3.0	17	17	2
Duration of assets	3.2	24	24	9
Duration of liabilities	3.2	23	23	9
Net equity position to capital	3.0	16	27	8

Note: Percentages based on 93 responses to the survey Compilation and Dissemination Questionnaire. In assessing compilation of components, the table reports figures on the least compiled component of each indicator.

1/ The scale for scores is: 1—not useful; 2—sometimes useful; 3—useful; 4—very useful.

2/ Reported compilation of components is less than reported compilation of this ratio because several countries did not delineate the components of total capital into Tiers 1, 2, and 3.

most of these FSIs can be compiled from unharmonized national data that reflect different supervisory and accounting practices. Over the longer term, if FSIs are to be comparable across countries, it will be important to address harmonization of underlying accounting standards, aggregation and consolidation issues, and asset valuation, classification, and provisioning rules. In the absence of harmonization and resolution of these issues, the usefulness of the core set of FSIs can be enhanced if national authorities disseminate, along with the FSIs, descriptions of the concepts and compilation practices used in their construction (i.e., the metadata).

48. Based on the criteria listed above, two key sets of FSIs were identified:²⁸

- **A core set of 15 FSIs that would be useful for the purpose of periodic monitoring and for compilation and dissemination efforts by national authorities.** This set of FSIs, listed in Table 4, fulfills the six selection criteria mentioned above. (1) All indicators included in the core set focus on core institutions—the banking sector. (2) The analytical relevance of the five aspects of bank vulnerability covered by the core set, as well as of individual FSIs, is well documented in the background paper on macroprudential analysis.²⁹ (3) All indicators with usefulness ratings above 3.5—as identified in the survey—are included in this set.³⁰ (4) The FSIs in the core set are meaningful in most country circumstances—a conclusion that is supported by both analytical evidence and the results of the survey. (5) Compilation in the short term appears broadly feasible, given the relatively large number of countries that now compile them or their components.³¹ (6) It provides data covering all main categories of bank risk, within a limited set of indicators. The core set should have priority in future work on FSIs.

²⁸An explanation of terms used to define the indicators can be found in Appendix I.

²⁹Durations of assets and liabilities are examples of indicators that are highly relevant analytically—which is why they are included in the core set—although their compilation is not widespread. Appendix I offers alternative indicators in cases where durations are not easily available, at least in the short term.

³⁰Two FSIs with usefulness ratings above 3.5 were not included on parsimony grounds as they capture aspects of bank vulnerability already covered by other FSIs. Some FSI definitions vary slightly from the ones used in the FSI Survey, and should be considered preliminary pending further work on the definition of FSIs.

³¹However, many countries would have to adjust existing data compilation programs to compile the core FSIs.

Table 4. Core Set of FSIs

Capital adequacy	Regulatory capital to risk-weighted assets Regulatory Tier I capital to risk-weighted assets
Asset quality	Nonperforming loans to total gross loans Nonperforming loans net of provisions to capital Sectoral distribution of loans to total loans Large exposures to capital
Earnings and profitability	Return on assets (net income to average total assets) Return on equity (net income to average equity) Interest margin to gross income Noninterest expenses to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio) Liquid assets to short-term liabilities
Sensitivity to market risk	Duration of assets Duration of liabilities Net open position in foreign exchange to capital

- **An *encouraged set*, which includes additional indicators for deposit-taking institutions as well as data on other institutions and markets that are relevant in assessing financial stability.** FSIs in this set fulfill some, but not all, of the selection criteria. FSIs on deposit-taking institutions included in the encouraged set may be particularly important in certain countries, but less in others. In the case of nonbank financial intermediaries, further work is needed to obtain meaningful indicators of their health and vulnerability; at the moment, the FSIs included in the set simply aim at capturing the importance of this sector in the overall financial system. While FSIs for the corporate sector and real estate markets emerge from both analytical studies and the survey as critical to assessments of financial vulnerabilities, their compilation—in terms of number of countries and coverage—remains very limited. As a result of these limitations, the encouraged set is somewhat more tentative. The FSIs included in this set are listed in Table 5.

49. **Working with two sets of FSIs—a core set and an encouraged set—avoids a one-size-fits-all approach, and provides a degree of flexibility in the selection of indicators that are most relevant to assessing vulnerabilities in country-specific circumstances.** Indicators of the core set can be combined with selected, additional indicators of the encouraged set that might be of particular relevance in the country concerned, depending on its level of financial development, institutional structure, and regional circumstances.

Table 5. Encouraged Set of FSIs

Deposit-taking institutions	<ul style="list-style-type: none"> Capital to assets Geographical distribution of loans to total loans Gross asset position in financial derivatives to capital Gross liability position in financial derivatives to capital Trading and foreign exchange gains (losses) to total income Personnel expenses to noninterest expenses Spread between reference lending and deposit rates Spread between highest and lowest interbank rate Customer deposits to total (non-interbank) loans Foreign currency-denominated loans to total loans Foreign currency-denominated liabilities to total liabilities Net open position in equities to capital
Market liquidity	<ul style="list-style-type: none"> Average bid-ask spread in the securities market 1/ Average daily turnover ratio in the securities market 1/
Nonbank financial institutions	<ul style="list-style-type: none"> Assets to total financial system assets Assets to GDP
Corporate sector	<ul style="list-style-type: none"> Total debt to equity Return on equity (earnings before interest and taxes to average equity) Earnings before interest and taxes to interest and principal expenses Corporate net foreign exchange exposure to equity Number of applications for protection from creditors
Households	<ul style="list-style-type: none"> Household debt to GDP Household debt service and principal payments to income
Real estate markets	<ul style="list-style-type: none"> Real estate prices Residential real estate loans to total loans Commercial real estate loans to total loans

1/ Or in other markets that are most relevant to bank liquidity, such as domestic foreign exchange markets.

50. **It should be noted that within the encouraged set, indicators of the corporate sector and real estate markets may be considered as a priority in light of their analytical significance for assessing financial vulnerabilities in a wide variety of circumstances, and their compilation should be strongly encouraged.** The exact methodology of compilation, and the number and coverage of corporate indicators, will need to take into account the specific circumstances of countries. As soon as a sufficient progress has been made in these areas, some of these indicators should be included in the core set.

VI. DATA DISSEMINATION

51. **With a central feature of the new international architecture being the provision of data to build market discipline and enable markets to form judgments as to a country's economic condition and prospects, dissemination of FSIs is clearly important.** Indeed, the survey on macroprudential indicators revealed a strong and widespread demand for dissemination. During the January 2000 Board discussion, interest was expressed in a linkage between FSIs and the SDDS. That said, it was recognized that before FSIs could be considered for inclusion in the SDDS, substantial work needed to be done in identifying a core set of FSIs, in defining them precisely, and in resolving a range of statistical and technical issues.

52. **Work remains in exactly defining and measuring some of the FSIs, including those in the core set.** In this regard, the results of the survey, as discussed in Section IV, should prove useful. They showed that many countries (including SDDS subscribers) compile the components of many of the FSIs and thus could potentially compile and disseminate FSIs.

53. **Staff considers it important to continue working to encourage dissemination of relevant and clearly defined FSIs by member countries.** The possibility of encouraging FSI dissemination through the SDDS will be discussed in the fourth Board review of the Fund's data standards initiatives in July 2001.

VII. PROPOSALS FOR FUTURE WORK ON FSIS

54. The work on FSI-related issues proposed for the remainder of FY2002 and, more broadly, for the medium term (see Table 6) includes possible activities in four areas:

- support of compilation efforts by national authorities;
- theoretical and empirical work on measuring and analyzing FSIs;
- strengthened monitoring of FSIs, in cooperation with the authorities, as a key component of the FSAP/FSSA process and Article IV consultations that include an in-depth financial sector assessment;
- encouragement of dissemination by national authorities.

Table 6. Envisaged Staff Activities in the Period Ahead

	FY2002	Medium-Term
Support of compilation efforts	<ul style="list-style-type: none"> • Start working on a <i>Compilation Guide on Financial Soundness Indicators</i> for use by national compilers, on the core as well as the encouraged set of FSIs. • Encourage national authorities to review their practices in the compilation and use of FSIs, and provide technical assistance in this area. • Encourage national authorities to compile the core set of FSIs. • Encourage compilation of indicators on the corporate sector and real estate markets as a matter of high priority. • Initiate discussions with international standard setting bodies dealing with accounting or supervisory issues in order to enhance the international comparability of FSIs. 	<ul style="list-style-type: none"> • Provide outreach and technical assistance on the compilation of FSIs after substantial completion of the <i>Compilation Guide</i>. • Promote countries' compilation of the full range of standard national accounts-based statistics (monetary statistics, flow of funds, sectoral balance sheets, etc.) that are used in the compilation of FSIs.
Analysis on FSIs	<ul style="list-style-type: none"> • Continue working jointly with World Bank staff on the FSAP with a view to, among other activities, enhancing the gathering and analysis of specific FSIs. • Undertake conceptual and empirical research on financial stability, with a focus on nonbank financial institutions and markets, to improve specification of the FSIs included in the encouraged set. • Further develop the analytical basis for stress testing, including by reviewing the experience from the FSAP. • Develop a framework for financial system vulnerability assessments based on analysis of FSIs and their determinants, and related stress testing, as input into broader vulnerability assessments for key countries. • Continue to liaise with other international organizations and groupings active in FSI-related areas. 	<ul style="list-style-type: none"> • Develop medium- and long-term programs to address complex statistical compilation and measurement issues. • Organize an outreach seminar with international organizations, central banks, supervisory authorities, and the private sector to discuss experiences with macroprudential analysis and statistics. • Continue analytical and empirical work on financial stability issues.
FSI monitoring and data collection	<ul style="list-style-type: none"> • In the context of the FSAP/FSSA process and related follow-up work, as well as in-depth financial sector assessments during regular Article IV consultations, strengthen the monitoring and systematic collection of FSIs—in cooperation with the authorities—and set up procedures for updating them within a database, with a focus on the core set of FSIs. 	<ul style="list-style-type: none"> • Further develop a regularly updated interdepartmental database on FSIs to be used for the purpose of offsite monitoring of national financial systems.
Encouragement of dissemination	<ul style="list-style-type: none"> • Encourage national authorities to initiate dissemination of FSIs. 	<ul style="list-style-type: none"> • Examine the feasibility of facilitating internet access to FSI data and metadata through the DSBB. • Consider the role of FSIs within the Fund's data dissemination initiatives.

55. **Fund monitoring of FSIs compiled from national sources, with a focus on the core set, will be strengthened.** While currently the collection and presentation of FSIs rely on what is readily available from country sources, it is envisaged that more systematic data compilation—in an appropriate format, based on better harmonized definitions, and with a focus on the core set—would be undertaken, in cooperation with the authorities, both in the FSAP/FSSA process and in those Article IV consultations where in-depth financial sector assessments are undertaken.

56. **The Fund would also leverage the widespread international interest in FSIs by acting as a catalyst and facilitator to encourage voluntary efforts by national and regional authorities to compile and disseminate the core set of FSIs, as well as those in the encouraged category, in particular indicators of the corporate sector and real estate markets.** Fund staff would develop compilation guidance on FSIs within both the core and the encouraged sets, in collaboration with experts and other international organizations,³² undertake outreach and technical assistance, and facilitate internet access to macroprudential information. Moreover, staff proposes to continue work to encourage dissemination of relevant and clearly defined FSIs by member countries. In this context, staff would examine the possibility that the Fund might facilitate access to national FSI data sites, for instance through the Dissemination Standards Bulletin Board (DSBB). The DSBB would allow the public to navigate from the Fund's website to national websites containing FSI data and metadata, thereby facilitating data dissemination and information sharing among market participants.

57. **The results of ongoing analytical work on FSIs and stress testing, and feedback from the FSAP, would help to build a strengthened framework for the analysis of financial system vulnerabilities, and continue to contribute to improvements in the specification of the encouraged set of FSIs.** Within the encouraged set, priority would be given to indicators of the corporate sector, real estate markets, and nonbank financial intermediaries and markets. Building on the wider availability of the core set of FSIs and additional stress testing experience, the framework for financial system vulnerability analysis would be strengthened. Work would be undertaken in collaboration with other international organizations and groupings active in this area—such as the Bank for International Settlements, the Basel Committee on Banking Supervision, the Financial Stability Forum, the

³²The proposed *Compilation Guide on Financial Soundness Indicators* would document areas where international standards and best practices exist; address issues relating to the consolidation and aggregation of FSIs; and promote cross-country comparability of FSIs. Staff would examine the general issues deriving from using prudentially based data for macroprudential purposes. In this connection, staff may consult, for instance, with the Basel Committee on Banking Supervision regarding the implications of the proposed new Basel Capital Accord for the compilation of FSIs.

International Accounting Standards Committee, the International Organization of Securities Commissions, and the World Bank. In particular, an outreach seminar could be organized in about a year to exchange experiences in FSI-related areas.

58. **It is envisaged that a regularly updated interdepartmental database on FSIs be established** for the purpose of offsite monitoring of national financial systems, including in-between FSAP missions. Such a database would complement data already available on macroeconomic and market-based information, thereby completing the statistical framework for financial system vulnerability analysis.³³ The modalities for maintaining the database will be formulated by MAE and STA in close consultation with area departments, RES, PDR, ICM, and the World Bank. Moreover, over the medium term the Fund could encourage more widespread compilation and dissemination of FSIs, intensify training and technical assistance (notably to countries with weaker regulatory and statistical institutions), tackle some of the more challenging statistical problems relating to FSIs, encourage convergence of FSIs with international statistical, prudential and accounting standards, and consider options for data collection and redissemination.

59. **In terms of budgetary implications, it is estimated that the work envisaged for FY2002 would require about one and a half staff years each in MAE and STA, and this work would be carried out within the existing work programs and staff allocations. Over the medium-term, additional resources would be necessary in order to broaden and deepen the FSI work program in FY2003 and beyond** (Table 7). These resources would be redistributed over functions on the basis of the different phases of the work program, and would need to be divided among MAE, STA, and area and other departments, depending on the distribution of FSI-related work. In the absence of additional resources, completion of each phase of the proposed program will be spread out over a longer period than implied by the resource estimates in Table 7.

60. It is envisaged that a comprehensive report on these activities would be provided to Executive Directors in about 18 months.

³³The inclusion of FSIs in existing databases would have the same resource implications as the creation and maintenance of a separate database. The challenge of the proposed FSI database is to overcome the lack of standardization in the measurement of the indicators, and differences in prudential, accounting, and statistical standards, and to keep the database up-to-date.

Table 7. Resource Requirements for the Intensified FSI Work Program

Activity	FY2002	FY2003	FY2004 and beyond
Systematic FSI data collection 1/	1.0	1.0	1.0
Development of an FSI database	0.5	0.5	--
Updating/maintenance of an FSI database 2/	--	1.0	1.5
Preparation of a Compilation Guide	0.5	0.5	0.5
Outreach	--	0.5	0.5
Technical assistance	0.5	1.0	1.0
Further analytical work	0.5	0.5	0.5
Facilitate Internet access to FSI data sites	--	--	1.0
Total	3.0 3/	5.0	6.0

1/ Both in the context of about 24 FSAP/FSSA reports per year and related follow-up work, and those Article IV consultations where in-depth financial sector assessments are undertaken.

2/ Includes updating by MAE staff in the context of regular Article IV consultations.

3/ These resources would be absorbed within the existing budget by redeploying staff activities.

VIII. ISSUES FOR DISCUSSION

61. Executive Directors may wish to comment on the following issues:

- Do Directors concur with the core and encouraged sets of FSIs, and with the criteria used to determine them?
- Do Directors agree that the primary focus of compilation of FSIs and their use for vulnerability assessments in the near term should be on the banking system? Do they concur that conceptual and empirical research to improve FSI specification should be more broadly focused to include nonbank financial intermediaries and markets? Do Directors agree that the compilation of indicators on the corporate sector and real estate markets is a matter of high priority?
- Do Directors support the proposal that more systematic compilation of FSI data, with a focus on the core set, be undertaken, in cooperation with the authorities, both in the FSAP/FSSA process and those Article IV consultations where in-depth financial sector assessments are undertaken?
- Do Directors agree that dissemination of FSIs by member states should be encouraged by the Fund, and that staff should continue to work to be able to provide guidance to member states on dissemination practices in this area?

- Do Directors agree that staff should collaborate with international standard setting organizations in the fields of accounting and banking supervision, to seek development of harmonized international standards in areas that are most critical for the compilation of FSIs?
- Do Directors concur with the proposed work program, including the phasing in of activities?

EXPLANATION OF FSI TERMS

This explanation of indicators included in the core set and the encouraged set of FSIs is provided to clarify the discussion in this paper. The terms may not correspond precisely to official definitions or standards. Work on a *Compilation Guide on Financial Soundness Indicators* would help to clarify the exact definition of the indicators included in the list below.

DEPOSITORY CORPORATIONS (Core Set)	
Regulatory capital to risk-weighted assets	Capital as defined in the 1988 Capital Accord of the Basel Committee on Banking Supervision (and revisions) divided by risk-weighted assets. Risk-weighted assets equal the sum of each category of asset (and on-balance-sheet equivalents of off-balance sheet positions) multiplied by a weight representing the credit risk associated with each category.
Regulatory Tier 1 capital to risk-weighted assets	The Capital Accord (and revisions) defines three capital elements: Tier 1—permanent shareholders' equity and disclosed reserves; Tier 2—undisclosed reserves, revaluation reserves, general provisions and loan-loss reserves, hybrid debt-equity capital instruments, and subordinated long-term debt (over five years); Tier 3—subordinated short-term debt (over two years).
Nonperforming loans to total gross loans	Designed to capture the share of “problem” loans in the total loan portfolio. There is no standard definition of NPLs. In some countries, a loan is considered to be nonperforming when the principal and/or interest payments on it according to the original terms of the borrower's loan agreement are past due (e.g., by 90 days or more). Gross loans are used at the denominator as opposed to net loans, which deduct specific provisions (loan-loss reserves) from loans.
Nonperforming loans net of provisions to capital	Compares NPLs and capital. NPLs are net of specific provisions (loan-loss reserves).
Sectoral distribution of loans to total loans 1/	Key sectors may include a dominant commodity export, or other. Classification according to national accounts classifications is encouraged.
Large exposures to capital	Exposure refers to one or more loans to the same individual/economic group. There is no standard definition of “large.” In some countries, it refers to exposures exceeding 10 percent of regulatory capital.
Return on assets	Measures banks' efficiency in using their assets. Can be calculated as net income (gross income—noninterest expenses) to average total assets.
Return on equity	Measures banks' efficiency in using their capital. Can be calculated as net income to average capital.
Interest margin to gross income	Looks at profitability resulting from banks' interest earning assets minus interest expenses, i.e., interest margin (or net interest income).
Noninterest expenses to gross income	Compares administrative expenses and gross income (interest margin plus noninterest income).
Liquid assets to total assets (liquid asset ratio)	Liquid assets, in general, refer to cash and assets that are readily convertible to cash without significant loss, often including government and central bank securities.

DEPOSITORY CORPORATIONS (Core Set)

Liquid assets to short-term liabilities	Designed to capture the liquidity mismatch of assets and liabilities. A variety of definitions are used at present.
Duration of assets Duration of liabilities	Weighted average term-to-maturity of an asset's (liability's) cash flow, the weights being the present value of each future cash flow as a percent of the asset's full price. As approximations, the following could be used: (1) average interest rate repricing period for assets and liabilities (period until financial instruments are redeemed or the interest rates on them are reset or reindexed); (2) average maturity of assets and liabilities. A currency breakdown of duration helps to identify a maturity mismatch in foreign currency.
Net open position in foreign exchange to capital	According to the Basel Committee, net open positions in each currency should be calculated as the sum of net spot position, net forward position, guarantees, net future income and expenses not yet accrued but already fully hedged, net notional value of foreign currency options, and any other item representing a profit/loss in foreign currencies.

DEPOSITORY CORPORATIONS (Encouraged Set)

Capital to assets	Simple ratio of capital to total assets, without risk weighting.
Geographical distribution of loans to total loans 1/	Looks at loan exposure by foreign country or region. The geographical focus would generally be country-specific.
Gross asset position in derivatives to capital Gross liability position in derivatives to capital	The on-balance sheet value of derivatives in an asset (or liability) position, plus the fair value of off-balance sheet derivatives in an asset (or liability) position.
Trading income to total income	Designed to capture the share of banks' income from trading activities, including currency trading.
Personnel expenses to noninterest expenses	Measures the incidence of personnel costs in total administrative costs.
Spread between reference lending and deposit rates	A simple measure of bank profitability as well as of efficiency and competition in financial markets, it measures the difference (usually in basis points) between representative rates. There is no standard definition of reference rates.
Spread between highest and lowest interbank rate	Designed to capture banks' own perception of problems facing banks with access to the interbank market.
Customer deposits to total (non-interbank) loans	A simple measure of liquidity, it compares deposits to loans (excluding interbank activity).
FX-denominated loans to total loans 1/ FX-denominated liabilities to total liabilities	In countries where financial intermediation (on the asset and liability side) in foreign currency (FX) is permitted, these indicators measure the relative size of this type of activities. The phenomenon is also known as dollarization.
Net open position in equities to capital	According to the Basel Committee, positions in each equity should be calculated by including notional positions in equity derivatives.

MARKET LIQUIDITY

Average bid-ask spread in the securities market	A measure of market tightness (the difference between prices at which a market participant is willing to buy and sell a security). The specific market could be that for Treasury bills and bonds, central bank bills, or others, depending on the particular conditions in the country.
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MARKET LIQUIDITY	
Average daily turnover ratio in the securities market	As a measure of market depth, it is the volume of securities traded daily as a percentage of total securities listed on an exchange. The indicator could be calculated for a variety of markets.
NONBANK FINANCIAL INTERMEDIARIES 2/	
NBFI assets to total financial system assets	Captures the relative importance of NBFIs in a country's total financial assets. It could be broken down by NBFI subsector.
NBFI assets to GDP	Indicates the relative size of NBFIs in the economy. It could be broken down by NBFI subsector.
NONBANK CORPORATIONS	
Total debt to equity	A measure of corporate leverage, it can be calculated as total debt to book value of equity.
Return on equity	Captures firms' efficiency in using their equity. Can be calculated as EBIT (earnings before interest and taxes) to average equity.
Debt service coverage	Measures firms' capacity to cover their debt service payments. Can be calculated as EBIT to interest and principal expenses.
Corporate net FX exposure to equity	Looks at firms' exposure to foreign exchange risk. It can be calculated as the sum of net positions in each foreign currency.
No. of applications for protection from creditors	A measure of bankruptcy trends; it is influenced by the quality and nature of bankruptcy and related legislation.
HOUSEHOLDS	
Household debt to GDP	Captures the overall level of household indebtedness (commonly related to consumer loans and mortgages) as a share of GDP.
Household debt burden to income	Measures households' capacity to cover their debt payments (principal and interest). Can be calculated as a share of total disposable income.
REAL ESTATE MARKETS	
Real estate prices	Designed to capture price trends in the real estate market. There is no standard definition and various intra-country and subsectoral breakdowns are possible (e.g. industrial, commercial, retail, residential).
Residential real estate loans to total loans	Measures banks' exposure to the real estate sector, with a focus on household borrowers. There is no standard definition. May include mortgage lending or loans collateralized by real estate.
Commercial real estate loans to total loans	Measures banks' exposure to the real estate sector, with a focus on corporate borrowers. There is no standard definition. May include loans for the purchase of commercial real estate, loans to construction companies, and/or other loans collateralized by commercial real estate.

1/ Data on credit, which is a more comprehensive concept than loans, can be used as an alternative to loans. Credit (assets for which the counterparty incurs debt liabilities) includes loans, securities other than shares, and miscellaneous receivables.

2/ These indicators reflect the relative importance of NBFIs in the economy; more analytical and empirical work is needed to identify specific indicators for the health and stability of (subsectors of) NBFIs, such as a gearing ratio; see Background Paper on Macprudential Analysis, Chapter III.A for details.