

# 14. What Use Can Be Made of the Specific FSIs?

## Introduction

**14.1** The previous chapter explained the need for FSIs and how they fit into the wider concept of macroprudential analysis. This chapter considers the use that can be made of the FSIs that have been agreed by the IMF's Executive Board.<sup>1</sup> These are considered below by sector.

## Deposit Takers

**14.2** The strengths and vulnerabilities of deposit takers can be analyzed under the headings of capital adequacy, asset quality, earnings and profitability, liquidity, and sensitivity to market risk. This is commonly known as the CAMELS framework used by banking supervisors in their assessment of the soundness of individual institutions, less—for FSI purposes—the “M,” which represents the quality of management.<sup>2</sup>

## Capital Adequacy

**14.3** Capital adequacy and availability ultimately determine the robustness of financial institutions to withstand shocks to their balance sheets. Aggregate risk-based *capital ratios* (for example, the ratio of regulatory capital to risk-weighted assets) are the most common indicators of capital adequacy, based on the methodology agreed to by the BCBS in 1988 (see Box 4.2). Simple leverage ratios, such as the *ratio of capital to assets*, often complement this measure. An adverse trend in these ratios may signal increased exposure to risk and possible capital adequacy problems. In addition to the amount of capital, it may also be useful to monitor indicators of capital quality. In many countries, bank capital consists of different ele-

ments that have varying availability and capability to absorb losses, even within the broad categories of Tier 1, Tier 2, and Tier 3 capital. If these elements of capital can be reported separately, they can serve as additional indicators of the ability of banks to withstand losses and help to put overall capital ratios into context.

**14.4** The BCBS has recently updated the standard capital ratios to introduce greater sensitivity to risk in the capital requirements by taking into account the rapid development of risk-management techniques and financial innovation.<sup>3</sup> These proposals introduce greater refinement into the existing system of risk weighting to relate its categories more accurately to the economic risks faced by banks. These risks could be measured by banks' own internal ratings systems. Alternatively, they could be measured on the basis of ratings given by external rating agencies. However, improved risk measurement could come at the expense of comparability of information among banks, because under these new proposals each bank's methods of estimating credit risk can differ. The resulting differences among banks in risk-weighted assets and capital ratios would make aggregation of individual banks' data problematic.

**14.5** An important indicator of the capacity of bank capital to withstand losses from NPLs is the ratio of *NPLs net of provisions to capital*. This FSI can help detect situations where deposit takers may have delayed addressing asset quality problems, which can become more serious over time as a result.<sup>4</sup> Well-designed loan classification and provisioning rules are key to obtaining a meaningful capital ratio. Loan classification rules are commonly a determinant of the level of provisioning,<sup>5</sup> which in turn affects

<sup>1</sup>This chapter draws on Sundararajan and others (2002).

<sup>2</sup>The quality of management is an important potential source of vulnerability. However, rather than using quantitative indicators on which there is no consensus, financial sector licensing and supervisory authorities usually assess this vulnerability qualitatively.

<sup>3</sup>See BCBS (2004). At the time of writing this *Guide*, Basel II was not yet finalized.

<sup>4</sup>This ratio does not show whether the borrower has provided the lender with collateral or other forms of credit risk mitigation. An alternative version of this FSI including collateral is provided in Appendix III.

<sup>5</sup>This is discussed in more detail in Appendix VI.

capital indirectly (by reducing income) and directly (through the inclusion of general provisions in regulatory capital). Moreover, in the FSI framework banks should deduct specific provisions from loans (that is, credit should be calculated on a *net* basis), which reduces the value of total assets and hence of capital (when the latter is calculated residually).

## Asset Quality

**14.6** Risks to the solvency of financial institutions most often derive from an impairment of assets, which in turn can arise from a deterioration in the financial health and profitability of the institutions' borrowers, especially the nonfinancial corporations sector (discussed below). The *ratio of NPLs to total gross loans* is often used as a proxy for asset quality. The coverage ratio—the ratio of provisions to NPLs—provides a measure of the share of bad loans for which provisions have already been made.

**14.7** Lack of diversification in the loan portfolio signals the existence of an important vulnerability of the financial system. *Loan concentration in a specific economic sector or activity* (measured as a share of total loans) makes banks vulnerable to adverse developments in that sector or activity. This is particularly true for exposures to the *real estate sector*. Country- or region-specific circumstances often determine the particular sectors of the economy that should be monitored for macroprudential purposes.

**14.8** Exposure to country risk can also be important in countries that are actively participating in the international financial markets. Data on the *geographical distribution of loans* allow the monitoring of credit risk arising from exposures to particular (groups of) countries and an assessment of the impact of adverse events in these countries on the domestic financial system.

**14.9** Concentration of credit risk in a small number of borrowers may also result from *connected lending* and *large exposures*. Monitoring of connected lending, usually measured as the share of capital lent to related parties, is particularly important in the presence of mixed-activity conglomerates in which industrial firms control financial institutions. Credit standards may be relaxed for loans to affiliates, even when loan terms are market based. The definition of what constitutes a connected party is usually set in consideration of the legal and ownership structures prevalent in

a particular country, which makes this indicator often difficult to use in cross-country comparisons. The assessment of large exposures, usually calculated as a share of capital, aims at capturing the potential negative effect on a financial institution should a single borrower experience difficulties in servicing its obligations. Identifying the number of such exposures provides an indication of how widespread such large exposures are. In addition, exposures of the largest deposit takers to the largest resident entities provide an indication of concentrated lending among the largest entities in the economy.

**14.10** In countries where domestic lending in foreign currency is permitted, it is important to monitor the ratio of *foreign-currency-denominated loans to total loans*.<sup>6</sup> Delgado and others (2002) note that ideally, a measure of risk from domestic lending in foreign currency should identify loans to unhedged domestic borrowers. In these cases, hedging would also include “natural hedges,” or borrowings for which an adverse exchange rate impact on foreign currency obligations is compensated by a positive impact on revenue and profitability. The level of the above ratio is related to that of *foreign-currency-denominated liabilities to total liabilities*, although differences may be observed, notably when sources of foreign currency financing are available from foreign lines of credit and other foreign capital inflows. It should be noted that owing to the compound nature of credit and currency risk in foreign-currency-denominated lending, even institutions with a balanced foreign exchange position face risks. For example, an exchange rate depreciation can impose losses directly on the banking sector but also have an indirect effect on asset quality by causing losses in the nonfinancial corporations sector.

**14.11** *Derivatives* can be a source of vulnerability. Positions in these instruments should be explicitly monitored and recognized on balance sheets using market value or an equivalent measure of value. In addition, monitoring bank soundness requires tracking the risks involved in *off-balance-sheet operations* (on account of guarantees and contingent lending arrangements). As a general rule, “exposures” should include positions that are both on balance sheet and off balance sheet, rather than merely positions on the balance sheet. However, off-balance-sheet positions

<sup>6</sup>Data on credit—assets for which the counterpart incurs a debt liability—are a more comprehensive concept than loans and could additionally be used.

can present special problems in evaluating the condition of financial institutions, because of the lack of reporting of such positions in some countries.

### Earnings and Profitability

**14.12** Accounting data on bank margins, income, and expenses are widely used indicators of bank profitability. Common operating ratios used to assess bank profitability include net income to average total assets (also known as *return on assets* [ROA]) and net income to average equity (also known as *return on equity* [ROE]).<sup>7</sup>

**14.13** Differences in capital structure and business mix across countries should be considered in analyzing bank performance and highlight the need to look at several operating ratios at the same time.<sup>8</sup> Banks with lower leverage (higher equity) will generally report higher ROAs but lower ROEs. Hence, an analysis of profitability based exclusively on ROEs would tend to disregard the greater risks normally associated with high leverage. Income ratios may also be affected by leverage. In the case of banks with low leverage, the *interest margin* and net income ratios will be higher because banks with higher levels of equity need to borrow less to support a given level of assets and thus have lower interest expenses. The proportion of gross income generated through fees and commissions compared with net interest income should also be monitored, as the employment of capital, the level of operating costs, and the level of assets held can differ.

**14.14** Information on the *spread between lending and deposit rates* could provide an indication of the underlying profitability of the sector, while data on *trading income to total income* provide an indication of the reliance on market-related activity to generate profits. The ratios of *personnel expenses to noninterest expenses* and *noninterest expenses to gross income* can provide an indication of efficiency; high and increasing ratios could affect profitability.

**14.15** In analyzing the above-mentioned ratios, the differing mix of banking business among banks should be taken into account. For example, retail banking is

associated with higher lending rates, lower deposit rates, and higher operating costs than is wholesale corporate banking. Often, high margin business involves high operating costs. Banks that offer a wider range of services, such as investment banks, tend to have higher noninterest income.

**14.16** Returns can also be calculated on a risk-adjusted basis, although this is not the approach taken in the *Guide*. The risk-adjusted return is calculated by discounting cash flows according to their volatility: the more volatile the cash flow, the higher the discount rate and the lower the risk-adjusted return. Risk-adjusted return on capital (RAROC) measures the return on capital required to offset losses on the underlying asset should volatility cause its value to decline (by two or more standard deviations). RAROC is particularly useful to banks in evaluating businesses and products according to their place along a risk/return spectrum and thus in correctly pricing a transaction. At the sector level, RAROC can be computed as interest margin to assets multiplied by the potential loss. Estimating the potential loss requires data on historical default and recovery rates and on banks' ability to liquidate assets (liquidity risk).

### Liquidity

**14.17** The level of liquidity influences the ability of a banking system to withstand shocks. For instance, a large shock, contributing to credit or market losses, could cause a loss of confidence in the banking sector by market participants or depositors. In turn, this could result in a liquidity crisis that has the potential to push solvent banks into insolvency, because if they lose access to funding they could be forced to sell assets at depressed prices to obtain liquidity.

**14.18** A common measure of liquidity is *liquid assets to total assets* (liquid asset ratio), which indicates how much balance sheet shrinkage the sector could absorb before being forced to sell illiquid assets. Another measure of liquidity is the ratio of *liquid assets to short-term liabilities*, which indicates the short-term liabilities that would have to be covered by asset sales if access to funding were lost. These indicators can highlight excessive maturity mismatches and a need for more careful liquidity management. The ratio of *customer deposits to total (noninterbank) loans* is also sometimes used to detect liquidity problems—a low ratio might indicate potential liquidity stress in the banking system and perhaps a loss of depositor and

<sup>7</sup>The ratios can be calculated using various income measures: for example, before or after provisions and before or after tax charges and (net) extraordinary items.

<sup>8</sup>Vittas (1991).

investor confidence in the long-term viability of the sector.

**14.19** Information on the volatility of bank liabilities can supplement the information provided by liquidity ratios. Bank liabilities that are subject to the risk of reversal of foreign capital flows, such as external credit lines and deposits of nonresidents, should be monitored closely, for example through indicators of the size of this type of funding in total bank liabilities. Such indicators of exposure to international capital movements highlight the relevance of macroprudential analysis to the assessment of external vulnerability.

**14.20** As bank liquidity depends on the level of liquidity of the overall system, it is important to monitor measures of *market liquidity*. The focus may be on a benchmark domestic government or central bank debt security, or on other securities that are most relevant to the liquidity of banks. Indicators of the tightness, depth, and resilience of a market can capture market liquidity.<sup>9</sup>

**14.21** Tightness indicates the general cost incurred in a transaction irrespective of the level of market prices and can be measured by the *bid-ask spread* (the difference between prices at which a market participant is willing to buy and sell a security); a narrower spread can indicate a more competitive market with a larger number of buyers and sellers providing liquidity. Monitoring spread volatility might also be useful for macroprudential purposes. A financial system might have relatively high but stable spreads, whereas a less stable financial system might have spreads narrower on average but more volatile under stressful conditions.

**14.22** *Depth* denotes the volume of trades possible without affecting prevailing market prices and is proxied by the *turnover ratio*. *Resilience* refers to the speed at which price fluctuations resulting from trades are dissipated and can be measured by the Hui-Heubel Ratio.

**14.23** Where foreign currency transactions are relevant, liquidity management can be complicated if the availability of foreign currency is limited and inter-

bank foreign exchange lines are vulnerable to disruption. In these cases, it is also important to measure the liquidity of foreign exchange markets and monitor its determinants. Foreign exchange liquidity also depends on developments in the external sector, where there is the potential for reversals of capital flows and where foreign exchange reserves may become inadequate.

**14.24** Standing central bank facilities, which are accessed at the initiative of banks, provide liquidity to banks (usually against collateral) and are an essential component of the liquidity infrastructure. A large increase in central bank credit to banks and other financial institutions—as a proportion of their capital or their liabilities—often reflects severe liquidity (and frequently also solvency) problems in the financial system. Therefore, it is important to monitor through monetary and financial statistics central bank lending to financial institutions.<sup>10</sup>

**14.25** The *dispersion in interbank rates* is a very useful indicator of liquidity problems and bank distress. Very often, banks themselves first detect problems in other banks because they are exposed to such institutions in the interbank market. A high dispersion in interbank rates—measured, for instance, by the spread between the highest and lowest rates in that market—may signal that some institutions are perceived by their peers as risky. Moreover, changes in interbank credit limits or an unwillingness of some institutions to lend to other institutions may indicate serious concerns about the liquidity of the latter.

### Sensitivity to Market Risk

**14.26** As banks become increasingly involved in diversified operations and take positions in financial instruments, they become more exposed to risk of losses arising from changes in market prices—that is, to market risk. The most relevant components of market risk are interest rate and exchange rate risk. Moreover, in some countries, banks are allowed to engage in proprietary trading in stock markets, which results in equity price risk. Financial derivatives may be used to manage such risks.

**14.27** A potential indicator of sensitivity to interest rate risk is the *duration of assets and liabilities*. The

<sup>9</sup>In times of particular financial distress, dealers may not be willing to make a market at all in certain securities. Such instances can be captured through surveys of primary security dealers. See Nelson and Passmore (2001).

<sup>10</sup>Such transactions may also have important implications for the conduct of monetary policy and the financial position of the central bank.

greater the mismatch in duration or “average” life between assets and liabilities, the greater the interest rate risk, and the greater the likely impact of changes in interest rates on earnings and capital. Alternatively, gap analysis can be used to assess interest rate risk. For floating-rate nonequity assets and liabilities, gap analysis considers the average time to repricing; for fixed-rate instruments, the focus is on the time remaining until payments are due.

**14.28** The most common measure of *foreign exchange exposure* is the net open position, as defined by the BCBS, and a commonly used measure of a bank’s equity risk exposure is its *net open position in equities*.

### Other Financial Corporations

**14.29** FSIs on the other financial corporations sector help monitor, and raise awareness of, potential risks emanating from this sector. Such indicators should provide information on the size of the other financial corporations sector—*other financial corporations assets to total financial system assets*—to gain a sense of its systemic importance. The size threshold in terms of systemic importance would vary from country to country depending on the institutional setting, such as the manner in which other financial corporations raise funds from the public (and segments of the public—small savers or wholesale investors—from which they raise funds). The indicator *other financial corporations assets to GDP* can also provide information on the importance of the sector. Finally, very rapid expansion of credit and accumulation of assets in general may indicate the potential for problems in this sector.

**14.30** The development of FSIs for other financial corporations is at an earlier stage than that for deposit takers.

### Nonfinancial Corporations

**14.31** The quality of financial institutions’ loan portfolios is directly dependent on the financial health and profitability of the institutions’ borrowers, especially the nonfinancial corporations sector; it is, therefore, important to monitor the financial condition of the sector.

**14.32** Excessive corporate leverage increases the vulnerability of corporate entities in the event of a shock

and may impair their repayment capacity; a common indicator is *total debt to equity*, also called the gearing (or leverage) ratio.

**14.33** Profitability is a critical determinant of corporate strength, affecting capital growth, ability to raise equity, operating capacity, ability to withstand adverse shocks, and, ultimately, repayment capacity and survival. Sharp declines in corporate sector profitability may serve as a leading indicator of financial system distress. The most significant measures of profitability include (1) *return on equity* (EBIT to average equity), (2) *return on assets* (EBIT to average assets), and (3) *income to sales* (EBIT to sales).<sup>11</sup> The absolute levels of these ratios are important, but it is equally important to focus on trends. Information on profitability is particularly affected by market structure—that is, industry characteristics, competitive environment, and pricing flexibility.

**14.34** Earnings can also be viewed in relation to a company’s burden of fixed charges. Cash flow adequacy is often measured by the ratio of earnings to interest expenses, or by the ratio of *earnings to interest and principal expenses*. Earnings can be measured before interest and taxes (EBIT). These ratios indicate the likelihood of corporate financial distress better than corporate leverage, as low debt-service capacity suggests growing financial fragility. Moreover, corporate liquidity determines the sector’s ability to carry out business without endangering credit quality.

**14.35** Assessments of corporate sector vulnerability should also measure the *net foreign exchange exposure to equity*, since significant currency depreciation could put severe pressure on those banks whose clients have large foreign currency debt-servicing burdens. This applies both to firms borrowing domestically in foreign currency and firms turning to foreign sources of financing.<sup>12</sup>

**14.36** A measure of bankruptcy trends in this sector is provided by the *number of applications for protection*

<sup>11</sup>Pretax measures of profitability provide measures of the income earned through the activities of the enterprise during a given period independent of the tax regime (which can differ widely among countries), and thus, such measures are suitable for international comparisons.

<sup>12</sup>In some cases, strengthened financial sector supervision may create incentives for firms to borrow abroad, thereby shifting to the corporate sector vulnerabilities related to foreign exchange exposure.

from creditors, which is affected by the quality and nature of bankruptcy (and other related) legislation.

## Households

**14.37** The size of household exposure to the deposit takers can be substantial. Furthermore, household consumption behavior has a strong effect on the corporate sector, while household asset portfolio decisions can affect bank liabilities and bank asset prices.

**14.38** The vulnerability of households may be assessed through the use of sectoral balance sheets, flow of funds, and other macro- and microeconomic data. Indicators include the ratios of *debt to GDP*, *debt to assets*, and *debt service and principal payments to income*. Other indicators that can be used derive from credit risk analysis, such as the ratio of a household's debt to the value of collateral it has pledged.

**14.39** Most of the analysis of the vulnerability of the household sector is focused on the direct exposure of deposit takers to households and thus relies heavily on the analysis of households' debt-servicing capacity. Alternatively, indicators of the asset composition

of households' portfolios highlight households' exposures to equity and real estate price movements.

## Real Estate Markets

**14.40** Rapid increases in *real estate prices*—often fueled by expansionary monetary policy or by large capital inflows—followed by a sharp economic downturn can have a detrimental effect on financial sector soundness, by affecting credit quality and the value of collateral.

**14.41** Ideally, a range of indicators should be analyzed to get a sense of real estate market developments and to assess financial sector exposure to the real estate sector. To determine the riskiness of this exposure, it is necessary to distinguish among different types of real-estate-related loans that may have very different risk characteristics. For example, it would be useful to distinguish between lending (1) for the purpose of investment in (purchase of) *commercial real estate*, or more generally, to construction companies, and (2) for the purpose of investment in *residential real estate*, including mortgages.