

Chapter 37: From-Whom-To-Whom Tables and related financial indicators

(New chapter with loose links to SNA 2008 Chapter 27)

A. Introduction

- 37.1 This chapter describes the from-whom-to-whom (FWTW) dimension of the relevant components in the sequence of economic accounts as well as a series of institutional sector related financial indicators. It focuses on the increased importance of highlighting the inter-relationships among the institutional sectors of the economy using the transactor approach, in terms of financial transactions and positions as well as non-financial transactions. This chapter also discusses the usefulness of financial indicators in better understanding the financial situation of the institutional sectors, both individually and how they relate to each other, as well as to the economy as a whole.
- 37.2 The SNA standard presentation of institutional sector accounts, as presented in the sequence of economic accounts in chapters 8 to 14, is not explicitly designed to show the intersectoral linkages, as it mainly focuses on answering “who does what”, and not “who does what with whom”.
- 37.3 However, the SNA provides an integrated framework for developing data on financial transactions, other flows and balance sheets, as well as current and capital transactions, on a FWTW basis, because its underlying principles ensure that the linkages of the economic and financial actions of an economy and its sectors are captured.
- 37.4 Promoting the implementation of the FWTW intersectoral relationships for financial positions and flows together with the institutional sector accounts is an important step towards filling one of the most significant data gaps identified during the global financial crisis that began in 2007-08.
- 37.5 The integrated framework on a FWTW basis allows certain questions to be answered, such as: who is financing whom and who is exposed to whom, to what amount, and with which type of financial instrument? As regards the allocation of income, it also permits tracing who is paying income (e.g. interest) to whom and who is receiving income from whom.
- 37.6 The reasons to collect, compile and present FWTW flows and stocks are analytical but also statistical:
- a) FWTW statistical information considerably enriches the method of monitoring the transmission of monetary policy and the impacts of financial shocks. Because price and interest changes of the various financial assets and liabilities of the various sectors play a major role in this process, the analysis may also focus on stock-flow adjustments among the various institutional sectors. In this respect, FWTW statistical information makes it possible to analyse how inter-sectoral relationships for flows and stocks of financial assets and liabilities have changed as a consequence of policy decisions and other events;
 - b) This information also helps to identify data problems and improve quality, as well as improve consistency across related statistical products. Datasets can be covered by more than one data source (which may also provide be an opportunity to enhance consistency across related macroeconomic statistical products), by only one data source, and by no data source owing to the lack of primary statistics. An example of data point with no data source might be trade credits provided by non-financial corporations to households. If sub instrument FWTW details on trade credits are available in some sources and incorporated in the macro data set, then the household estimates can be improved in quality (from a pure residual approach).
- 37.7 This chapter complements Chapter 8 of the Monetary and Financial Statistics Manual and Compilation Guide (MFSMCG) 2016 that deals with financial statistical tables and the IMF’s balance sheet approach to financial stability work, as well as the chapter 6 of the UN handbook on Financial Production, Flows and Stocks in the System of National Accounts (FPFS) 2015 that discusses the from-whom-to-whom tables.
- 37.8 Section B presents a concise overview of the general structure of FWTW-tables, while section C deals with some key data sources, such as source data containing counterpart data and security-by-security

databases. Section D shows some possible uses of detailed FWTW tables. Section E concludes this chapter with an overview of financial indicators that can shed light on financial risks and vulnerabilities.

B. Overview of table structures and additional considerations

37.9 There are essentially two data structures within institutional sector accounts, both of which basically present similar information albeit in a different format: matrix-type of presentation and presentations of FWTW-information in a time series format. These may relate to positions of financial instruments, financial transactions, certain income and capital transactions, revaluations and other changes in volume data. While it is possible to construct matrix-type of FWTW tables for different periods, the time series perspective provides a better view on select information for consecutive periods.

1. Matrix-type of presentations of institutional sector accounts

37.10 The matrix structure presents, for selected flows or positions recorded in the sequence of economic accounts, an overview of the interlinkages between sectors and counterparty sectors for a certain period (in the case of flows) or at a certain point in time (in the case of positions). Such matrices have been in use for some time but have gained much more prominence after the global financial crisis that began in 2007. This crisis clearly showed the relevance of these interdependencies, and the related financial risks and vulnerabilities, between sectors and countries, leading to a cascade of events spreading across the world.

Balance sheet matrix

37.11 The balance sheet matrix presents, for any given point in time, the stocks of financial assets and liabilities, whereby the holders of financial assets, typically presented in the columns of the matrix, are cross-classified with the issuers of the relevant liabilities, typically presented in the rows of the matrix. As in the case of the sequence of economic accounts, for each instrument, total assets equal their corresponding liabilities. The balance sheet matrix may provide FWTW details by transactor for selected instruments, such as debt securities and their characteristics (such as currency and maturity), but may also relate to the sum of or the details for all financial assets and liabilities (see Table 8.5 in the MFSMSCG 2016), or to a certain grouping of financial assets and liabilities which is of particular interest. It is a statement of the financial positions of sectors as well as the linkages between institutional sectors and shows the accumulation of funds having been transferred from surplus to deficit sectors alongside the corresponding financial exposures of sectors to other sectors.

37.12 Table 37.1 provides a basic example of the relationship between debtors and creditors for debt securities, with creditors on the horizontal axis and debtors on the vertical axis.

Table 37.1: FWTW table for positions in debt securities

HOLDERS→ ----- ISSUERS↓	Resident non- financial corporations	Resident financial corporations	Resident general government	Resident households and NPISHs	<i>Total economy*</i>	Non- residents	All holders (matrix total)
Resident non-financial corporations	20	90	10	40	160	40	200
Resident financial corporations	10	30	10	20	70	30	100
Resident general government	30	100	10	80	220	80	300

Total economy	60	220	30	140	450	150	600
Non-residents	30	50	10	10	100		100
All issuers (sector totals)	90	270	40	150	550	150	700

*Sum of resident sectors

Financial account matrix

37.13 The financial account matrix is similar to the balance sheet matrix, except that it records transactions in financial assets and liabilities in a certain period of time, broken down by sector and counterparty sector using the transactor approach. In particular for tradable securities, the transactor approach means that for *primary market* transactions new issues (liability) and the purchases (asset) of those issues are netted (i.e., gross new issues are recorded net of redemptions/repurchases); and in the case of subsequent *secondary market* activity, the asset-side transactions in those same securities are also shown net (i.e., purchases less sales) without explicitly accounting for the changes in the counterparty sectors of the debtors as financial transactions. This information can be very useful in identifying how net borrowing sectors finance their deficits and which net lending sectors provide the necessary funds. Like the balance sheet matrix, the financial accounts matrix may be compiled for selected financial transactions, or for certain grouping of financial instruments. For example, table 37.1 above can also be constructed for transactions in debt securities, possibly delineating the counterparties of new issues of debt securities from the purchases and sales of outstanding securities. Some countries may also be able to present supplementary information on gross basis, with respect to transactions in securities.

2. FWTW-information in a time series format

37.14 While the matrix presentation is very useful for providing a bird eye's view of the interrelationships between sectors, analysis often requires a focus on the developments over time of the interrelationships for any given sector(s) and any given financial instrument. This can be done by re-ordering the information in the FWTW-matrices in a time series format, whereby for a certain financial instrument each of the sectors holding the assets show a breakdown of the sectors which have issued the relevant financial asset.

37.15 A FWTW table in time series format presents the inter-sectoral relationships for a given instrument over time on a transactor basis. It displays the evolution of selected financial instruments from both the asset and the liability perspective, thus allowing the users to analyse the changing patterns in the financing by debtors and the related financial exposures of creditors over time, and also allowing for a deeper understanding of the financial risks and vulnerabilities of a certain sectors or the economy as a whole.

37.16 Table 37.2 is basically a re-arrangement of Table 37.1. The time series dimension is presented on the horizontal axis, while creditors and debtors are shown sequentially on the vertical axis.

Table 37.2: FWTW-table for positions in debt securities in a time series format

STOCKS	T	T+1	...	T+n
Held by: Non-financial corporations	90			
Issued by: Non-financial corporations	20			
Issued by: Financial corporations	10			
Issued by: General government	30			
<i>Total economy*</i>	60			
Issued by: Non-residents	30			
All issuers	90			
Held by: Financial corporations	270			
Issued by: Non-financial corporations	90			

Issued by: Financial corporations	30			
Issued by: General government	100			
<i>Total economy*</i>	220			
Issued by: Non-residents	50			
All issuers	270			
Held by: General government	40			
Issued by: Non-financial corporations	10			
Issued by: Financial corporations	10			
Issued by: General government	10			
<i>Total economy*</i>	30			
Issued by: Non-residents	10			
All issuers	40			
Held by: Households and NPI	150			
Issued by: Non-financial corporations	40			
Issued by: Financial corporations	20			
Issued by: General government	80			
<i>Total economy*</i>	140			
Issued by: Non-residents	10			
All issuers	150			
Held by: <i>Total economy</i>	550			
Issued by: Non-financial corporations	160			
Issued by: Financial corporations	70			
Issued by: General government	220			
<i>Total economy*</i>	450			
Issued by: Non-residents	100			
All issuers	550			
Held by: Non-residents	150			
Issued by: Non-financial corporations	40			
Issued by: Financial corporations	30			
Issued by: General government	80			
<i>Total economy*</i>	150			
Issued by: Non-residents				
All issuers	150			
Held by: ALL HOLDERS	700			
Issued by: Non-financial corporations	200			
Issued by: Financial corporations	100			
Issued by: General government	300			
<i>Total economy*</i>	600			

*Sum of resident sectors

3. Additional considerations on FWTW-tables

37.17 Although the FWTW-tables presented above show information on the interrelationships between the main sector for a certain financial instrument, they are still aggregated ones that, while useful, may be somewhat limited in their analytical capacity. For example, it may be important to know the long-term and short-term split of debt securities, or to have details on debt securities denominated in domestic currency versus those denominated in foreign currency. It may also be considered useful to have deeper breakdowns of sectors and counterparty sectors. As an example, a demand to better understand non-depository financial institutions is greatly enhanced by including financial corporations' subsectors in FWTW-tables. The level of detail will obviously depend on the availability of the required source data, which is discussed in section C below.

37.18 While the discussion thus far has focused on debt securities, as noted before, FWTW-tables can be constructed for any of the financial instruments, either stocks or transactions, source data permitting. However, certain financial instruments such as loans, debt securities and equity tend to feature more prominently in FWTW-tables because they tend to be key sources of lending and borrowing, subject to various types of risks and vulnerabilities and usually a variety of sectors involved.

4. Extensions of FWTW-tables

- 37.19 FWTW-tables have generally been understood to cover financial positions and/or financial transactions by instrument, as generally illustrated by tables 37.1 and 37.2. However, the inclusion of selected components of the current and capital accounts can add to the analytical usefulness of these statistics. Certain components of the current and capital accounts lend themselves quite readily to the FWTW-table structure, such as earned income transactions as well as current and capital transfers.

Earned income transactions - investment income

- 37.20 Earned income components can also be cast in the FWTW-framework, and some countries have adopted a FWTW-table approach for investment income. This articulates income associated with financial instruments by debtor and creditor sectors. These can be used for analysis of the flows of interest and dividends by institutional sector and counterparty sector. It can also serve as a tool for data quality purposes. By checking the consistency of financial positions with related flows of investment income. For example, the relationship between interest or dividend transactions in the current accounts with related debt or equity instruments in the balance sheets, together with information on holding gains and losses can generate average implicit yields that help to interpret the financial positions of sectors.

Current transfers

- 37.21 Revenues and expenditures for transactions recorded in current transfers other than social transfers in kind account can also be compiled on a FWTW-basis. For example, there may be policy or analysis related interest for additional details on current taxes by type, or social contributions and benefits, or the components of other current transfers in terms of which (sub)sectors are paying and receiving. As another example, for employer's pension plans one could combine the FWTW-tables for components of investment income, income transfers, financial transactions and positions, to provide an integrated approach to employer sponsored pensions over a given time period.

Capital transfers

- 37.22 It is also possible to construct FWTW tables on receipts and payments for the elements of capital transfers and their sub-components -- capital taxes, investment grants, and the various elements of other capital transfers. The latter could include inter-sectoral details on compensation for extensive damages, exceptionally large insurance settlements from natural disasters, calls on standardized guarantees, etc. (data confidentiality permitting).

5. Cross country tables

- 37.23 Where positions and/or transactions with non-residents can be broken down by country and sector, linkages across economies can be better followed. Global FWTW tables (sometimes referred to as global flow of funds analysis) with such detail could highlight the financial relationships across economies. As an example, many country analysts were interested in exposures to US banks during the financial crisis. The data limitations can be significant in developing such tables. See paragraphs 37.45 and 37.464 for a further discussion on the potential to provide cross-country details on a FWTW-basis.

6. Quality considerations

- 37.24 Analysis can be limited by the quality of the estimates on the various sectors, even in the case of aggregated FWTW-tables. For example, the split between the bond holdings of households and non-financial corporations in tables 37.1 and 37.2 above may be based on simple rules of thumb, due to gaps in the source data. In this case, the table may be less useful, although the table still accurately accounts for two-thirds of the holding of debt securities in the financial corporations, government, and non-resident sectors, respectively. Alternatively, households and non-financial corporations could be grouped together. On the other hand, it may be known with some degree of certainty that the remaining one-third is largely held by the households sector, so the allocation can be considered as reasonably accurate. In all cases, it is important to provide additional metadata on the quality aspects of the statistics presented.

- 37.25 Accuracy issues should not necessarily preclude more disaggregated FWTW-tables. It is standard practice that compilers use whatever source data are available and ideally include them in the compilation of their financial accounts and balance sheets for institutional sectors, including underlying details such as the FWTW-information. If the source data show to be inadequate, or simply missing, for certain financial instruments, one may want focus on certain financial instruments for which source data are considered of sufficient quality. The next section briefly discusses some source data that are important in the context of financial accounts and balance sheets, as well as for more disaggregated FWTW-data.

C. Counterpart data and security-by-security databases

1. Introduction

- 37.26 In the past, compilers relied more heavily on survey and information from regulators and umbrella organizations (e.g., investment fund institutes, central credit unions) and other information to compile the individual pieces of the institutional sector accounts. This resulted in a more than desirable reliance on residual derivation in sectors for which very limited or no direct source information was available. In recent decades various national agencies (e.g., financial institutions' regulator authorities) and international agencies have supported the need to improve the quality of the source data for compiling the institutional sector accounts. As an example, the development and increased availability in many countries of monetary and financial statistics as well as government finance statistics have helped complete and standardize financial reporting in many countries. All of these efforts have supported and strengthened statistics in the financial corporations' and government sectors, both critical areas in the sector accounts, including additional details. In addition, there has been a great deal of development in external sector statistics in many countries, with respect to both instrument details and stock data.
- 37.27 The availability and analytical usefulness of FWTW-tables is to a significant degree dependent on the availability of more detailed source data, including an increasing reliance on microdata on, for example, securities. The efforts by many statistical agencies and central banks, as well as by international organizations, over the years have been facilitated by the further development of databases and related data infrastructure systems in the last decades. This has led to an expanded emphasis on source data on counterparty sectors and their microdata equivalence of security-by-security databases. In addition, one can observe an increasing availability of additional dimensions, such as the term structure and currency composition, for key financial instruments.

2. Data on counterparty sectors

- 37.28 Data on counterparty sectors for a few financial instruments can be relatively straightforward. For example, certain types of government savings bonds can only be issued to households. Other counterparty data may come from supplementary information from deposit-taking financial institutions. For example, a deposit liability broken down by counterparty sector from banks may provide high quality FWTW-information on this financial instrument which can replace lower quality survey data on the holdings of deposits. This may also include a term structure for the deposits and a domestic-foreign currency split. Similarly, loan assets by counterparty sector from financial corporations may provide FWTW-information that is superior to the source data from debtors and may also include term structure and currency composition.
- 37.29 Security-by-security (SBS) data are compiled by many countries for use in the compilation of financial accounts and balance sheets. Data on new issues of debt and equity securities can be obtained from corporations supporting these markets, such as flotation corporations and exchanges, or from companies that compile and sell this information. Such databases include the new issues of securities, broken down by security, and they usually also include information on the terms and issue rates of the security, the redemption, the current value, the currency of issue, the security identifier number, and other details (sometimes the initial purchaser), etc. In the case of debt securities, this supplementary information can allow for the calculation of market values, revaluations and accrued interest. This high-quality information can replace survey data and provide the sub-instrument detail in FWTW-tables for issuers (liability side), such as currency, maturity and interest rate breakdowns.

- 37.30 In some economies, compilers have been able to augment their SBS data by adding information on the asset side, by security, and matching it with the liability side information. Typically, compilers approach large institutional investors and custodians to obtain electronic data on holders' current values for the compilation of balance sheets, as well as purchases and sales of securities for the compilation of financial accounts from companies that facilitate these transactions such as brokers and exchanges or from companies that compile information on this activity. As with the liability side, this information often comes with additional details on the securities (e.g., security identifiers and currency). This is a more efficient process than trying to obtain this data via surveys, although the information might be collected under the auspices of a survey. Given the importance of securities in most economies, this type of database data is quite valuable to compilers and allows for the construction of very detailed FWTW-tables on securities to enhance their analytical potential (such as mentioned in paragraph 37.28).
- 37.31 More detailed information on source data particularly relevant for the compilation of financial accounts and balance sheets, including relevant FWTW-information can be found in chapter 7 of the UN Handbook on Financial Production, Flows and Stocks in the System of National Accounts.

D. Uses of FWTW-tables

1. Introduction

- 37.32 More recently, there has been increased interest in financial accounts and balance sheets in terms of detecting spillover effects across institutional sectors, both in the domestic economy and abroad. The financial crisis that began in 2007 gave prominence to the need for FWTW-tables as a supplement to the institutional sector accounts, with the need for more granular information on interlinkages between sector and countries in response to specific analytical issues. FWTW-tables can support a more detailed analysis of overall inter-sector relationships (e.g., between lenders and borrowers), in addition to a detailed representation of financing activities and portfolio shifts across sectors, and an enhanced analysis of selected instruments and related markets. Moreover, exposures and potential vulnerabilities may become evident from the information in the FWTW-tables, and the inter-sectoral relationships by instrument are now deemed essential to analyse and monitor. This type of analysis can also help prepare for adverse economic conditions in one sector or market that might rapidly spread to other sectors and markets and thus more broadly affect financial markets, sectors and the economy at large. While in a contagion situation, the transmission effects can be traced with the help of FWTW-tables. In addition, in the case of a complete and fully integrated sequence of economic accounts, there is the potential to trace other types of spillover effects more fully (e.g., those that originate from supply or demand shocks, unanticipated price instability for commodities or financial instruments, etc.).
- 37.33 This section discusses and illustrates some extensions of FWTW-tables and describes their applications. It is not intended to be exhaustive. In addition, it is important to note these derived tables can be customized and paired with other tables, to focus on specific aspects which are important for policy and analysis.

2. Analysis of exchange rate fluctuations and financial adjustments

- 37.34 FWTW-tables on financial transactions, as recorded in the financial accounts, can highlight the transaction-based inter-relationships across the institutional sectors of the economy in a certain period of time. These tables provide, for a financial instrument, transactor details on the issuers of liabilities and counterpart holders of assets, including subsequent sales and purchases in these financial instruments, and thus illuminate the financing activity across institutional sectors. This information can also help assess the reactions of economic agents to different events and provide a leading indicator that can help shed light on the build-up of risk and potential spillover effects across sectors.
- 37.35 It may be that in a particular period, there is an unusual swing in the exchange rate at the outset of a quarter with respect to a major foreign currency in use in the economy. In this example, it is assumed that there is an appreciation of the domestic currency over this foreign currency. A key question might be how economic agents (borrowers as well as lenders) in the economy react to this change. Some indication might be gleaned from a FWTW-table for total loans, however the foreign currency

transactions would be partially masked by transactions in domestic currency (which could be partly offsetting). In fact, this demonstrates the need to incorporate currency details in these tables. In this case, it would be useful to construct both a domestic and foreign currency FWTW-table for loans, or to incorporate both in the same table. Table 37.3 presents a simplified example of a FWTW-table for foreign currency loans.

Table 37.3: FWTW-table for financial transactions in loans, foreign currency

HOLDERS→ ----- ISSUERS ↓	Resident non-financial corporations	Resident financial corporations	Resident general government	Resident households and NPISHs	Total economy*	Non-residents	All holders (matrix total)
Resident non-financial corporations, foreign currency	10	40	0	0	50	30	80
Resident financial corporations, foreign currency	0	-10	0	0	-10	20	10
Resident general government, foreign currency	0	10	0	0	10	0	10
Resident households, foreign currency	0	0	0	0	0	0	0
Total economy, foreign currency	10	40	0	0	50	50	100
Non-residents, foreign currency	0	0	0	0	0		0
All borrowers, foreign currency	10	40	0	0	50	50	100

*Sum of resident sectors

37.36 Table 37.3 suggests some developments in the quarter, likely related to the exchange rate fluctuation. First, there has been an increase in loan borrowing in foreign currency at the economy-wide level, concentrated in non-financial corporations which borrowed from financial corporations and non-residents. Second, financial corporations also raised funds in foreign currency but shifted borrowing toward non-residents (e.g., loans from non-resident corporations) with a reduction in borrowing from resident financial corporations. And third, non-residents supplied a full half of all new funds raised in foreign currency loans.

37.37 This table could be supplemented by the term structure of those loans, which might shed some light on the short-term expectations around the exchange rate. Pairing this table with one on domestic loans would indicate whether total loans are up or down in the quarter or whether there was simply a shift towards foreign currency loans. Other financial instruments' foreign currency tables would add to the understanding of how economic agents in the economy more fully adjusted to the exchange rate movement. In particular, a FWTW-table on foreign currency and deposits, or a joint table on deposits and loans, would likely also yield useful information. In addition, for any of these tables it might be useful to include the subsector details for financial corporations, to arrive at a more complete picture of which of these types of institutional units accounted for borrowing abroad. Similarly, a time series presentation as well as corresponding balance sheet tables would add additional context to the adjustments in relation to the change in the exchange rate.

3. Analysis of a financial crisis

- 37.38 Another example concerns the impact of a financial crisis for which the catalyst was largely a sustained and significant housing bubble and a related problem of overextended credit in a mortgage market in a large economy. An analysis of the mortgage market can be supplemented. For example, the issue of sub-par mortgages could be partially spread through the securitization of mortgages and the subsequent use of credit default swaps, with adverse effects on the economy. In relatively short order, the crisis could spread to other economies and take on different forms. Detailed FWTW-tables can shed some light in this context.
- 37.39 To focus on one angle of such a crisis, it could be useful to not just monitor the growth in securitization but to also understand who was holding the potentially compromised mortgage-backed securities, how their positions changed over time, and whether the predominance of the activity was in long or short-term securities relative to the securitized assets. In other words, one may want to have available FWTW-tables for components of the debt securities included in tables 37.1 and 37.2, by breaking down short and longer-term asset-backed securities with as much sector detail as possible. This could have been paired with other FWTW-tables tied to the mortgage market and different instruments tied to liquidity (in the case of a credit crunch). In table 37.4, it is assumed that long-term asset-backed securities (ABS) are dominated by mortgage-backed securities (MBS). MBS may be available as a subcomponent of ABS. On the other hand, short-term securities may be dominated by personal loans (including credit cards) and other short-term loans as indicated by the asset composition of the issuing sector. In this case, the FWTW-table compares the issuers of ABS in the subsector other financial intermediaries, except insurance corporations and pension funds (S.125) to the holdings of ABS by term structure of the securities.

Table 37.4: FWTW-table for positions in asset-backed debt securities, by term structure

STOCKS	T	T+1	T+2	...	T+n
Issued by: ABS units in other financial institutions (S125), short-term	50	60	90		
Issued by: ABS units in other financial institutions (S125), long-term	100	140	210		
Held by: Depository corporations (S122), short-term	10	10	15		
Held by: Depository corporations (S122), long-term	20	25	35		
Held by: MMFs (S123), short-term	2	7	7		
Held by: MMF (S124), long-term	0	0	0		
Held by: NMMFs (S123), short-term	0	0	0		
Held by: NMMF (S124), long-term	20	25	35		
Held by: Other financial intermediaries (S125), short-term	10	10	20		
Held by: Other financial intermediaries (S125), long-term	10	15	25		
Held by: Insurance corporations (S128), short-term	2	2	2		

Held by: Insurance corporations (S128), long-term	15	15	20		
Held by: Pension funds (S129), short-term	14	19	29		
Held by: Pension funds (S129), long-term	25	35	55		
Held by: Government (S14), short-term	0	0	0		
Held by: Government (S14), long-term	5	5	10		
Held by: Households (S14), short-term	2	2	2		
Held by: Households (S14), long-term	5	5	10		
Held by: Other domestic sectors, short-term	0	0	0		
Held by: Other domestic sectors, long-term	0	0	0		
Held by: Total economy*, short-term	40	50	75		
Held by Total economy*, long-term	100	125	190		
Held by: Non-residents (S12), short-term	10	10	15		
Held by non-residents (S12), long-term		15	35		
All holdings, short-term	50	60	90		
All holdings, long-term	100	140	210		

*Sum of resident sectors

37.40 Table 37.4 suggests some interesting developments. Firstly, it shows a sharp increase in ABS outstanding over three time periods, with the bulk of the growth in long-term securities. What share of these new ABS is related to sub-par mortgages (future non-performing loans) is unknown, but it is likely that some of the problems in the mortgage market are reflected in the notable increase in ABS thus transmitting increased risk to investors. The table also shows that all investors have increased their holding of ABS. Pension funds more than doubled their investment, to become the largest domestic investor in ABS. Mutual funds had also increased their exposure, and it is possible that doubling of the holdings in S125 reflects issues of ABS securities that have not yet been picked up by other investors. Another possible interesting development shown in the table is the growth in short-term ABS, and the question of whether some of these are backed by longer-term assets (in this case securitized mortgages) leading to a maturity mismatch within the subsector. Lastly, non-residents have tripled their holdings of ABS, especially in the last quarter, possibly leading to a situation where some of the domestic mortgage market problems are transmitted abroad.

4. Analysis of interest rate fluctuations on investment income

37.41 For analytical purposes, the interest component of property income might be useful to focus on. For example, there can be a demand in following, during a period of interest rate fluctuations, the transactions in various interest-bearing instruments on both the expenditures and revenues sides in relation to the sectors/subsectors receiving and paying interest. In this case, one might be interested in FWTW-tables for interest transactions in deposits, loans and debt securities, possibly by term structure (one such split being between demand deposits and time deposits). Table 37.5 presents interest flows (receipts and payments) on deposits offered by domestic depository corporations, by sector, by type, and over time (assuming quarterly time periods). Such a table might be constructed in the event of a sharp increase in short-term interest rates in period $t+2$), which may or may not be sustained.

Table 37.5: FWTW-table for interest on deposits

STOCKS	T	T+1	T+2	...	T+n
Paid by: Deposit-taking corporations, demand deposits	70	80	80		

Paid by: Deposit-taking corporations, time deposits	100	109	113		
Received by: Financial corporations, demand deposits	5	6	6		
Received by: Financial corporations, time deposits	10	12	12		
Received by: Government (S14), demand deposits	5	7	7		
Received by: Government (S14), time deposits	0	0	0		
Received by: Households and NPIs, demand deposits	40	44	44		
Held by: Households (S14), time deposits	60	64	69		
Received by: Non-financial corporations, demand deposits	10	12	12		
Received by: Non-financial corporations, time deposits	20	22	22		
Received by: Total economy*, demand deposits	60	69	69		
Received by Total economy*, time deposits	70	98	101		
Received by: Non-residents (S12), demand deposits	10	11	11		
Received by non-residents (S12), term deposits	10	11	11		
All receipts, demand deposits	70	80	80		
All receipts, term deposits	100	109	113		

*Sum of resident sectors

37.42 Table 37.5 shows deposit taking sectors increasing their interest payments in t+2, reflected in higher receipts in almost all holders' subsectors. The limited increases in period t+3 suggest that the short-term rates remained at their higher level with some additional term deposits coming due and receiving a higher return. This analysis could be partnered with an accompanying FWTW-table on demand versus term deposits, in order to identify the role that any portfolio shifts may have played in the interest income changes.

37.43 More generally, a FWTW table for interest flows can be combined with a FWTW-tables on interest bearing instruments for different or all such instruments. The tables can then be combined to estimate the implicit yields in interest-bearing instruments (e.g., interest received by type of instrument over instrument holdings), though one may wish to add back the implicit financial services on loans and deposits component on deposits and loans for this exercise. The overall return on an instrument can be thought of as the property income and holding gains or losses. Holding gains/losses from the revaluation account can also be presented in a FWTW dimension. These might be used, by combining holding gains on debt and equity instruments with sector/subsector holdings to calculate a different type of implicit yield.

37.44 There are other examples of complementary FWTW-tables that can be used for purposes of policy and analysis. For example, FWTW-tables on financial stocks and flows can be analysed in conjunction with each other for an expanded perspective on financing and its effects. A detailed sequence of accumulation accounts FWTW table can also be constructed (for any given instrument or total instruments) that incorporates stocks and flows, including holding gains and volume changes, by sector of issuer (on the vertical scale) and sectors of holders (on the horizontal scale). There might also be an interest in analysing holding gains on financial instruments with taxes on holding gains.

5. Cross-country analysis

37.45 For any given financial instrument, with debt securities being the most likely candidate, it may be possible to construct a FWTW cross-country or global FWTW table, with varying degrees of detail. Table 37.6 displays the possibilities for countries A, B, C, and D, where good quality bilateral data allow for such a more detailed analysis. It may also be possible to include some or all of the sector details, by country, data sources permitting. Such a table would clearly show the global and sectoral interconnectivities related to this instrument. The IMF has undertaken related work with respect to certain financial instruments (e.g., the coordinated portfolio investment survey (CPIS)), and some of these are more likely to be able to be broken down by sector. There have also been proposals and initiatives with respect to international exchanges of data for securities (see IFC paper “The IMF balance sheet approach: towards from-whom-to-whom information on cross-border portfolio securities”, 2018).

Table 37.6: Financial instrument holdings and outstanding issues by country

Holder/ issuer resident in	Holders, by sector Country A	Holders, by sector Country B	Holders, by sector Country C	Holders, by sector Country D	Holders, by sector Other countries	TOTAL All holders
Issuers, by sector Country A						
Issuers, by sector Country B						
Issuers, by sector Country C						
Issuers, by sector Country D						
Issuers, by sector Other countries						
TOTAL all issuers						

37.46 More generally, it may be possible to construct a global FWTW-table across certain countries for the net international investment position (net IIP), assuming that some or all of the supporting key sub-instrument details and the required geographical data are available. The analysis can be enhanced for selected countries that have broken down their IIP assets and liabilities by institutional sector. Such a table would show how the sectors in these economies are related to each other, via the net international claims. However, the data demands are quite significant for such an endeavour, given that not all international assets and liabilities may be able to be readily broken down by sector and by geographical region. Nevertheless, such a table would be possible to be compiled for countries with good bilateral/multilateral data, supplemented by other sources of data and some degree of estimation.

E. Related financial indicators

1. Introduction

37.47 This section underlines the usefulness of a framework that can help assess the financial health of individual sectors and subsectors, and touches on some existing and newer approaches in this area. FWTW-information may add to the analytical usefulness of such indicators, by providing granular information that allows for the tracing of debtor-creditor relationships among institutional sectors.

2. The balance sheet approach to financial stability

37.48 Interest in balance sheet data as a means to detect financial risks and vulnerabilities post-financial crisis

is alluded to in the above. It is also evident in some of the updated data frameworks, including work undertaken at the IMF in the Monetary and Financial Statistics domain, that focusses on the assets and liabilities of financial corporations, and the IMF's Financial Soundness Indicators. This also concerns the Balance Sheet Approach to Financial Stability developed by the IMF (see IMF Working Paper, A Balance Sheet Approach to Financial Crisis, 2002; and Balance Sheet Analysis in Fund Surveillance, 2015), which is an analytical framework for understanding financial crises in emerging markets based on an examination of various financial asset and/or liability stock variables in the main sectors of the economy as well as for the balance sheet of the economy. This effort also applies to developed economies, many of which have made use of similar indicators for some time, but usually not as systematically as in the balance sheet approach. The approach basically augments the longer-standing analysis which mainly focused on flow variables (e.g., current account, fiscal balance) or on aggregated indicators.

37.49 The balance sheet approach helps to highlight how balance sheet problems in one sector can spill over into other sectors. Sectoral balance sheets can help analysts evaluate the trade-offs between different policy objectives that arise after sectoral problems may have expanded into a systemic threat to the financial and economic system. Some financial crises occur from a gradual build-up of risk in certain sectors (endogenous factors), while others are precipitated or exacerbated by adjustments in portfolios from an initial shock (exogenous factors). In all cases, timely balance sheet statistics can help shed light on potential vulnerabilities.

37.50 Specifically, the balance sheet approach assesses the balance sheet of an economy's major sectors, for maturity, currency, capital structure mismatches and solvency issues. When such problems arise, these are not typically confined to the original sectors or instruments, and each can be further analysed in the context of specific FWTW tables. The following main mismatches can be distinguished:

- **Maturity mismatches** can occur in instances where there is a large gap that between liabilities due in the short term and liquid assets, which can leave a sector or subsector unable to meet its contractual commitments on debt. This can occur if the refinancing of short-term debt is problematic, such as temporarily not possible or demands a higher return for the refinancing. This is also known more broadly as liquidity risk. FWTW tables can identify the potentially vulnerable counterparty holders of the short-term debt.
- **Currency mismatches** can occur in a situation where liabilities are primarily denominated in foreign currency, but financial assets are largely in domestic currency. This can create an ongoing problem in terms of principal and interest payments on debt, which can be exacerbated by a domestic exchange rate depreciation. Alternatively, there can be a situation where financial assets are largely stated in foreign currency relative to assets, then a capital loss can occur if the foreign currency depreciates relative to the domestic currency resulting in a different type of potential debt service issue. FWTW-tables on foreign debt (e.g., loans and securities) can shed light on the counterparties at risk.
- **Capital structure issues** cover instances where there is a relatively heavy reliance on debt (e.g., in the non-financial corporations' sector) as opposed to equity financing, which can result in a situation that is untenable in the face of a sharp or sustained drop in income. This is also referred to as assessing a firm's leverage and is measured by its debt-to-equity ratio. In such a scenario, FWTW-tables can display the counterparties that are exposed to the debt.
- **Solvency issues** cover instances where current financial assets and expected future revenue streams are insufficient to cover the liabilities, including any contingent liabilities. This situation can occur due to sustained weak income performance and/or a gradual build-up of debt, or it can arise in conjunction with some of the other situations described above.

37.51 The analysis above can be augmented by combining key indicators related to currency and maturity characteristics for relevant financial instruments, such as deposits, loans, and debt securities in FWTW-tables. As one example, a FWTW-table for stocks of debt securities (such as table 37.1) of resident issuers and holders, by sector, as well as the rest of the world, with currency and maturity details might

be possible to construct for some countries. As another example, a FWTW-table could be constructed for stocks of foreign debt securities with currency and maturity details for resident holders by institutional sector relying mainly on data from the Coordinated Portfolio Investment Statistics (CPIS). At the limit, it might be possible to extend table 37.6 to add maturity and currency details for select countries and instruments, provided that quality bilateral data are available.

3. Some other financial indicators

37.52 There are indicators which may complement the balance sheet approach discussed above and can be extended beyond financial and non-financial corporations sectors.

- **For corporations**, expanding on maturity mismatches, a *current ratio* can be calculated as short-term assets to short-term liabilities, as a measure of the ability meeting current obligations. This measure usually excludes receivables and payables and can also exclude inventories. *Tobin's Q* can be calculated as the ratio of the market value of equity to its own funds at book value and it is indicative of any premium or discount that investors have assigned to corporate shares.
- **For any given sector**, the leverage calculation can be applied as liabilities relative to net worth or financial net worth.
- **For all sectors of the economy**, a further liquidity indicator that can be used in all sectors is the ratio of short-term to long-term debt, which is used to assess the degree of, and possible risk associated with, a sustained shift towards shorter-term debt. The composition, and changes in the composition, of assets-liabilities by institutional sector and subsector is important for monitoring structural changes and preferences with respect to liquidity and risk. As a more detailed supplement to this exercise, FWTW-tables as presented in tables 37.1 and 37.2, can also be compiled in percentage form for any given financial instrument.

37.53 There are also a series of ratios that use balance sheet and other data to measure and monitor issues associated with financial stability.

- **For corporations**, the *performance ratio* is the measure of saving or undistributed earnings to equity (own funds at book value), which compares earnings to shareholders' investment. For non-financial corporations the *return ratio* compares net operating surplus to non-financial assets.
- **For all sectors**, the ratio of interest (and possibly principal) payments to debt - *the debt service ratio* - is a useful supplement to leverage measures. The *internal to external sources of funds ratio* provides an indication of the funds borrowed or raised externally to saving or sales of financial assets. The ratio of saving or net lending to GDP/GNI is a broad indication of the sector's role in providing funds for its own financing or for other sectors of the economy. All of these indicators can change significantly during periods of economic stress.
- **For government** gross or net debt to GDP/GNI ratios have been in use for a long time for various purposes (e.g., debt sustainability, the ability for fiscal stimulus, etc.). These measures can be enhanced by further breakdowns of debt in selected FWTW-tables.