Chapter 2

Indicators of Financial Structure, Development, and Soundness

This chapter presents an overview of quantitative indicators of financial structure, development, and soundness. It provides guidance on key system-wide and sectoral indicators, including definitions, measurement, and usage. Key data sources for these indicators are explained in appendix C (Data Sources for Financial Sector Assessments). Detailed analysis and benchmarking of these indicators are discussed in chapters 3 and 4. More detailed data requirements are presented in appendix B (Illustrative Data Questionnaires for Comprehensive Financial Sector Assessments).

2.1 Financial Structure and Development

Indicators of financial structure include system-wide indicators of size, breadth, and composition of the financial system; indicators of key attributes such as competition, concentration, efficiency, and access; and measures of the scope, coverage, and outreach of financial services.

2.1.1 System-wide Indicators

Financial structure is defined in terms of the aggregate size of the financial sector, its sectoral composition, and a range of attributes of individual sectors that determine their effectiveness in meeting users' requirements. The evaluation of financial structure should cover the roles of the key institutional players, including the central bank, commercial and merchant banks, savings institutions, development finance institutions, insurance companies, mortgage entities, pension funds, and financial market institutions. The functioning of financial markets, including money, foreign exchange, and capital markets (including

bonds, equities, and derivative and structured finance products) should also be covered. For financial institutions, the structural overview should focus on identifying the number and types of institutions, as well as growth trends of major balance sheet aggregates; for financial markets, a description of the size and growth trends in various financial market instruments (volume and value) would be appropriate. The overview should also reflect new linkages among financial markets and institutions that may be forged from a variety of sources, including innovations in financial instruments, new entrants into financial markets (e.g., hedge funds), and changing practices among financial market participants (e.g., energy trading and investments by financial institutions).

The overall size of the system could be ascertained by the value of financial assets, both in absolute dollar terms and as a ratio of gross domestic product (GDP).[1] Although identifying the absolute dollar amount of financial assets is informative, normalizing financial assets on GDP facilitates benchmarking of the state of financial development and allows comparison across countries at different stages of development. Other indicators of financial size and depth that could be usefully examined include ratios of broad money to GDP (M2 to GDP),[2] private sector credit to GDP (DCP to GDP),[3] and ratio of bank deposits to GDP (deposits/GDP). However, one should be careful in interpreting observed ratios because they are substantially influenced by the state of financial and general economic development in individual countries. Cross-country comparisons of economies at similar stages of development are, therefore, useful in obtaining reliable benchmarks for "low" or "high" ratios.

The description of the number and types of financial intermediaries and markets is also useful, and this information should be supplemented by information on the relative composition of the financial system. Even though many countries do have a wide range of non-bank financial intermediaries (NBFIs), banking institutions still tend to dominate overwhelmingly. In advanced markets and in many emerging markets, NBFIs, particularly pension funds or insurance companies, often play a larger part than do banks in domestic and global asset allocation (and, sometimes, in the providing of credit). Similarly, market participants such as hedge funds play an increased role in financial markets and in the performance of various asset classes. Hence, for one to get a true view of financial structure, it is useful to focus on the share of various sub-sectors (banks, non-banks, financial markets, etc.) in total financial assets by using assets of financial institutions in different sub-sectors and value of financial instruments in different markets as numerators. This type of focus on market shares enables the assessor to get a quick indication of the "effective" structure of the financial system. In addition, the presence of large financial conglomerates—also referred to as large and complex financial institutions (LCFIs)—in the domestic market (either foreign-owned or domestic) would warrant special attention to the scope and scale of their activities, including exposures to other domestic institutions, as well as to intra-group and cross-border exposures, to ascertain their local systemic importance.[4]

Evaluating the overall growth of the financial system and of major sub-sectors is important, and valuable information could be obtained by examining changes in the number and types of financial intermediaries, as well as the growth of financial assets in each sector over time, in both nominal and real terms. Although a description of trends is informative, it is also critical to indicate the driving forces behind (a) observed changes in institutions and their asset positions, and (b) the number of and growth rates of

available money and capital market instruments. One factor that has accounted for the observed growth of financial systems in many countries (number of institutions and size of assets) is financial liberalization, especially the softening of entry conditions for banks and other financial institutions and the liberalization of interest rates, which has stimulated financial markets (especially money markets). In addition, changes in prudential regulation and accounting standards often have provided incentives for developing new ways to manage risks (e.g., asset and liability management for insurance company and pension funds) and have led to development of new risk-transfer instruments in capital markets.

2.1.2 Breadth of the Financial System

Data on the financial breadth or penetration often serve as proxies for access of the population to different segments of the financial sector. Well-functioning financial systems should offer a wide range of financial services and products from a diversified set of financial intermediaries and markets. Ideally, there should be a variety of financial instruments that provide alternative rates of return, risk, and maturities to savers, as well as different sources of finance at varying interest rates and maturities. Evaluating the breadth or diversity of the financial system should, therefore, involve identifying the existing financial institutions, the existing markets for financial instruments, and the range of available products and services. The relative composition of the financial system discussed above is a first-cut approach to determining the extent of system diversification. In addition, comparisons between bank and non-bank forms of financial intermediation are useful, for instance, comparisons between banking credit and issues of bonds by the private sector. Often, significant savings and financing through non-bank forms are indicators of financial diversity because bank deposits and loans constitute the traditional forms of savings and credit in many countries. It is, therefore, useful to compare the extent of financial intermediation through banks with the amount of intermediation through insurance, pensions, collective investment schemes, money markets, and capital markets. In particular, the share of various classes of asset holders—specifically, households, non-financial corporations, banks, and NBFIs—within the total capital market instruments or mutual fund assets can provide valuable information on financial diversification.

To supplement the overall indicators of diversity, assessors should also focus on sectoral indicators of financial development. For instance, the development of the insurance industry could be measured by examining trends in the ratio of gross insurance premiums to GDP, which could be broken down further into life and non-life premiums. Similarly, leasing penetration could be measured by the value of leased assets as a percentage of total domestic investment. Table 2.1 shows a few sub-sectors of the financial system and suggests relevant indicators of their size and development. The breadth of the financial system also could be analyzed in terms of the outreach of existing financial institutions. A common indicator related to this outreach is the branch network of the banking system, in particular, the total number of branches and the number of branches per thousand inhabitants. A comparison of the distribution of branches between rural and urban areas or among different provinces could also be useful as an indicator of the outreach of banking outlets.

Table 2.1. Sectoral Indicators of Financial Development

Sub-sector	*Indicator*
Banking	• Total number of banks • Number of branches and outlets • Number of branches/thousand population • Bank deposits/GDP (%) • Bank assets/total financial assets (%) • Bank assets/GDP (%)
Insurance	• Number of insurance companies • Gross premiums/GDP (%) • Gross life premiums/GDP (%) • Gross non-life premiums/GDP (%)
Pensions	• Types of pension plans • Percentage of labor force covered by pensions • Pension fund assets/GDP (%) • Pension fund assets/total financial assets (%)
Mortgage	• Mortgage assets/total financial assets • Mortgage debt stock/GDP
Leasing	• Leased assets/total domestic investment
Money markets	• Types and value of money market instruments • New issues and growth in outstanding value • Number and value of daily (weekly) transactions in the instruments
Foreign exchange markets	• Volume and value of daily foreign exchange transactions • Adequacy of foreign exchange (reserves in months of imports, as ratio to short-term external debt or to broad money)
Capital markets	• Number of listed securities (bonds and equities) • Share of households, corporations, banks, and NBFIs in the holdings of securities • Number and value of new issues (bonds and equities) • Market capitalization/GDP (%) • Value traded/market capitalization (%) • Size of derivative markets
Colllective investment funds	• Types and number of schemes (unique and mixed funds) • Total assets and growth rates (nominal and as percentage of GDP) • Total number of investors and average balance per investor • Share of households, corporations, banks, and NBFIs, in total mutual funds assets

2.1.3 Competition, Concentration, and Efficiency

Competition in the financial system can be defined as the extent to which financial markets are contestable and the extent to which consumers can choose a wide range of financial services from a variety of providers. Competition is often a desirable feature because it normally leads to increased institutional efficiency, lower costs for clients, and improvements in the quality and range of financial services provided. There are numerous measures of competition, including the total number of financial institutions, changes in market share, ease of entry, price of services, and so forth. In addition, the degree of diversity of the financial system could be an indicator of competition or the lack thereof because the emergence of vibrant non-bank intermediaries and capital markets often have been a source of effective competition for banking systems in many countries. All things remaining equal, an increase in the number of financial institutions or an expansion in available financial market instruments will increase competition by expanding the available sources of financial services that consumers can access. Ease of entry into the system could be judged by looking at the regulatory and policy requirements for licensing, for example, the required minimum paid-up capital.

In many cases, the ownership structure of the financial system can be indicative of competition or lack thereof. For instance, banks of different ownership often have different mandates and clientele, leading to substantial market segmentation. Also, systems dominated by state-owned financial institutions tend to be less competitive than those in which privately owned institutions are very active because state ownership often dampens commercial orientation. In some cases, the shares of domestic- and foreign-owned financial institutions in various financial sub-sectors could be relevant in assessing competition and incentives for financial innovations.

Measures of concentration often have been used as indicators of competition. Concentration is defined as the degree to which the financial sector is controlled by the biggest institutions in the market (as defined by market shares). For example, the three-bank concentration ratio measures the market share of the top three banks in the system, defined in terms of assets, deposits, or branches. Deciding what is concentrated and what is not depends a lot on judgment, and benchmarking becomes critical.[5] A more sophisticated measure of concentration is the Herfindahl Index (HI), which is the sum of squares of the market shares of all firms in a sector. Higher values of the index indicate greater market concentration. When applied to the financial sector, this index uses information about the market share of each bank to obtain a single summary measure.[6] The concept of concentration also could be applied to financial markets, especially by examining the share of different market instruments in the total outstanding value of financial market instruments. For example, the relative shares of money and capital market instruments in total financial assets could give an indication of the extent to which financial markets are positioned between short-term and long-term intermediation. Information on holdings of the instruments by types of investors and by number of issuers of different instruments also helps assess market competition.

The sustainable development of a financial system and the degree to which it provides support to real sector activities depend to a large extent on the efficiency with which intermediation occurs. Efficiency refers to the ability of the financial sector to provide high-quality products and services at the lowest cost. Competition and efficiency of the financial system are related to a large extent because more competitive systems invariably turn out to be more efficient (all other things being equal). Quantitative measures of efficiency that could be evaluated include (a) total costs of financial intermediation as percentage of total assets and (b) interest rate spreads (lending minus deposit rates). Components of intermediation costs include operating costs (staff expenses and other overhead), taxes, loan–loss provisions, net profits, and so forth. Those costs can be derived from the aggregated balance sheet and income statements for financial institutions. However, interest rate spreads sometimes remain high despite efficiency gains because of the need to build loan–loss provisions or charge a risk premium on lending to high-risk borrowers.

For money and capital markets, efficiency implies that current security prices fully reflect all available information. Hence, in an efficient financial market, day-to-day movements of market prices tend to be random, and information on past prices would not help predict future prices. The bid–ask spread (i.e., the difference between prices at which participants are willing to buy and sell financial instruments) is often used as a proxy for measuring the efficiency of markets, with more efficient markets exhibiting narrower

Table 2.2. Indicators of Financial System Performance

Sub-sector	*Indicator*
Competition and concentration	• Total number of institutions • Interest rate spreads and prices of financial services • Intermediary concentration ratios (market share of 3 or 5 of the largest institutions) • Financial market concentration ratios (market share of the largest financial instruments, as a percentage of total financial assets) • Herfindahl index
Efficiency	• Interest rate spreads • Intermediation costs (as percentage of total assets)
Liquidity	• Ratio of value traded to market capitalization • Average bid–ask spread

bid–ask spreads. Because bid–ask spread also reflects market liquidity, as discussed below, additional analysis of the extent of competition in the market and of volatility of price movements would be needed to assess efficiency. In addition, measures of price volatility are sometimes used to substitute for market efficiency, although short-run changes in volatility may reflect shifts in the amount of liquidity in that market.

Two important dimensions of market liquidity should be considered: market depth and market tightness. Market depth refers to the ability of the market to absorb large trade volumes without significant impact on market prices.[7] This dimension is usually measured by the ratio of value traded to market capitalization (turnover ratio), with higher ratios indicating more liquid markets. Another dimension of liquidity is market tightness—ability to match supply and demand at low cost that is measured by the average bid–ask spread. More liquid markets usually have narrower bid–ask spreads. Further discussion of these indicators can be found in section 2.2.4.

Table 2.2 summarizes the indicators of financial system performance that have been discussed in this section.

2.1.4 Scope and Coverage of Financial Services

The financial system provides five key services: (a) savings facilities, (b) credit allocation and monitoring of borrowers, (c) payments, (d) risk mitigation, and (e) liquidity services.

Savings mobilization can be assessed by examining the effectiveness with which the financial system provides saving facilities and mobilizes financial resources from households and firms. The extent of financial savings could be ascertained by examining the level and trends in the ratio of broad money to GDP. As mentioned earlier, this indicator may overstate the true picture if currency constitutes a high proportion of broad money. Other more specific indicators of access to savings facilities include the ratio of bank deposits to GDP and the proportion of the population with bank accounts.

Information on the outreach of the financial system can help interpret developments in financial savings. Hence, indicators such as the total number of bank branches, the population per bank branch, and the distribution of branches and other outlets (e.g., rural or urban) could provide valuable information on the access of the population to saving facilities. Further, it is important to assess the range of saving vehicles that are available

because, in many countries, traditional bank deposits are the most common form of financial savings. Saving through non-bank forms of financial intermediation are, therefore, crucial to financial diversity, and development indicators for non-bank intermediaries such as insurance, pensions, and capital markets could be useful in gauging the degree to which the population uses non-bank forms of financial savings. Hence, household and corporate holdings of non-bank financial assets (e.g., bonds) could provide extra information on the degree of access to financial savings.

The ratio of private sector bank credit to GDP is a common measure of the provision of credit to the economy, as well as of banking depth. Often, this indicator is supplemented by information on the ratio of loans to total bank deposits. Where available, the volume of finance raised through the issuance of bonds and money market instruments should supplement information on bank credit. Analyzing trends in those indicators should reveal the overall degree to which the banking sector provides credit to firms and households. It is also useful to assess the sectoral distribution of private sector credit to gauge the alignment of bank credit with the distribution of domestic output. Therefore, the relative proportion of total credit going to agriculture, manufacturing, and services would be relevant information in evaluating the adequacy of the level of credit provided to the economy.

A key function of financial systems in market economies is to offer fast and secure means of transferring funds and making payments for goods and services. The state of development of the payment system is of interest here, especially the focus on the various instruments for making payments, including cash, checks, payment orders, wire transfers, and debit and credit cards. The proportion of payments (volume and value) made with different payment instruments can reveal the developmental status of the payment system, with cash-based economies at the lower end of the spectrum. Some indicators such as the number of days for clearing checks, the number and distribution of clearing centers, and the volume and value of checks cleared could provide general information on the effectiveness of existing money transfer mechanisms. In addition, it is relevant to examine the various risks associated with the payments system, through indicators such as access to settlement credit, size of settlement balances, and so forth, thereby complementing the qualitative information from assessments of Core Principles for Systemically Important Payment Systems.[8]

The major risk mitigation services offered by the financial system include insurance (life and non-life) and derivative markets. The ratio of gross premiums to GDP is a popular indicator of development in the insurance industry, and this indicator could be supplemented with a breakdown of premiums between life and non-life insurance. A deep and well-functioning insurance industry would offer a wide range of products in both the life and non-life business, including motor vehicle, marine, fire, homeowners, mortgage, workers' compensation, and fidelity insurance and life insurance, as well as disability, annuities, medical, and health insurance. In addition, coverage of derivative markets—options, futures, swaps, and structured finance products—where relevant in terms of available instruments, liquidity, and transaction costs, would be important, owing to their role in managing risk and in facilitating price discovery in spot markets.

Liquidity service provided by financial systems is reflected in maturity transformation and secondary market arrangements, which facilitate investment in high-yielding

projects. Most high-return projects require a long-term commitment of capital; however, savers are often reluctant to give up their savings for long periods of time.[9] The role of the financial system is to transform liquid, short-term savings into relatively illiquid, long-term investments, thus promoting capital accumulation. The availability of liquidity, therefore, allows savers to hold assets that they can sell easily if they need to redeem their savings.

Against this background, it is important to examine the degree of access that specified target groups (e.g., farmers, the poor, small and medium enterprises, or different geographic regions) have to those financial services. Access is defined as the availability and cost of financial services and could be measured in a variety of ways.[10] First, relevant measures of the supply of financial services includes the numbers of different types of financial institutions, the number of branches and other service outlets, the number of clients served, and the population per outlet. The volume of services (deposits, credit, money transmission, etc.) provided is another useful measure, especially if it is broken down by clientele and size (i.e., in a breakdown by socioeconomic groups or broad sectors or by size distribution). Second, it is also relevant to consider demand-side measures of access. However, demand-side indicators are not easy to construct and often require surveys to collect relevant data. Those surveys have often focused on collecting relevant information such as the savings and credit needs of households and enterprises, the needs relative to the supply, and the ease or difficulty of meeting those needs.[11] Finally, it is important to examine the costs of financial services, usually by examining the level and trends in spreads between the borrowing and lending rates, the general interest rate structure, and the prices of other financial services (e.g., fees and minimum balances for deposits, as well as cost and time of payment services).

In addition, indicators of the functioning of various elements of financial system infrastructure—the insolvency and creditor rights regime, the systemic liquidity arrangements (other than those of payment systems, which have already been covered as a core financial system function), and the information and governance arrangements (e.g., credit reporting, disclosure rules)—can provide useful insights into costs and efficiency of financial transactions. Appendix B (Illustrative Data Questionnaires for Comprehensive Financial Sector Assessment) contains examples of those types of indicators.

2.2 Financial Soundness Indicators

Financial soundness indicators (FSIs) are indicators of the current financial health and soundness of the financial institutions in a country, as well as of their corporate and household counterparts, and FSIs play a crucial role in financial stability assessments. FSIs include both aggregated individual institution data and indicators that are representative of the markets in which the financial institutions operate. FSIs are calculated and disseminated for use in macroprudential surveillance, which is the assessment and monitoring of the strengths and vulnerabilities of financial systems.

FSIs are a relatively new body of economic statistics that reflect a mixture of influences. Some of the concepts are drawn from prudential and commercial measurement frameworks, which have been developed to monitor individual entities. Other concepts

Table 2.3. The Core Set of Financial Soundness Indicators

Indicator	*Indicates*	*Comment*
Deposit-taking institutions[a]		
Regulatory capital to risk-weighted assets	Capital adequacy	Broad measure of capital, including items giving less protection against losses, such as subordinated debt, tax credits, and unrealized capital gains
Regulatory Tier I capital to risk-weighted assets	Capital adequacy	Highest quality capital such as shareholder equity and retained earnings, relative to risk-weighted assets
Nonperforming loans net of provisions to capital	Capital adequacy	Indicates the potential size of additional provisions that may be needed relative to capital
Nonperforming loans to total gross loans	Asset quality	Indicates the credit quality of banks' loans
Sectoral distribution of loans to total loans	Asset quality	Identifies exposure concentrations to particular sectors
Return on assets and return on equity	Earnings and profitability	Assesses scope for earnings to offset losses relative to capital or loan and asset portfolio
Interest margin to gross income	Earnings and profitability	Indicates the importance of net interest income and scope to absorb losses
Noninterest expenses to gross income	Earnings and profitability	Indicates extent to which high noninterest expenses weakens earnings
Liquid assets to total assets and liquid assets to short-term liabilities	Liquidity	Assesses the vulnerability of the sector to loss of access to market sources of funding or a run on deposits
Net open position in foreign exchange to capital	Exposure to FX risk	Measures foreign currency mismatch

a. Domestically controlled institutions, that may be grouped in different categories according to control, business lines, or group structure.

are drawn from macroeconomic measurement frameworks, which have been developed to monitor aggregate activity in the economy. A list of FSIs, grouped into a core set and an encouraged set, is presented in tables 2.3 and 2.4 and will be discussed in this chapter. Detailed exposition and guidance on those FSIs can be obtained from the *Compilation Guide on Financial Soundness Indicators* (IMF 2004). It contains a discussion of the distinction between a "core set" for which data are generally available and are found to be highly relevant for analytic purposes in almost all countries and an "encouraged set" for which data are not as readily available and whose relevance could vary across countries.[12]

The list of FSIs discussed herein consists mainly of aggregate balance sheet measures. This type of aggregation of individual institution-level indicators (microprudential indicators) into financial soundness indicators (macroprudential indicators) necessarily involves a loss of information because the distribution of prudential indicators of individual institutions is also a crucial dimension of financial stability. Although aggregation is required for facilitating macroprudential analysis and international comparison, the assessments could be strengthened by allowing some disaggregation through peer groups or through the monitoring of the distributional characteristics of various indicators. In addition, FSIs themselves are either backward-looking or contemporaneous indicators of financial soundness, available often with a lag or low frequency. Therefore, proper interpretation and use of FSIs requires a range of analytical tools (discussed in chapter 3), which includes conducting stress tests of individual institutions and monitoring the

Table 2.4. The Encouraged Set of Financial Soundness Indicators

Indicator	*Indicates*	*Comment*
Encouraged set[a]		
Corporate sector		
Total debt to equity	Leverage	Provides an indication of credit risk because a highly leveraged corporate sector is more vulnerable to shocks
Return on equity	Earnings and profitability	Indicates the extent to which earnings are available to cover losses
Earnings to interest and principal expenses	Debt service capacity	Indicates the extent to which earnings available to cover losses are reduced by interest and principal payments
Corporate net foreign exchange exposure to equity	Foreign exchange risk	Reveals corporate sector vulnerability to exchange rate movements
Number of applications for protection from creditors[b]		
Capital to assets	Capital adequacy	Broad measure of capital adequacy, which is a buffer for losses
Geographical distribution of loans to total loans	Asset quality	Identifies credit exposure concentrations to particular countries by the banking system
Gross asset position in financial derivatives to capital[c]	Exposure to derivatives	Provides a crude indicator of exposure to derivatives
Gross liability position in financial derivatives to capital[c]	Exposure to derivatives	Provides a crude indicator of exposure to derivatives
Large exposures to capital	Asset quality	Identifies credit exposure to large borrowers
Trading income to total income	Earning and profitability	Indicates the dependence on trading income
Personnel expenses to noninterest expenses	Earnings and profitability	Indicates the extent to which high noninterest expenses reduces earnings
Spread between reference lending and deposit rates	Earnings and profitability	Indicates level of competition in the banking sector and the dependence of earnings on the interest rate spread
Spread between highest and lowest interbank rate	Liquidity	Market indicator of counterparty risks in the interbank market
Customer deposits to total (non-interbank) loans	Liquidity	Assesses the vulnerability to loss of access to customer deposits
Foreign currency-denominated loans to total loans	Foreign exchange risk	Measures risk to loan portfolios from foreign exchange movements
Foreign currency-denominated liabilities to total liabilities	Foreign exchange risk	Measures extent of dollarization
Net open position in equities to capital	Equity market risk	Measures exposure to equity price movements
Market liquidity		
Average bid-ask spread in the securities market[d]	Liquidity	Indicates liquidity in the securities market
Average daily turnover ratio in the securities market[d]	Liquidity	Indicates liquidity in the securities market
Other financial corporations		
Assets to total financial system assets	Size	Indicates size and significance within the financial sector
Assets to GDP	Size	Indicates size and significance within the financial sector
Households		
Household debt to GDP	Leverage	Provides an indication of credit risk because a highly leveraged household sector is more vulnerable to shocks
Household debt service and principal payments to income	Debt service capacity	Indicates a household's ability to cover its debt payments
Real estate markets		
Real estate prices	Real estate prices	Measures trends in the real estate market
Residential real estate loans to total loans	Exposure to real estate	Measures banks' exposure to the residential real estate sector
Commercial real estate loans to total loans	Exposure to real estate	Measures banks' exposure to the commercial real estate sector
Other relevant indicators that are not formally part of the encouraged set of FSIs[e]		

a. See *Compilation Guide for Financial Soundness Indicators* (IMF 2004) for a detailed definition and exposition of encouraged indicators.
b. These may be grouped in different categories based on ownership, business lines, or group structure.
c. May be in notional amounts or market value. The latter provides a better measure of exposure but may be more difficult to obtain.
d. Or in other markets that are most relevant to bank liquidity, such as foreign exchange markets.
e. Other indicators such as additional balance sheet data (e.g., maturity mismatches in foreign currency), data on the life insurance sector, or information on the corporate and household sector may be added.

distribution of stress tests results, as well as examining the determinants of FSIs and forecasting their future course.

In addition, FSIs can be complemented by various market-based indicators, which are forward-looking indicators of soundness and are available with higher frequency. The various categories of FSIs are discussed in the following sections.

2.2.1 FSIs for Non-financial Sectors

Corporate sector indicators tend to focus on indicators of leverage (or gearing), profitability, liquidity, and debt-servicing capacity because of those indicators' demonstrated usefulness in predicting corporate distress or failure.[13] Four commonly used measures of corporate sector health are the debt-to-equity ratio, the return on equity, the cash ratio, and the debt service coverage (or interest coverage ratio). Total debt to equity measures leverage or the extent to which activities are financed out of other than own funds. High corporate leverage increases the vulnerability of corporations to shocks and may impair their repayment capacity. Return on equity is commonly used to capture profitability and efficiency in using capital. Over time, it can also provide information on the sustainability of capital positions. Profitability is a critical determinant of corporate strength, affecting the capital growth, the ability to withstand adverse events, and, ultimately, the repayment capacity. Sharp declines in corporate sector profitability, for example, as a result of economic deceleration, may serve as a leading indicator of financial difficulties.

The cash ratio is a measure of short-term assets held against short-term liabilities, after deductions for inventories and receivables. The cash ratio measures the capacity to absorb sudden changes in cash flows. Debt service coverage measures the capacity to cover debt service payments (interest and principal) and serves as an indicator of the risk that a firm may not be able to make the required payments on its debts. One commonly used measure of debt service coverage is the earnings before interest, taxes, depreciation, and amortization divided by debt servicing costs (principal plus interest). FSIs on the corporate sector can be compiled by aggregating data from the consolidated financial statements of publicly listed corporations and, thus, are a direct analog of the indicators used by shareholders and market participants to monitor the financial health of individual corporations. For the economy as a whole, domestically consolidated data (e.g., data based on National Income Accounts) can be used when corporate financial statements do not provide sufficient coverage.

Household sector indicators of leverage, liquidity, and debt servicing capacity can be useful in monitoring the health of the sector. Two common measures are used: the ratio of household debt to GDP, and the ratio of household debt burden to income. The household-debt-to-GDP ratio measures the overall level of household indebtedness (commonly related to consumer loans and mortgages) as a share of GDP. High levels of borrowing increase the vulnerability of the household sector to economic and financial market shocks and may impair their repayment capacity. The ratio of household debt burden to income measures the capacity of households to cover their debt payments (interest and principal). It is also a potentially significant predictor of future consumer spending growth: a high debt-to-service ratio sustained over several quarters can affect the rate of growth of personal consumption.[14]

Monitoring of the real estate sector tends to focus on indicators of significant swings in prices or volumes of lending and construction because this information often signals future problems in credit quality and collateral. Rapid increases in real estate prices—often fueled by expansionary monetary policies or by large capital inflows—that are followed by a sharp economic downturn can have a detrimental impact on financial sector health and soundness.[15] Ideally, a range of indicators should be analyzed to get a sense of real estate market developments (demand, supply, prices, and links to the business cycle) and to assess financial sector exposure to the real estate sector. If one is to determine the exposure of the banking sector to the real estate sector, it is important to have information on the size of the credit exposure and the riskiness of the exposure. Different types of loans related to real estate may have very different risk characteristics, so it may be useful to distinguish lending according to purpose (e.g., lending for commercial real estate or to construction companies and lending for residential real estate, including mortgages). The level of sophistication of the mortgage market (e.g., mortgage interest rate structure, availability of home equity release products) may also have implications for risk management and financial stability.

2.2.2 FSIs for Banking

Banking sector FSIs can provide useful quantitative information on the stability or vulnerability of the banking system.[16] Banking sector FSIs can be grouped according to six key areas of potential vulnerability in the CAMELS (**C**apital adequacy, **A**sset quality, **M**anagement soundness, **E**arnings and profitability, **L**iquidity, and **S**ensitivity to market risk) framework. Most FSIs are compiled by aggregating microprudential indicators for individual institutions to produce a measure for key peer groups such as domestically owned banks, local branches, foreign subsidiaries, state-owned banks, complex groups, or the entire banking system.[17] Non-bank FSIs (such as those for the corporate and household sectors or those for insurance) can be used to assess credit risks arising for banks from their credit and other exposures to non-bank sectors.

Each of the six subgroups of bank FSIs has a different part in the stability assessment. Indicators of capital adequacy can be used to measure the capacity of the sector to absorb losses. Because risks to the solvency of financial institutions most often derive from impairment of assets, the second category of FSIs is asset quality. FSIs in this category monitor loan quality and exposure concentrations of bank asset portfolios. Indicators of management efficiency are used to capture the importance of sound management in ensuring the health and stability of banks. A variety of data on margins, income, and expenses can be used to measure earnings and profitability because earnings indicate the ability to absorb losses without drawing on capital. In contrast, rapid growth in earnings or profits may also signal excessive risk taking. Measures of liquidity indicate the ability of a banking system to withstand shocks to cash flows. FSIs for liquidity measure the liquid assets available to a bank in the event of a loss of market funding or an outflow of deposits. Market liquidity measures also can be included to monitor the liquidity of the main securities held by banks. Banks are then exposed to market risk from their increasingly diversified operations and positions in financial instruments. Sensitivity to market risk (changes in market prices, particularly interest rates and exchange rates and, occasionally,

equity prices) can be measured using information on net open positions, durations, and stress test results.

2.2.3 FSIs for Insurance

Quantitative soundness indicators for the insurance sector can be presented within a CARAMELS (**C**apital adequacy, **A**sset quality, **R**einsurance, **A**dequacy of claims and actuarial, **M**anagement soundness, **E**arnings and profitability, **L**iquidity, and **S**ensitivity to market risk) framework. This framework is analogous to the CAMELS framework for the banking sector. Das, Davies, and Podpiera (2003) propose a set of core and encouraged soundness indicators for the insurance sector (grouped separately for life and non–life insurance). The core indicators presented in table 2.5 are those considered necessary for adequate surveillance of the sector whereas the encouraged set includes additional indicators that are useful in monitoring more specific areas of vulnerability.

2.2.4 FSIs for Securities Markets

The stability of securities markets can be monitored using a range of quantitative indicators that focus on market liquidity because of the important role that liquid securities play

Table 2.5. Insurance Financial Soundness Indicators: Core Set

Category	*Indicator*	*Non-life*	*Life*
Capital adequacy	Net premium/capital	X	
	Capital/total assets	X	
	Captial/technical reserves		X
Asset quality	(Real estate + unquoted equities + debtors)/total assets	X	X
	Receivables/(Gross premium + reinsurance recoveries)	X	X
	Equities/total assets	X	X
	Nonperforming loans to total gross loans		X
Reinsurance and actuarial issues	Risk retention ratio (net premium/gross premium)	X	X
	Net technical reserves/average of net claims paid in last three years	X	
	Net technical reserves/average of net premium received in last three years		X
Management soundness	Gross premium/number of employees	X	X
	Assets per employee (total assets/number of employees)	X	X
Earnings and profitability	Loss ratio (net claims/net premium)	X	
	Expense ratio (expense/net premium)	X	X
	Combined ratio = loss ratio + expense ratio	X	
	Revisions to technical reserves/technical reserves		X
	Investment income/net premium	X	
	Investment income/investment assets		X
	Return on equity (ROE)	X	X
Liquidity	Liquid assets/current liabilities	X	X
Sensitivity to market risk	Net open foreign exchange position/capital	X	X
	Duration of assets and liabilities		X

Note: Relevance to life or non-life segment of Insurance is indicated by X.
Source: Das et al. (2003). The authors also propose a set of encouraged indicators for each of the above categories in order to capture additional dimensions. These include sectoral and geographic distribution of investments and underwritten business, derivative exposures, risk weighted capital ratio, market based indicators (market/ book value, price/ earnings, and price/ gross premium ratios), and measures of Group exposures (group debts/ total assets, proportion of business from group companies (Premium + claims)/ total business.

in the balance sheets of financial institutions.[18] Market liquidity can be defined as a measure of volume of securities that can be sold in a relatively short period without having a significant effect on their price. The literature typically recognizes two key dimensions of market liquidity: tightness and depth. Tightness is a market's ability to match supply and demand at low cost. The bid-ask spread FSI may serve as an approximate index of tightness in each market, in that a narrower spread indicates a more competitive market with a larger number of buyers and sellers providing liquidity. Depth relates to the ability of a market to absorb large trade flows without a significant effect on prices. When market participants raise concerns about the decline in market liquidity, they typically refer to a reduced ability to deal without having prices move against them; that is, they refer to reduced market depth. The FSI of market turnover (gross average daily value of securities traded relative to the stock) helps assess the liquidity of banks' balance sheets by giving an indication of the volume of securities that institutions can liquidate in the market. Market depth also can be approximated by other volume variables, quota sizes, on-the-run–off-the-run spreads, and volatilities.

2.2.5 Market-Based Indicators of Financial Soundness

Market-based measures drawn from price and volatility measures of various capital market instruments can provide forward-looking indicators of financial soundness. For example, default probabilities (for banks and non-banks) may be computed on the basis of models of credit risk, using equity prices and balance sheet data. In some cases, volatilities and risk premiums in market prices themselves provide indicators of likelihood of default. Further discussion of those indicators is contained in chapter 3.

2.3 Aggregate Balance Sheet Structure of Financial and Non-financial Sectors—Inter-sectoral Linkages

Analysis of stock variables in countries' sectoral balance sheets (assets and liabilities of financial firms, non-financial firms, households, government, and sub-sectors of those sectors, as appropriate) and the consolidated aggregate balance sheet (for the country) can help highlight inter-sectoral linkages and can provide valuable information on the adequacy of financial structure and on the potential for financial instability. The balance sheet analysis focuses on (a) the determinants and evolution of stocks of assets and liabilities and (b) the likely shocks to the stock variables, both of which can trigger large adjustments in flows (including cross-border capital flows, shifts in holdings of domestic or foreign currency assets, etc.). An approach of this type can, therefore, be a useful complement to the traditional flow analysis that is based on data related to fiscal, balance-of-payments, and financial programming. A classification of claims on and liabilities to any one sector from other sectors can reveal both the extent of access to financial services (in providing savings instruments, in offering credit intermediation, and in providing risk diversification and insurance) and the extent of inter-sectoral linkages that highlight the potential effect of shocks in one sector on the other. In addition, balance sheet data classified by maturity, currency, contractual nature of liabilities (e.g., debt versus equity), and

Box 2.1 The Balance Sheet Approach—An Overview

Applications and Policy Implications

Availability of comprehensive data on sectoral balance sheets permits the analysis of relationship between financial sector and real sectors (households, corporations, etc.) and how the deterioration in one can be reinforced or offset by a strengthening of the other. In particular, capital account crises typically occur because of a sudden loss of confidence in the soundness of the balance sheets of one of the countries' main sectors: the banking system, the corporate sector, the households, or the government. The negative impact of an initial adverse shock to a balance sheet will depend on the existing mismatches in the balance sheet. The currency mismatch (a predominance of domestic currency assets over foreign currency liabilities) or a maturity mismatch (a predominance of long-term illiquid assets over short-term liquid liabilities) can expose the vulnerability of a sector to sharp movements in exchange rate or interest rate or both, which arise from the initial confidence shock, and it can lead to spillover into other sectors, often snowballing in the process. For example, a capital structure mismatch of firms (a predominance of debt over own funds and equity liabilities in the balance sheet) can result in unsustainable debt servicing burden because of an exchange rate or interest rate shock, thus leading to insolvency of firms, and illiquidity and insolvency of financial firms with exposures to the highly leveraged firms.

A loss of confidence in the banking system can lead, in turn, to runs on deposits and flight from currency, thereby exacerbating the initial currency and interest rate shock. Banking crisis also could trigger the realization of contingent liabilities of the government, as well as weaken the government balance sheet and threaten government debt sustainability. This type of interaction among balance sheets could magnify the negative impact of a shock on real output levels. Policy implications of the balance sheet analysis focus on policies to foster a buffering and hedging of private balance sheets, including effective banking supervision to ensure strong risk management by banks, sound public debt and reserve management that effectively balances costs and rollover risks, and promotion of domestic capital markets to ensure currency diversification. Moreover, macroeconomic policy mix would need to take into account the constraints posed by the balance sheet mismatches such as the tradeoff between interest rate and exchange rate adjustments in the presence of maturity and exchange rate mismatches.

The financial sector's balance sheets are key for the resilience of the economy. The relationship between the financial sector balance sheet and the corporate and household balance sheets as well as the impact of shocks on these balance sheets typically are analyzed in financial sector assessments as part of the macroprudential analysis and the related stress–testing exercises. (See chapter 3 for further details.)

Data Availability and Limitations

A comprehensive analysis of sectoral balance sheets is often constrained by a lack of relevant data. The absence of this information often leads to a focus on a few key stock positions in the public sector balance sheet and in listed companies' balance sheets. Therefore, for many countries, balance sheet information beyond what is readily available must be gathered before complete intersectoral analysis is feasible. Some efforts are under way to establish good databases on balance sheets. The efforts to promote the compilation and dissemination of financial soundness indicators focuses on the needs of financial stability analysis. Other ongoing efforts in improving the providing of data to the Fund are designed to strengthen availability of detailed balance sheet data on external and public sector assets and liabilities.

Although it is widely recognized that balance sheet analysis of the corporate sector is key to financial stability analysis, the availability of data poses practical limitations. Typically, data are available only for listed companies; however, a much more comprehensive and differentiated analysis of the sector is needed to understand fully the access to financial services and vulnerabilities to financial risks of this sector.

Financial stability reports published by various countries have increasingly relied on systematic analysis of balance sheet data, thereby creating a demand for strengthened data compilation and dissemination systems. When balance sheet data are not available in sufficient sectoral detail, the flow of funds information (data on changes in assets and liabilities of different sectors) can be a useful alternative because the real and financial transactions that underpin the flow of funds accounts are the means by which balance sheet adjustments take place. Data from sectoral balance sheets and from the flow of funds suffer from a number of measurement difficulties: (a) available information is typically based on book (or transaction) values that may differ sharply from market values, (b) data on off-balance sheet exposures are not well captured, and (c) sharp portfolio adjustments in response to shifts in relative asset prices and new information may render data that are based on historical accounting records to become quickly outdated.

Table 2.6. Stylized Framework for Presenting Financial Interlinkages between Sectors in an Economy

Sector A's balance sheet[a]	
Assets of Sector A	Liabilities of Sector A
Financial claims on	Financial obligations to
Sector B by currency by maturity	Sector B by currency by maturity
Sector C by currency by maturity	Sector C by currency by maturity
Sector D by currency by maturity	Sector D by currency by maturity
Sector E[b] by currency by maturity	Sector E[b] by currency by maturity
Net worth/net[b] International investment[b]	

Note: A = government sector; B = banking system; C = non-bank financial sector; D = non-financial private; E = rest of world.

a. Similar sectoral balance sheets can be constructed for each sector in line with those in the System of National Accounts (United Nations, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, and World Bank 1993); the *Monetary and Financial Statistics Manual* (IMF 2000) also provides advice for compilation of accounts with limited data. In practice, presenting information on currency exposures and maturity may be challenging in many countries.
b. When consolidating the sectoral balance sheets into the country's balance sheet, the assets and liabilities held among residents net out, leaving the country's external balance relative to the rest of the world (nonresidents), which is shown as sector E. In the official balance-of-payments statistics, the difference between external financial assets and liabilities is the net international investment position. For other sectors, the difference between financial assets and liabilities is net worth or capital position of the sector.

quality of the assets can help to analyze how balance sheet imbalances in one sector could trigger changes in demand for financial assets of one or more sectors that could trigger financial instability. Recent work on the analytical uses and policy implications of balance sheet data—The Balance Sheet Approach—and some issues in compilation of balance sheet information are highlighted in box 2.1.

Illustrative sectoral balance sheets shown in table 2.6 highlight important information on sectoral interlinkages that will remain hidden in the consolidated country balance sheets. If sectoral balance sheet data can be disaggregated, as shown in the table, to allow the measurement of mismatches in the balance sheet by currency, maturity, and capital structure, then this type of information helps to analyze vulnerability to various shocks.

Some sources of sectoral balance sheet data are noted, as follows. Company finance statistics compiled by Bank of Korea (Financial Statements Analysis) provide balance sheet and income statements for listed and unlisted firms at a detailed level of industrial classification. Annual data on financial assets and liabilities of households in New Zealand are published in Reserve Bank of New Zealand Web site.[19] Those kinds of data help to analyze the effects that macroeconomic shocks have on the soundness of firms and households. The framework for compiling and presenting a government balance sheet is presented in the *Government Finance Statistics Manual* (IMF 2001), and this framework has been applied in several countries (e.g., Ecuador, Uruguay). The issues in the compilation

of financial sector balance sheets are discussed in IMF's *Compilation Guide on Financial Soundness Indicators* (IMF 2004). The balance sheet analysis of financial sector is routinely undertaken in all financial sector assessments as part of macroprudential analysis, which is explained in chapter 3.

Notes

1. To get a more useful indication of financial size, central bank assets should be excluded from this calculation.
2. Although this ratio is one of the most popular measures of financial depth, the M2 to GDP ratio could be misleading if currency constitutes a high proportion of broad money.
3. Where available, this ratio should include non-bank forms of intermediation, for example, issues of bonds and money market instruments.
4. For a definition of large and complex financial institutions, see Miles (2002).
5. It is advisable to supplement these measures with other indicators of competition. See chapter 4 for a discussion of model-based indicators of competition.
6. For an example of the computation of the Herfindahl index, see chapter 15 of the *Compilation Guide on Financial Soundness Indicators* (IMF 2004).
7. See chapter 8 of the *Compilation Guide on Financial Soundness Indicators* (IMF 2004).
8. Issued by the Committee on Payment Settlement Systems of the Bank For International Settlements. See Chapter 11 for a detailed discussion of these core principles.
9. See Levine (1997) for more information.
10. See World Bank (2004). Chapter 4 has a brief discussion of access, including an analysis of different approaches to measuring access.
11. See Honohan (2004) for a discussion of various sources of survey data and proposals for basic national access indicators.
12. See also chapter 3.
13. For a survey, see Altman and Narayanan (1997). In the wake of the Asian crisis, numerous authors have demonstrated the close links between poor corporate performance and banking system distress; for example, see Pomerleano (1998).
14. See Debelle (2004) for an overview of household debt and its effect on the macroeconomy and implications for financial stability.
15. See Borio and McGuire (2004), and see Bank for International Settlements (2005) for an overview of housing price dynamics and implications for financial stability.
16. For more details of how to use FSIs to assess banking soundness, see IMF (2004, chapters 6, 8, and 14) and Evans and others (2000).
17. The particular peer groups chosen can be based on the structure of the banking system and the underlying source of weaknesses, so vulnerabilities are not masked but are highlighted by the choice of peer group.
18. See chapter 8 of IMF (2004) for an overview of statistics on securities markets. Two works of the Bank for International Settlements (BIS; 1999, 2001) also provide a detailed discussion of market liquidity, including its measurement and analysis.

19. The Web site for the Reserve Bank of New Zealand is available at http://www.rbnz.govt.nz./statistics/monfin/index.html.

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