Chapter Three

Accounting Principles for Financial Soundness Indicators

Introduction

3.1   To compile both position and flow data for use in calculating FSIs a consistent set of accounting principles is required. This chapter provides guidance on accounting principles that could be employed, drawing on existing international standards and taking account of the analytical needs of FSI data. But it is recognized that at this time, in practice, there is no full-fledged adherence to internationally agreed prudential, accounting, and statistical standards by all countries. So, in disseminating any information, countries are encouraged to disclose the basis of accounting that is used to compile FSI data series, along with the critical assumptions made.

Definition of flows and positions

3.2   In the *Guide*, flow data include transactions in goods, services, income, transfers, nonfinancial and financial assets; holding gains and losses arising from price or exchange rate movements; and other changes in the volume of assets, such as losses from extraordinary events. Under certain circumstances, potential costs can also be included. Position data are the value of outstanding stocks of nonfinancial and financial assets, and liabilities.[22]

Time of recognition of flows and positions

3.3   The guiding principle in the *Guide* is that flows and positions should be recorded using the accrual basis of accounting. On this basis, flows are recognized when economic value is created, transformed, exchanged, transferred, or extinguished. In other words, under accrual accounting, revenue and gains are recognized in the period when they are earned, and expenses and losses when they are incurred, rather than when cash is received or disbursed. Existing actual assets and liabilities are recognized, but contingent positions are not.

3.4   The accrual approach to recording is adopted because by matching the time of recognition with the time of resource flows and the time of gains and losses in value, the economic consequences of transactions and events on the current health and soundness of the reporting entities is best observed. Moreover, this method has the advantage of capturing all types of resource flows regardless of whether or not cash has been exchanged.

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[22] A fuller definition of transactions and other flows, and of positions, is provided on pages 72 to 78 of the *1993 SNA* and on pages 9 to 12 of the *European System of Accounts 1995* (see Eurostat, 1996). However, potential costs cannot be included as flow data within the conceptual framework of the *1993 SNA*.

3.5   Whether assets and liabilities exist and are outstanding is determined at any moment in time by the principle of ownership.[23] So for debt instruments, the creditor owns a claim on the debtor, and the debtor has an obligation to the creditor.[24]

3.6   When a transaction occurs in assets, the position should be recorded on the date of the change of ownership (the value date), when both creditor and debtor have entered the claim and liability, respectively, in their books. If an existing asset is sold by one entity to another, the first entity derecognizes and the second entity recognizes the asset on the date of the change of ownership. The date of recording may actually be specified to ensure matching entries in the books of both parties. If no precise date can be fixed on which the change in ownership occurs, the date on which the creditor receives payment in cash or in some other asset is decisive. When a service is rendered, interest accrues, or an event occurs that creates a transfer claim (such as taxation), a financial claim is created and exists until payment is made or forgiven. Service charges, like interest, can accrue continuously. After dividends are declared payable, they are recorded as liabilities/assets until paid.

3.7   The *Guide* recommends that interest costs accrue continuously on debt instruments, matching the cost of funds with the provision of funds and increasing the principal amount outstanding until the interest is paid.[25] The preference of the *Guide* is that interest should accrue at the rate—effective yield—agreed at the time of the issuance of the debt instrument. For example, for a loan this is the contractual rate of interest. Thus, for fixed-rate instruments, the effective yield is the rate of interest that equates the future payments to the issue price. For variable-rate instruments, the yield will vary overtime in line with the terms of the contract. No adjustment should be made to interest income for any gains or losses arising from financial derivatives contracts, as these are recognized as gains and losses on financial instruments (see paragraph 4.22). These recommendations for the accrual of interest are largely consistent with the approach in the related international statistical and accounting standards.[26] However, it is recognized that for data compiled under IASs, when an instrument is traded, interest accrues for the new creditor at the effective yield at the time of acquisition of the instrument and not the effective yield at the time of issuance of the instrument.[27]

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[23] IASs use the criteria of the probability of future economic benefits that can be measured reliably and of control to recognize assets. In recognizing subsidiaries, the *Guide* also adopts the concept of control (see paragraph 5.7).

[24] So the *Guide* does not recognize any unilateral repudiation of debt by the debtor.

[25] Interest accrual on nonperforming assets is discussed in Chapter 4.

[26] Under some accounting systems certain fees are treated as an integral part of the effective yield of a financial instrument, and hence, affect the rate at which interest accrues. As discussed under "Fees and Commissions receivable/payable" in Appendix IV, this approach is followed in IASs.

[27] This opens the possibility that there could be asymmetric reporting of interest income for traded financial instruments by debtor and creditor deposit-takers. One possibility is to calculate interest income based on the average current effective yield during the period. Such a yield may be observable by both parties so reducing

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3.8   For interest costs that accrue in a recording period, these transactions should be recorded as an expense (income) in that period. For position data, there are three measurement possibilities: (1) interest costs that accrue are paid within the reporting period, in which instance there is no impact on end-period positions; (2) they are not paid, because they are not yet payable, for example, interest is paid each six months on a loan or debt security, and the position is measured after the first three months of this period—in which instance, the positions increase by the amount of interest that has accrued during the three-month period; or, (3) they are not paid when due, in which instance, the positions increase by the amount of interest costs that has accrued during the period (excluding any specific provisions against such interest—see also paragraph 4.19). The *Guide* recommends including interest costs that have accrued and are not yet payable as part of the value of the underlying instruments.

3.9   For bonds issued on discount or on a zero-coupon basis, the difference between the issue price and the value at maturity is treated as interest, and recorded as accruing over the life of the bond. As calculated interest income exceeds any coupon payments for these instruments, the difference is included in the outstanding principal amount of the asset. For instruments issued at a premium, coupon payments will exceed calculated interest income, with the difference reducing the principal amount outstanding.

Arrears

3.10   When principal or interest payments are not made when due, such as on a loan, arrears are created. Arrears should continue to be recorded from their creation, which is when payments are not made,[28] until they are extinguished, such as when they are repaid, rescheduled, or forgiven by the creditor. Arrears should continue to be recorded in the underlying instrument (excluding any provisions for accrual of interest on nonperforming assets—see also paragraph 4.19).

3.11   If debt payments are guaranteed by a third party (guarantor) and the debtor defaults, the debtor records an arrear until the creditor invokes the contract conditions permitting the guarantee to be exercised. Once exercised, the debtor no longer records an arrear as the debt is attributed to the guarantor. In other words, the arrear of the debtor is extinguished as though repaid. Depending upon the contractual arrangements, in the event of a guarantee being exercised, the debt is not classified as arrears of the guarantor but instead is classified as a short-term debt liability until any grace period for payment ends.

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the possibility of asymmetric reporting. However, a consensus on the merits of adopting such an approach more generally in macroeconomic statistics has not emerged at the time of writing the *Guide*.

[28] It is recognized that in some instances, arrears arise for operational reasons rather than a reluctance or inability to pay. Nonetheless, in principle, such arrears, when outstanding at the reference date, should be recorded as arrears.

Contingencies

3.12   Many types of contractual financial arrangements between institutional units give rise to conditional requirements either to make payments or provide items of economic value.[29] In this context, "conditional" means that the claim only becomes effective if a stipulated condition or conditions arise. These arrangements are referred to as *contingent items* and are not recognized as financial assets (or liabilities) in the *Guide*, because they are not actual claims (or obligations). Nonetheless, such arrangements represent potential exposures to risks.

3.13   The types of contingent arrangements for which data could be collected on the basis of the maximum potential exposures[30] are described ahead:

3.14   *Loan and other payment guarantees* are commitments to make payments to third parties when another party, such as a client of the guarantor, fails to perform some contractual obligations. These are contingent liabilities because payment is only required if the client fails to perform and until such time no liability is recorded on balance sheet of the guarantor. The common type of risk assumed by a deposit-taking guarantor is commercial risk or financial performance risk of the borrower.

3.15   Included under payment guarantees are *letters of credits (LoC)*. Irrevocable and stand-by LoCs are guarantees to make payment upon nonperformance by the client provided all the conditions in the letter have been met. LoCs are an important mechanism for international trade. Revocable LoCs allow the terms of the letter to be changed without prior approval of the beneficiary. Also included are *performance bonds* that normally cover only part of the contract value but in effect guarantee a buyer of goods, such as an importer, that the seller, such as an exporter, will meet the terms of the contract.

3.16   *Lines of credit* and *credit commitments,* including undisbursed loan commitments, are contingencies that provide a guarantee that undrawn funds will be available in the future, but no financial liability/asset exists until such funds are actually advanced.

3.17   Included under credit commitments are unutilized back-up facilities such as *note issuance facilities* (NIFs) that provide guarantees that parties will be able to sell short-term debt securities (notes) that they issue and that the financial corporations providing the facility will purchase any notes not sold in the market. Other note guarantee facilities providing contingent credit or back-up purchase facilities are *revolving underwriting facilities* (RUFs),

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[29] In the *Guide*, financial derivatives instruments, as defined in Chapter 4, including credit derivatives, are actual—not contingent—positions.

[30] The valuation of contingent liabilities is complex and, amongst other things, depends upon the probability of the contingent "event" occurring. Valuation of contingent liabilities is discussed in more detail in Chapter 9 of IMF (2003a).

multiple options facilities, and *global note facilities* (GNFs). Both banks and nonbank financial institutions provide such back-up purchase facilities.

3.18   Also, *potential* costs—such as potential losses of deposit-takers on financial assets in general or costs of nonfinancial corporations associated with product warranties—are not recognized in the *Guide* as liabilities on balance sheet as no clear legal claim/liability exists. However, if such potential costs can be valued reliably, they are included as an expense in the income statement (e.g., as a provision) as such an approach provides a better measure of current financial health. It is preferred that the amounts so provisioned be included as a general reserve in capital and reserves,[31] consistent with prudential regulation but not with IASs (see also Box 4.3).

3.19   If such costs are subsequently realized there is no impact on net income because the costs have already been recognized,[32] but general reserves (and so capital and reserves) decline. Also, there is either a decline in the value of assets—through say a settlement of the expense, or a decline in the value of an instrument—or a liability is recognized on balance sheet. Overestimation of potential costs could be reversed in subsequent periods, increasing income, such as through a lower amount of provisioning.

Valuation

3.20   The *Guide* prefers valuation methods that can provide the most realistic assessment at any moment in time of the value of an instrument or item.[33] This approach supports macroprudential analysis by facilitating the compilation of more reliable measures of capital strength and profitability than provided by other approaches.

3.21   Crucial in determining the valuation approach to adopt is whether, or not, a market exists for the instrument or for similar instruments (or items) that can allow a reliable measure of value to be established. [34] When an instrument is tradable the expectation is that it

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[31] Consistent with the approach in IASs, such potential costs could arise from future judicial settlements and/or other penalties arising from past actions that contravene existing legislation. For deposit-takers, and consistent with the approach in IASs, amounts set aside for general banking risks, outside of provisions for losses on assets, should not be provisioned through the income statement but appropriated from retained earnings. See Chapter 4 for a detailed exposition of expenses to be included in the income statement for deposit-takers.

[32] If a specific provision is made from the general reserve then in that period, all other things being equal, in the income statement specific provisions increase and general provisions decrease, with no impact on net income. However, the value of the instrument against which the specific provision has been made declines, as do provisions in capital and reserves by the amount of the specific provision.

[33] Including real estate and other nonfinancial assets.

[34] IASs 39.95-102 outlines fair value measurement considerations and emphasizes that fair value is reliably measured if, (a) the variability in the range of fair value estimates is not significant for the instrument, and (b) the probabilities of the various estimates within the range can be reasonably assessed and used in estimating fair value. Moreover, IAS includes the idea that reliability encompasses the ability of the user to rely that data presented are fairly representing what they purport to represent.

should be valued at market or fair value (approximation of market value). For nontradable instruments, the *Guide* acknowledges that nominal value[35] (supported by appropriate provisioning policies) may provide a more realistic assessment of value than the application of fair value. For such instruments, application of fair value when a significant degree of subjectivity is involved could diminish the reliability of data for macroprudential analysis. For transactions, the market value is the amount of money that willing buyers pay to acquire something from willing sellers.

3.22   It is recognized that the use of market or fair value can introduce fluctuations into the valuation of assets and liabilities that may prove temporary. Nonetheless, at any moment in time, the opportunity costs facing the creditor and debtor, as reflected in the market or fair value, provide the most relevant, but not perfect, basis for assessing financial soundness. In this light, an institution that owns securities that have fallen significantly in value but which are valued on the balance sheet on an historic cost basis will be overstating its capital strength—and so its financial soundness—because the institution cannot realize the value for the assets recorded on the balance sheet. Moreover, an institution that holds assets on an historic cost basis and has a weak capital position and low profitability has an incentive to sell those assets that show a significant gain in the market and hold those that do not, thereby boosting profits and capital while the overall quality of assets held deteriorates.

3.23   Information on the trends in market prices overtime is of analytical value in its own right, not least in allowing the price risk associated with the end-period observation to be assessed. Given this, it might be appropriate to monitor period-average, and end-period market prices for representative assets and liabilities of the reporting population. Data on average period market prices could also help indicate unusual outlier observations in end-period market price data.

Transactions

3.24   Transactions are generally valued at the actual prices agreed by the transactors, including sales of instruments classified as nontradable such as loans. Market price equivalents might be needed when no actual market price is set or where the value is far from the prevailing market value—for instance, for transactions between related entities. In such instance, a customary approach is to construct market prices by analogy with known market prices for the same or similar items established under conditions that are considered

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[35] Nominal value is the amount the debtor owes to the creditor at any moment in time. This value is typically established by reference to the terms of a contract between the debtor and creditor. It reflects the value of the claim/liability at creation, and any subsequent economic flows, such as transactions (e.g., repayment of principal), valuation changes (including exchange rate and other valuation changes other than market price changes), and any other changes (such as write-offs). Conceptually, the nominal value of a debt instrument can be calculated by discounting future interest and principal payments at the existing contractual interest rate(s) on the instrument; the latter may be fixed-rate or variable-rate. Nominal value is not necessarily face value, which is the undiscounted amount of principal to be repaid. For equity instruments, the nominal value is the amount(s) contributed by shareholders.

essentially the same. Any difference from such an estimated price and the transaction price could be classified as a subsidy from one party to the other (see also paragraph 4.30).

Positions

3.25   The market value of an asset or liability on the balance sheet is a measure of what the financial and nonfinancial asset or liability is worth in the market at the reference date of the balance sheet.

3.26   The market value for a traded instrument at a reference date should be determined by the market price for that instrument prevailing on the date to which the position relates. Such a price is the best indication of the value that economic agents currently attribute to specific financial claims. The ideal source of a market price for a traded instrument is an organized exchange or other financial market (e.g., an over-the-counter, or off-exchange market) in which the instrument is traded in considerable volume and the market price is listed at regular intervals. If the markets are closed on the reference date, the market price that should be used is that prevailing on the closest preceding date when the market was open. In some financial markets, the market price quoted for traded debt securities does not take account of interest costs that have accrued but are not yet payable; but in determining market value, these interest costs need to be included.

3.27   When specific assets are not traded in organized exchanges or other financial markets but are tradable, various approaches can be taken to estimate the market value. The preferred approach in the *Guide* is to estimate the present value of the instrument by discounting the expected stream of future benefits associated with the asset at an appropriate market rate of interest.[36] Both the *1993 SNA* and IASs support this approach.[37]

3.28   The method requires that (1) the future cash flows are known with certainty or can be reliably estimated, and (2) a market interest rate or series of market interest rates are observable (such as through reference to a similar instrument(s) traded in organized markets).

3.29   Other approaches to estimating market or fair value can include using market prices that are observable for similar assets that are traded; using a market-related price reported for accounting or regulatory purposes; and for nonfinancial assets, accumulating and revaluing

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[36] Options and instruments with embedded options are not valued by this method. Instead, pricing could require the use of an appropriate options pricing model.

[37] The formula for calculating the discounted present value is $\sum_{t=1}^{n} \frac{(cash\ flow)_t}{(1+i)^t}$

Where *(cash flow)$_t$* denotes the cash flow in a future period (*t*), *n* denotes the number of future periods for which cash flows are expected, and *i* denotes the interest rate that is applied to discount the future cash flow in period *t*. A single discount rate, i, is usually used to discount the cash flow in all future periods. In some circumstances, using different discount rates in the various future periods may be warranted.

acquisitions less disposals of the asset in question over its lifetime, including taking account of depreciation (consumption of fixed capital)[38] or amortization costs. If used, these methods should be applied consistently both over time and, where relevant, in debtors and creditors' financial statements.

3.30   For some financial instruments, such as loans, currency and deposits, and trade credit, because of their nontraded nature and the difficulty of reliably pricing such instruments at fair value, nominal value may provide the most realistic measure of value. Such instruments may be predominant in the balance sheet of deposit-takers. Nonetheless, for nontraded instruments, particularly loans, recorded at nominal value, the creditor (but not the debtor) should reduce the balance sheet value of the asset for expected losses by making specific provisions or otherwise writing down the value of the asset. Provisioning is discussed in more detail in Chapter 4 in the section on deposit-takers.[39]

3.31   If an instrument that is considered to be nontradable is sold or transferred to another entity, in the absence of market or fair valuation the transaction value should be the basis for any subsequent balance sheet valuation. So, for instance, if a deposit-taker sold a portfolio of loans that are not tradable to another deposit-taker at a heavily discounted price, the initial balance sheet value for the purchaser should be the purchase price. The seller would record as a loss in the income statement, under gains and losses on financial instruments, the difference between the value on the balance sheet (after deduction of specific provisions) at the end of the previous period and the sale value.

3.32   As markets and valuation techniques develop, the likelihood could increase of estimating fair values for nontraded instruments that provide for a more realistic measure of value than nominal value—such as using information from credit derivatives linked to the credit risk of individual entities. In such instances, compilers are encouraged to compile information on market or fair values of nontraded instruments initially as supplementary information so that the implications of market (fair) valuation for such instruments can be assessed.

3.33   The value of a share and other equity investment in an associate and unconsolidated subsidiary is equal to the investor's proportionate share, in terms of ownership of the equity capital, of the value of the capital and reserves of the associate/subsidiary. Any equity investment by an associate or unconsolidated subsidiary in the parent investor (known as a reverse equity investment) is similarly valued. In practice, balance sheet values of these entities are generally utilized to determine the value of this investment. If the investor sells equity such that they no longer retain an associate stake but still retain some equity in the other entity, the remaining investment is valued in the same manner as for any other equity

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[38] Depreciation is discussed in Chapter 4 (paragraph 4.30).

[39] Depending on national accounting practices, loan values could increase if information exists to make such a revaluation.

investment. On the other hand, if the investor adds to an equity investment such that an associate or subsidiary stake is created, the whole investment is valued on a proportionate basis.

Residence

3.34   In the *Guide*, residence (or location) is a relevant concept as the location of a deposit-taker, and in some instances that of its parent, determines the extent to which data should be collected. The same holds true for other types of entities. The residence of a parent deposit-taker determines the residence of the deposit-taking group. When such deposit-takers have international operations, it is essential that account is also taken of the activity of their foreign branches and subsidiaries through consolidation of their domestic and foreign operations. Domestically located deposit-takers are those resident in the economy—a host country concept consistent with the approach taken in economic statistics.

3.35   The concept of residence is not based on nationality or legal criteria, but rather on whether an institutional unit has a center of economic interest—dwelling, place of production, or other premises—in the economic territory of the country in question, from where it intends to engage (indefinitely or for a year or more) in economic activities and transactions on a significant scale. So, corporations (or quasi-corporations) are residents of a country in which they are ordinarily located. This concept is central to the compilation of national accounts data.

3.36   The economic territory of a country covers geographic territory administered by a government within which persons, goods, and capital circulate freely, and includes free trade zones, entrepots, bonded warehouses or factories that are physically located within a country's boundaries. This territory is not always based strictly on physical or political borders, although there is usually a close correspondence.[40] In recording the geographic distribution of assets, claims of deposit-takers or other lending entities are attributed to economies on the basis of the residence of the entity on which they have a claim.

Some specific aspects of residence

3.37   A *branch or subsidiary* is resident in the economy in which it is ordinarily located, because it engages in economic activity and transactions from that location, rather than necessarily the economy in which its parent is located.

3.38   The residence of *offshore units* is attributed to the economies in which they are located. For instance, in some countries, deposit-takers, including branches of foreign banks,

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[40] A country's economic territory includes (1) airspace, (2) territorial waters, (3) any continental shelf lying in international waters over which the country enjoys exclusive rights or over which it has, or claims to have, jurisdiction with respect to the right to exploit natural resources such as fish, minerals, or fuels, and (4) clearly demarcated territorial enclaves that are located in the rest of the world and are established by formal agreements with the governments of the countries in which the enclaves are physically located.

are licensed to take deposits from and lend primarily, or even only, to residents of other economies, and are treated as "offshore banks." These banks usually face different exchange or other regulatory requirements and may not be required to provide the same amount of information to supervisors as "onshore" banks. Nonetheless, they are resident in the economy in which they are located.

3.39   Similar issues can arise with "*brass plate companies*," "*shell companies*," or "*special purpose entities*" (SPEs). These entities may have little physical presence in the economy in which they are legally incorporated or legally domiciled (e.g., registered or licensed), and any substantive work of the entity may be conducted in another economy. In such circumstances, there might be debate as to where the center of economic interest for such entities lies. The *Guide* attributes residence to the economy in which the entity, which has the liabilities on its balance sheet—and, therefore, on whom a creditor has a claim—is legally incorporated, or in the absence of legal incorporation, is legally domiciled.

3.40   However, "brass plate companies," "shell companies," or SPEs, if deposit-takers, should be included in the cross-border consolidated information of the parent deposit-taking entity.

3.41   A *household* is resident in the country in which its members maintain regular residence. The situation differs for military personnel and civil servants (including diplomats) employed abroad in government enclaves such as military bases and embassies, and for students and medical patients abroad, who remain members of households in their home countries.

3.42   The *ownership of land and structures* within the economic territory of a country is not deemed to be sufficient in itself for the owner to have a center of economic interest in that country. When an owner of land or buildings in an economy is a resident of another economy, he/she is classified as a nonresident from the viewpoint of the first economy.

3.43   Unless *agents* take positions between the borrower and the creditor bank on to their own balance sheets, the debtor/creditor relationship is between the lending bank and the borrowing entity, with the agent merely facilitating the transaction by bringing the borrower and lender together.

Domestic and foreign currencies, unit of account, and exchange rate conversion

3.44   The extent to which assets and liabilities on the balance sheets of corporations are denominated in foreign currencies and the degree to which currency risks are matched, is important for financial stability analysis because of the potential impact on the domestic currency value of assets and liabilities from movements in foreign exchange rates.

3.45   Domestic currency is the one which is legal tender in the economy and issued by the monetary authority for that economy or for the common currency area to which the economy

belongs.[41] Any currencies that do not meet this definition are foreign currencies to that economy. Under this definition, an economy that uses as its legal tender a currency issued by a monetary authority of another economy—such as U.S. dollars—or of a currency area to which it does not belong should classify the currency as a foreign one, even though domestic transactions are settled in it.

3.46   In the *Guide*, the currency composition of assets and liabilities is primarily determined by characteristics of the future payment(s). Foreign currency instruments are those payable in a currency other than the domestic currency. A subcategory of foreign currency instruments comprises those payable in a foreign currency but with the amounts to be paid linked to a domestic currency (domestic-currency-linked instrument). Foreign-currency-linked instruments are those payable in domestic currency but with the amounts to be paid linked to a foreign currency. Domestic currency instruments are those instruments payable in the domestic currency and not linked to a foreign currency. In the unusual instance of debt instruments with interest payments to be paid in a foreign currency but principal payments to be paid in a domestic currency, or vice versa, only the present value of the payments to be paid in a foreign currency need be classified as a foreign currency instrument.

3.47   From the perspective of the national compiler, the domestic currency unit is the obvious choice in which to calculate FSIs. Such data are compatible with the national accounts and most of the economy's other economic and monetary statistics, which are expressed in that unit. However, if the value of the domestic currency is subject to significant fluctuation relative to other currencies, a statement denominated in domestic currency could be of diminished analytical value, because valuation changes could make period-to-period comparisons less meaningful.

3.48   The calculation of FSIs can be complicated by the fact that transactions, other flows, and positions may be expressed initially in a variety of currencies or in other standards of value. Their conversion into a reference unit of account is a requisite for the construction of a consistent and analytically meaningful set of FSI statistics. The most appropriate exchange rate to be used for conversion of position data denominated in foreign currencies into the unit of account is the market (spot) exchange rate prevailing on the reference date to which the position relates. The midpoint between buying and selling rates is preferred to ensure consistency of approach among the reporting population. For conversion of an instrument in a multiple rate system,[42] the rate on the reference date for the actual exchange rate applicable to the specific liabilities or assets should be used. Transactions and other flows in foreign currencies should be converted at the market exchange rate—the midpoint between buying

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[41] In this context, a common currency area is one in which more than one economy belongs, and has a regional central bank with the legal authority to issue the same currency within the area. To belong to this area, the economy must be a member of the regional central bank.

[42] A multiple exchange rate system is one in which there are schedules of exchange rates, set by the authorities, and where different exchange rates are applied to various categories of transactions/transactors.

and selling rates is preferred—prevailing at the moment when the transaction occurs. If this information is not available, the average rates for the shortest period applicable should be used. If only information on aggregated transactions over a period is available, then the average exchange rate over this period is a suitable proxy.

Maturity

3.49   Maturity is relevant for financial stability analysis both from a liquidity viewpoint (e.g., in calculating the value of liabilities falling due in the short-term) and from an asset/liability mismatch perspective (e.g., in estimating the effect of changes in interest rates on profitability). In the *Guide*, short-term is defined as a maturity of one year or less[43] and long-term as a maturity of more than one year (or no stated maturity).

3.50   One approach is to determine the maturity classification of financial instruments on the basis of the time until repayments of principal (and interest) are due—known as remaining maturity (and sometimes referred to as residual maturity).[44] Another approach uses the maturity at issuance—known as original maturity—thus indicating whether the funds were raised in the short-term or long-term markets.

3.51   Yet another approach to maturity is to calculate the *duration* of assets and liabilities. Duration is the weighted average term to maturity of a financial instrument and can be used as a measure of the sensitivity of the value of financial assets to changes in interest rates, rather than of maturity as such.

3.52   For a given portfolio of financial assets and liabilities the magnitude of gains or losses arising from potential interest rate changes can be estimated using duration analysis, and compared with capital and reserves.

3.53   The longer the duration of a portfolio, the greater the gains (or losses) for any given change in interest rates. Therefore, if despite the matching of the maturities of financial assets and liabilities, the timing of the cash flows on assets and liabilities is not perfectly matched, that is the duration of assets and liabilities differ, corporations can be open to gains (or losses) as interest rates change. [45]

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[43] For financial instruments, inter alia, this category includes amounts payable on demand and those debt instruments redeemable at short notice.

[44] Strictly defined, the outstanding amount of short-term assets or liabilities on a remaining maturity basis is the present value of payments due in one year or less. In practice, short-term remaining maturity can be measured by adding the present value of outstanding debt (original maturity) to the present value of long-term debt (original maturity) to be paid in one year or less.

[45] Macaulay duration can be calculated as follows:

3.54   For fixed-rate instruments, the time period until the receipt/payment of each cash flow, such as six months, is weighted by the present value of that cash flow as a proportion of the present value of total cash flows over the life of the instrument. So, the more cash flows are concentrated toward the early part of an instrument's life, the shorter the duration relative to maturity. Duration equals remaining maturity only for zero-coupon instruments. In the *Guide*, the preferred approach is that the discount rate used to calculate present value of each payment is the current yield to maturity of the instrument.

3.55   For a floating-rate instrument, its duration is the time until the next interest rate reset date rather than the time until the receipt/payment of each cash flow.

3.56   Depending upon the analytical need, the instrument coverage of duration measures can vary. Shares and other equity are typically excluded from the calculation.

$$D_i = \frac{\sum_{t=1}^{N} CF_t \times DF_t \times t}{\sum_{t=1}^{N} CF_t \times DF_t} = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} PV_t}$$

where,

D_i = Duration measured in years for instrument i

CF_t = Cash flow to be received on the financial instrument at end of period t

N = Last period in which the cash flow is received—maturity of instrument

DF_t = Discount factor = $1/(1+R)^t$ where R is the yield or current level of interest rates in the market

$\sum_{t=1}^{N}$ = Summation sign for addition of all terms for t=1 to t=N

PV_t = Present value of the cash flow due at the end of the period t, which equals CF_t x DF_t

The use of a single interest rate as the discount factor implies that changes in interest rates result in a parallel shift in the yield curve. Alternatively, to account for the possibility of changes in the shape of the yield curve as interest rates change, specific discount factors for each cash flow could be employed. However, this approach might be harder to implement in practice.