II
National Accounts

Many early writers on economics, such as Adam Smith, focused on national wealth as an indicator of economic strength and performance. Later writers on economic theory, such as Keynes, Frisch, and Tinbergen, focused on economic flows. One major advance that the *System of National Accounts 1993 (1993 SNA*; Commission of the European Communities and others, 1993*)* made was to effectively marry these two approaches by linking in detail the accounts that present transactions and other economic flows with the balance sheets that present stocks of wealth.

The *1993 SNA* provides readers with a comprehensive and systematic framework for collecting, presenting, and analyzing macroeconomic statistics. In a sequence of accounts, the framework presents a mass of details about how an economy works and how economic agents interact. Through this system, the *1993 SNA* enables users to analyze the production and use of goods and services and to measure the gross domestic product (GDP)—the basic production concept of the *1993 SNA*. It enables users to analyze the incomes generated by that production, earned from the ownership of assets and redistributed within the economy. It also allows users to identify the capital and financial flows that take place. It provides information not only about economic activity but also about the levels of an economy's productive assets and the wealth of its inhabitants.

Further, the *1993 SNA* addresses closely related issues, including methodology for compiling price and volume indices for flows of goods and services; detailed supply and use tables (SUTs) showing how economies allocate supplies of goods and services from domestic and imported sources between intermediate or final uses (including exports); information on the ways in which analysts define and classify the items in the accounts, notably the key production and asset boundaries; and labor force indicators.

The following sections (1) summarize the sequence of *1993 SNA* accounts, provided in a diagram of the *1993 SNA* framework; (2) introduce the starting point in the framework—measuring the GDP; (3) illustrate the

additional wealth of information found in the details of the sequence of accounts; and (4) review issues related to the *1993 SNA*, such as volume and real income measures, quarterly national accounts data, important boundaries, labor force indicators, multifactor productivity, environmental and economic accounting, and informal sector and illegal activities.

Summary: Sequence of Accounts in the *1993 SNA* Framework

Built around a sequence of interconnected flow accounts and stocks presented in balance sheets, the main sets of accounts in the *1993 SNA* framework are the *current accounts*, the *accumulation accounts*, and the *balance sheets*. In these sets, each flow account pertains to a different type of economic activity, and each balance sheet records the value of assets and liabilities held at the beginning or end of the period.

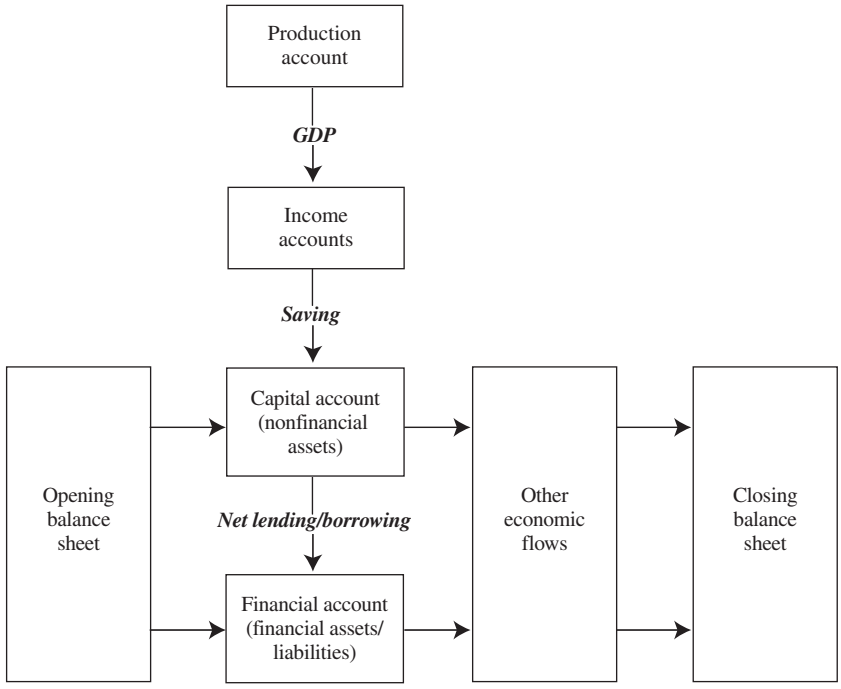
The *current accounts* comprise the *production account*, which measures GDP, and the *income accounts,* which derive national income, national disposable income, and saving.

The *accumulation accounts* consist of the *capital account*, which records transactions in nonfinancial assets and capital transfers; the *financial account*, which records transactions in financial assets and liabilities; and the accounts for *other economic flows*, which record revaluations and other changes in the volume of assets. In the capital account, the balancing item is *net lending/borrowing* (NL/B). If an economy's saving and capital transfers exceed its net acquisition of nonfinancial assets, then it is a net lender to the rest of the world. Conversely, if its net acquisition of nonfinancial assets exceeds its saving and capital transfers, it is a net borrower from the rest of the world. In the financial account, the transactions in financial assets and liabilities reflect the NL/B.

The *balance sheets* show the stock of assets and liabilities at the beginning and end of each period and are fully integrated with the transactions and other economic flows for those assets and liabilities. The balancing item for the balance sheets is *net worth*.

How are the accounts presented in the *1993 SNA* framework? The sequence of accounts and balances can be presented for the economy as a whole and/or for different institutional sectors to show the contribution of each sector to the economy. Table 1 illustrates the framework, and more detail is shown in the description of the sequence of accounts later in this chapter.

TABLE 1. *1993 SNA* FRAMEWORK



Before showing the details of the sequence of accounts, the next section illustrates the starting point of the *1993 SNA* framework—measuring the GDP, the basic production concept of the *1993 SNA*.[6]

Measuring Gross Domestic Product

To measure GDP, analysts use three standard approaches: the production, income, and expenditure approaches. In the *1993 SNA* framework, the production approach is presented in the production account, the income approach in the generation of income account, and the expenditure approach

[6]In a number of countries, an alternative measure known as gross national product (GNP) is emphasized. It is equal to GDP plus net primary income flows with the rest of the world. In the *1993 SNA*, GNP is more correctly referred to as gross national income (GNI).

in a rearrangement of the goods and services account. Before describing the approaches, the *1993 SNA* defines GDP as indicated below.

Defining GDP

GDP is the sum of *value added* produced by all institutional units resident in the domestic economy plus the value of *taxes less subsidies on products.* In the definition, *value added* equals the value of output less the values of goods and services (intermediate consumption) used to produce this output. Also in the definition, *taxes on products*[7] have a direct bearing on measuring GDP.

In its treatment of taxes, the *1993 SNA* distinguishes between taxes levied because production takes place but that *cannot be related to a specific product*, and taxes levied on the value or volume of *specific* products. Examples of the nonspecific product taxes are import duties (*taxes on products)* and payroll taxes (*other taxes on production*), whereas a sales tax is an example of a specific product tax.

Although users sometimes think of GDP as equal to the sum of the value added by resident producers, they should be mindful that value added excludes taxes on products, whereas the value of goods and services includes them. Thus, to ensure that the value of supply equals the value of use, analysts need to add back the taxes on products to the value added.

In addition, *other taxes on production* have a bearing on measurement when value added is summed at *basic prices*—the preferred valuation of output of a producing unit in the national accounts. The basic price includes other taxes on production payable by the producer, because units treat them as production costs needing to be covered by the price. The basic price excludes taxes on products, because the unit considers the taxes income for the government, not the producer.

To understand the basic principles for measuring GDP, let us assume that a country produces wheat, cotton, steel, flour, bread, cloth, dresses, cigarettes, and automobiles. How is this production to be accounted? An establishment or enterprise may use some of the goods produced by other establishments as its inputs. Wheat is used in the production of flour, cotton in the production of cloth, and so on. To avoid any duplication in accounting, recorders must subtract from the value of the output of all resi-

[7]The discussion has been couched in terms of taxes on production but applies equally to subsidies on production. Subsidies are effectively a negative tax.

dent producing units their intermediate consumption (the inputs of goods and services used up in the process). The measure would be of the *value added* to intermediate consumption to generate the output.

Production Approach

The above approach to measuring GDP is termed the *production approach* and is presented in the production account of the system. GDP is termed gross because no deduction has been made for the consumption of fixed capital (depreciation) used in production. It is useful to note that GDP is measured at market prices.[8]

Income Approach

An alternative approach to measuring GDP is to sum the incomes generated by the productive process. Called the *income approach,* the method involves summing compensation of employees, taxes less subsidies on production, and the operating surplus/mixed income of the producer. *Mixed income* simply refers to the surplus owned by households as producers—economists consider it a combination of compensation of employees and operating surplus. *Compensation of employees*, a broad term, includes not only wages and salaries paid directly but also various indirect benefits of employment, such as employers' contributions to social security and pension funds. This approach is presented in the generation of income account of the system.

Expenditure Approach

A third method of calculating GDP is to sum the final use of the output produced. Called the *expenditure approach,* this involves a summation and a subtraction: (1) summing the values of (a) final consumption (that is, goods and services used up by individual households or the community to satisfy their individual or collective needs or wants), (b) gross capital formation (that is, gross fixed capital formation, changes in inventories, and net acquisition of valuables), and (c) exports of goods and services and (2) subtracting imports of goods and services. *Gross fixed capital formation* is measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period plus certain addi-

[8]GDP at factor cost is not a concept used explicitly in the system.

TABLE 2. GOODS AND SERVICES ACCOUNT

Resources		Uses	
Output, basic prices	3,604	Intermediate consumption	1,883
Taxes less subsidies on products	133	Final consumption expenditure	
		Government	368
Imports of goods and services	499	Households and NPISH	1,031
		Gross capital formation	
		Gross fixed capital formation	376
		Changes in inventories	28
		Acquisitions less disposals of valuables	10
		Exports of goods and services	540
Total supply	**4,236**	**Total use**	**4,236**

tions to the value of nonproduced assets realized by the productive activity of institutional units.

The expenditure approach is based on the fact that the total supply of goods and services must be allocated to a use: for intermediate/final consumption of goods and services, fixed capital formation, inventories, valuables, and exports.[9] It involves a rearrangement of the goods and services account of the *1993 SNA*, as in Table 2.[10]

From this account (see Table 2), a well-known identity is readily apparent between the resources and uses of the total supply of goods and services. That is, the total resources consist of the sum of output and imports, and total uses consist of the sum of consumption, investment, and exports.

Moving intermediate consumption from the right-hand side of the account to the left as a negative resource, while moving imports from the left-hand side to the right as a negative use, results in both sides now summing to GDP (Table 3). In Table 3, the left-hand side presents the production approach and the right-hand side presents the expenditure approach.

In algebraic terms, this relationship can be presented as $GDP = C + I + G + (X - M)$, where C is final consumption expenditure of households and

[9]The third category of capital formation, net acquisition (that is, acquisitions less disposals) of valuables, was introduced in the *1993 SNA*. Valuables (such as precious stones and metals and paintings) are used as "stores of value" and not for consumption or production.

[10]Tables 2 through 6 in this chapter include sample data entries based on the data examples given in the *1993 SNA*.

TABLE 3. GROSS DOMESTIC PRODUCT

Production Approach		Expenditure Approach	
Output, basic prices	3,604	Final consumption expenditure	
Less intermediate consumption	–1,883	Government (*G*)	368
Gross value added	**1,721**	Households and NPISH (*C*)	1,031
		Gross capital formation (*I*)	
		Gross fixed capital formation	376
Taxes less subsidies on products	133	Change in inventories	28
		Acquisitions less disposals of valuables	10
		Exports of goods and services (*X*)	540
		Less imports of goods and services (*M*)	–499
GDP	**1,854**	**GDP**	**1,854**

NPISH, *I* is gross capital formation, *G* is final consumption expenditure of government, *X* is exports of goods and services, and *M* is imports of goods and services.

Although analysts greatly emphasize measuring GDP, the details of the *1993 SNA*'s sequence of accounts present a good deal more useful information as well. In essence, users can compile the accounts for each institutional sector in the economy (for example, general government) and for the economy as a whole.[11] Such sectoral accounts usefully inform users about the structure of an economy and changes in that structure over time.

Details: The Sequence of Accounts

As noted earlier, the main sequence of accounts is the current, accumulation, and balance sheet accounts. Current accounts consist of production and income accounts; accumulation accounts consist of capital, financial, and other economic flow accounts; and balance sheets present the stock information.

Further, each account includes a balancing item—a residual from the transactions recorded on the two sides of the account. The balancing item from one account is carried forward as the first item in the following account, thereby making the sequence of accounts an articulated whole. The

[11]The sequence of accounts can also be applied at the level of the individual institutional unit, which makes it a very powerful compilation and verification framework.

main balancing item from the current accounts is *saving*, and the main balancing item from the capital account is *NL/B*, which is also the balancing item for the financial account.

We begin with the current accounts (Table 4).

Current Accounts

Production accounts

The *production account* emphasizes *value added* measured on both a gross and a net basis. Gross value added is derived as the difference between the value of output and the value of goods and services (intermediate consumption) used to produce this output. Intermediate consumption does not cover the progressive wear and tear of fixed capital, which is recorded as a separate transaction (consumption of fixed capital), making the difference between the alternative gross and net balancing items.[12] Users can derive these balancing items for each institutional sector. For the economy as a whole, after allowing for taxes less subsidies on products, the balancing item is GDP—the sum of gross value added for each sector—and the net balancing item is *net domestic product*.[13]

Income accounts

The *income accounts* are the generation of income, allocation of primary income, secondary distribution of income, and use of income.

The *generation of income account* shows the *primary incomes* that originate from production (primary income accrues to units from their involvement in production or their ownership of assets). That is, the account shows how value added is allocated from the producers' point of view. The account shows the charges producers have to meet—out of value added (as a resource)—to the government through taxes less subsidies on production and to employed labor as compensation of employees. The balancing item is *operating surplus/mixed income*.

The *allocation of primary income account* focuses on the *recipients* of primary incomes from production, as well as on the recording of the distribution of income from the ownership of financial assets, land, and

[12]Accounting for the consumption of fixed capital in any account in this sequence will result in a net measure for the balancing item.

[13]Users may be also interested in information on an industry breakdown of GDP and its components. SUTs provide this information, discussed in the annex to this chapter.

TABLE 4. CURRENT ACCOUNTS

Uses		Resources	
		Production account	
Intermediate consumption	1,883	Output, basic prices	3,604
Domestic product, gross (GDP)	***1,854***	Taxes less subsidies on products	133
Less consumption of fixed capital	–222		
Domestic product, net	***1,632***		
		Generation of income account	
Compensation of employees	762	GDP	**1,854**
Taxes less subsidies on production			
Taxes less subsidies on products	133		
Other taxes less subsidies on production	58		
Gross operating surplus/mixed income	***901***		
		Allocation of primary income account	
Property income payable	391	Gross operating surplus/mixed income	**901**
National income, gross	***1,883***	Compensation of employees	766
		Taxes less subsidies on production	191
		Property income receivable	416
		Secondary distribution of income account	
Current taxes on income, wealth, etc. payable	212	National income, gross	**1,883**
Social contributions payable	322	Current taxes on income, wealth, etc. receivable	213
Social benefits payable	332	Social contributions receivable	322
Other current transfers payable	269	Social benefits receivable	332
National disposable income, gross	***1,854***	Other current transfers receivable	239
		Use of income account	
Final consumption	1,399	National disposable income, gross	**1,854**
Saving, gross	***455***		
Less consumption of fixed capital	–222		
Saving, net	***233***		

Note: The system described is for transactions between resident units in which both ends of the transaction are recorded—their resource and use. But since one end of some transactions may be a use or resource of nonresident units, then to close the system, the national accounts has a "rest of the world" segment, not illustrated here. For example, compensation of employees in the generation of income account may be paid to resident and nonresident employees, but compensation of employees in the allocation of income account is that received by resident households only, but would include income received from nonresident units.

subsoil assets (property income). Because domestic flows of property income are resources for some sectors and uses for others, they appear on both sides of the account.[14] For the total economy, *national income* is the balancing item.[15]

The *secondary distribution of income account* shows how the balance of primary incomes of sectors (national income) is transformed into its *national disposable income* by the receipt and payment of current transfers. By definition, current transfers cover current taxes on income, wealth, and so forth; social contributions and benefits; and other current transfers. Because these transfers are resources for some sectors and uses for others, they appear on both sides of the account. For a measure of final consumption and saving, analysts can use the balancing item *national disposable income*. It equals national income plus net current transfers from the rest of the world.

The *use of income account* shows how national disposable income is allocated between final consumption and *saving*, which is the balancing item.

The next section reviews the accumulation accounts—the capital and financial accounts (Table 5) and the other economic flows (Table 6).

Accumulation Accounts

Capital account

The *capital account* records the transactions—acquisitions/disposals—of nonfinancial assets and capital transfers (see Table 5). The right-hand side of the account comprises saving and net capital transfers (that is, changes in net worth owing to saving and capital transfers). The left-hand side shows transactions in nonfinancial assets.

If, in the capital account, the aggregate of saving and capital transfers exceeds the net acquisition of nonfinancial assets, the balancing item is *net lending* (+), which measures the surplus an economy has lent to the rest of the world. On the other hand, if saving and capital transfers, and so forth, are

[14]Compensation of employees is recorded in both the generation and allocation of income accounts. In the former, it would be compensation paid to resident and nonresident households, whereas for the latter it would be compensation received by the resident household sector.

[15]*National income* is commonly defined as GDP plus net primary income receivable from the rest of the world.

TABLE 5. CAPITAL AND FINANCIAL ACCOUNTS

Changes in Assets		Changes in Liabilities and Net Worth	
	Capital account		
Gross fixed capital formation	376	Saving, net	**233**
Less consumption of fixed capital	–222	Capital transfers, receivable	62
Change in inventories	28	Capital transfers, payable	–65
Net lending (+)/borrowing (–)	***38***	**Changes in net worth due to saving and capital transfers[1]**	**230**
	Financial account		
Net acquisition of financial assets	641	Net incurrence of liabilities	603
Monetary gold and SDRs	–1	Currency and deposits	132
Currency and deposits	119	Securities other than shares	123
Securities other than shares	138	Loans	217
Loans	244	Shares and other equity	43
Shares and other equity	44	Insurance technical reserves	36
Insurance technical reserves	36	Financial derivatives	0
Financial derivatives	0	Other accounts payable	52
Other accounts receivable	61		
		Net lending (+)/net borrowing (–)	**38**

[1]This item is not a balancing item but corresponds to the total of the right-hand side of the capital account.

insufficient to finance the net acquisition of nonfinancial assets, the balancing item is *net borrowing (–),* which corresponds to the deficit the economy has been obliged to finance by borrowing from the rest of the world.

Financial account

The *financial account* shows how an economy undertakes the NL/B through transactions in financial assets and liabilities (see Table 5). The account is classified by financial instrument, with the net acquisition of financial assets shown on the left-hand side, and the net incurrence of liabilities on the right. Users are often interested in more detail on the financial flows taking place in an economy than is provided at the aggregate level of the financial account for the whole economy, and this is illustrated in the detailed list of instruments making up the assets and liabilities.

Other economic flows

Other economic flows appear in the *other changes in volume of assets account* and the *revaluation account* (see Table 6). The other changes in volume

TABLE 6. BALANCE SHEET AND ACCUMULATION ACCOUNTS

Assets		Liabilities and Net Worth	
Opening balance sheet			
Nonfinancial assets	9,922	Liabilities	6,298
Financial assets	6,792	**Net worth**	**10,416**
Changes in balance sheet (accumulation accounts)			
1. Transactions			
Acquisitions less disposals of nonfinancial assets	192	Net incurrence of liabilities	603
Net acquisition of financial assets	641	**Changes in net worth due to saving and capital transfers**	**230**
2. Other changes in volume of assets account			
Changes in assets		Changes in liabilities	–2
Nonfinancial	10	**Changes in net worth due to other changes in volume of assets**	**17**
Financial	5		
3. Revaluation account			
Nominal holding gains (+)/losses (–)		Nominal holding gains (+)/losses (–) liabilities	76
Nonfinancial assets	280		
Financial assets	84	**Changes in net worth due to nominal holding gains/losses**	**288**
Closing balance sheet			
Nonfinancial assets	10,404	Liabilities	6,976
Financial assets	7,522	**Net worth**	**10,951**

of assets account includes events such as the discovery of new oil reserves, destruction of assets by national catastrophes, and uncompensated seizures of assets. And the revaluation account includes holding gains and losses owing to price changes in the assets or liabilities over the accounting period.

Balance Sheets

The *balance sheets* show the values of the stock of assets and liabilities for the economy at the beginning and end of the period. They inform users, therefore, about the types of assets owned by an economy and the structure of its debt and other liabilities. The difference between the total stock of assets and the stock of liabilities is the *net worth* of the economy.

The change in the balance sheet between the opening and closing positions is explained fully by the transactions (of the capital and financial accounts) and the other economic flows (the other changes in volume of assets account and revaluation account) (see Table 6).

Other Related Issues in the *1993 SNA*

Other related issues include the volume and real income measures, quarterly national accounts (QNA) data, important boundaries (production boundary, asset boundary, and current and capital transfers), labor force indicators, multifactor productivity, environmental and economic accounting, and informal sector and illegal activities. Finally, an annex illustrates supply and use tables.

Volume and Real Income Measures

One of the questions users expect national accountants to answer is, "By how much has GDP changed?" Another is, "What has happened to the 'real' income of the country?" Volume and price indices provide some answers to such questions. They provide information over and above the growth rates calculated from GDP measured at current (nominal) prices. As users are aware, those particular growth rates are of little analytical use because they include both price and volume changes, and only the latter are generally of interest to the user.

GDP volume and constant price measures

With volume and constant price measures, users can factor changes over time in the value of goods and services into two components—changes in their prices and changes in their volumes. Measuring the volume, while holding prices constant at some base period, provides the constant price value of the aggregate. Users may achieve this either by deflating the current period value with an appropriate price index (deflation) or by extrapolating the base period value with an appropriate indicator of volume or quantity change. Users often choose components of the producer price index (PPI), consumer price index (CPI), and export and import price indices (XMPIs) as the deflators. These indices are also valuable as measures of price changes in their own right (see Boxes 4–6).

To obtain a volume series of GDP at the constant prices of some base year, users can combine estimates of expenditure at constant prices (consumption, capital formation, and exports) less imports at constant prices. This involves deflating each component (and subcomponent) by relevant price indices. Or it involves using alternative extrapolation methods, depending on available source data for each component (for example, volume changes of related output or inputs as indicators).

Box 4. Producer Price Index

A producer price index (PPI) measures the rate of change in the prices of goods and services bought and sold by producers. It usually includes mining, manufacturing, public utilities, agriculture, forestry, and fishing but can extend to construction and services. It is a key statistic for economic and business decision making and inflation monitoring. An *output* PPI measures the rate of change in the prices of products sold as they leave the producer. An *input* PPI measures the rate of change in the prices of the inputs of goods and services purchased by the producer.

The main uses of the PPI are as (1) a short-term indicator of inflationary trends; (2) indexation in legal contracts in both the public and private sectors, particularly for more detailed PPI components; (3) compilation of other inflation measures such as an export price index or the final expenditure price index; (4) an analytical tool for businesses and researchers; and (5) national accounts deflation.

Collecting data for PPIs is not trivial. In practical terms, PPIs require sampling—from a representative sample of establishments—a set of well-defined products whose overall price changes represent those of the millions of transactions taking place. Statistical offices then monitor the prices of these same products periodically (usually monthly) and weight their price changes according to their relative revenue.

The *Producer Price Index Manual: Theory and Practice* (ILO and others, 2004a) provides clear, up-to-date guidance on the concepts, uses, methods, and economic theory of the PPI, including information on classifications, sources, compilation techniques, and analytical uses of the PPI. The *Manual*'s conceptual framework derives from the *1993 SNA* and recent developments in index number theory.

To obtain a volume series of GDP at constant prices from the production approach, users must sum, for each period, the gross value added, measured at the (constant) prices of the base year, of producers in the economy and then add a "real" measure of taxes less subsidies on products. To measure gross value added of a unit, industry, or sector, at constant prices, users can subtract intermediate consumption at constant prices from output at constant prices. Known as the double-deflation approach, this method takes into account differences over time in the ratio of intermediate consumption to output as well as price changes of output and intermediate consumption.

However, sufficient data are not always available, and a second-best alternative would be to extrapolate base-year value added by an output

Box 5. Consumer Price Index

The consumer price index (CPI) measures, usually as a monthly series, the overall rate of change in the prices of goods and services consumed by households. Analysts also widely use it as a proxy for a general index of inflation for the economy as a whole, partly because of the frequency and timeliness with which it is produced. It has become a key statistic for the purpose of economic policymaking, especially monetary policy. It is often specified in legislation and in a wide variety of contracts as the appropriate measure of inflation for the purpose of adjusting payments (such as wages, rents, interest, and social security benefits) for the effects of inflation. It can therefore have substantial and wide-ranging financial implications for governments and businesses, as well as for households. Another use is for national accounts deflation.

The prices used to compile the CPI are of selected representative items of different product groups, monitored each month from a representative sample of shops or other retail outlets. The usual method of calculation is to measure the average period-to-period price changes for each selected item and then weight these item price changes by the relative amounts that households spend on them. It is not unusual for agencies to monitor more than 100,000 price quotes each month. CPIs are official statistics usually produced by national statistical offices, ministries of labor, or central banks. They are published as quickly as possible, typically about 10–15 days after the end of the most recent month or quarter.

The *Consumer Price Index Manual: Theory and Practice* (ILO and others, 2004b) provides guidelines for statistical offices and other agencies responsible for constructing CPIs and explains in depth the methods used to calculate a CPI. It also examines the underlying economic and statistical concepts and principles needed for making methodological choices efficiently and cost-effectively and for appreciating the full implications of those choices.

volume index. A third-best alternative would be to deflate current-period value added by a price index for output (single deflation).

In measuring a GDP series at constant base-period prices, users need to ensure that the price index used for deflation—or the volume index used for base-period extrapolation—uses relative expenditure/revenue values in the base period as weights in their aggregation. However, such weights will become out of date, and users should regularly update them to reflect changes in production/consumption patterns.

It follows that users need to update the base period(s) frequently and link the resulting series. The *1993 SNA* expresses a preference for annual chain-

Box 6. Export and Import Price Indices

Export and import price indices (XMPIs) for a country measure the rate of change over time in the prices of traded goods and services. A country's *export* price index measures the rate of change in the prices of goods and services sold to foreign buyers by residents of that country. A country's *import* price index measures the rate of change in the prices of goods and services purchased from abroad by residents of that country.

These foreign trade indices, as measures of both price and volume changes, have many uses. The most important of these are their use in government economic policy, analysis of competitiveness, conclusion of trade contracts, measurement and forecasting of inflation, analysis of exchange rate, and compilation of national accounts.

Surrogates for price indices are sometimes unit-value indices—a readily available by-product of the collection of trade data by customs authorities. However, in this respect, unit-value indices are recognized as prone to bias. Survey-based XMPIs are the preferred alternative. Yet in practical terms, these require sampling, from a representative set of establishments, a set of well-defined commodities whose overall price changes represent those of the millions of transactions taking place. Statistical offices then monitor the prices of these same commodities periodically (usually monthly) and weight their price changes according to their relative trade shares. As with the CPI and PPI indices, this is a complex exercise.

The *Export and Import Price Index Manual: Theory and Practice* (IMF, forthcoming) will provide clear, up-to-date guidance on the concepts, uses, methods, and economic theory of the XMPIs, including information on classification, sources, compilation techniques, and analytical uses. The *Manual*'s conceptual framework derives from the *1993 SNA* and recent developments in index number theory.

ing, with a note that base-year updates should be made at least about every five years. In preparing annual chained indices (extrapolating a GDP series by volume indices or deflating it by price indices that have benefited from updated weights), users should no longer describe the series as at the constant prices of the base period. The resulting series is a volume measure of GDP.

Chained indices for subcomponents, such as industries, do not aggregate consistently to higher levels—say, to GDP. Yet these chained indices are conceptually more sound than fixed-base indices, which may add up but yield a worse estimate. Chained indices are, however, biased when used for high-frequency—say, monthly—volatile data.

Dividing the series of GDP at nominal (current) prices by the series of GDP at constant prices will result in the GDP (implicit price) deflator—a measure of the cost of goods purchased by households, government, industry, and so forth.[16] The CPI (see Box 5) covers household expenditure, while the coverage of GDP has been explained to extend beyond this. Further, the weighting implicit in the GDP deflator may, depending on the method used for the volume index, be quite different from the CPI's base-period weighting.

Real income

Before considering the measures of real income for an economy, users need to understand the difference between GDP at constant prices and real gross domestic income (GDI).[17] GDP at constant prices is a volume measure for *output*. However, the real *income* that residents derive from domestic production depends also on changes in the country's terms of trade. If the prices of a country's exports rise faster than the prices of its imports (that is, the terms of trade improve), then fewer exports are needed to pay for a given volume of imports. Thus, improving the terms of trade in a country makes it possible for that country's residents to purchase an increased volume of goods and services out of the incomes generated by a given level of domestic production.

It follows that when the terms of trade change, the movements in GDP at constant prices and in real GDI may significantly diverge. Economists generally describe this difference as the "trading gain (or loss)." Calculating the trading gain (or loss) is described in Box 7.

In addition to measuring real GDI, countries find it useful to derive the other national accounts aggregates in real terms. For example, in a number of countries, the receipts of workers' remittances from abroad are crucial for domestic demand, and an emphasis on measuring only GDP at constant prices may be misleading. In particular, the real disposable income of such countries may show a very different pattern of growth from their GDP growth because the flow of remittances is affected by developments in the rest of the world.

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[16]An implicit price deflator for an aggregate, such as GDP, is obtained by dividing the value at current prices by the value at constant prices and multiplying the result by 100.

[17]The term *real GDP* should be avoided. The concern is either with the volume measure of GDP or with real income.

Box 7. Calculating Trading Gains (Losses) Resulting from Changes in the Terms of Trade

The trading gains (losses) are calculated as

$$T = \frac{X - M}{P} - \left(\frac{X}{P_X} - \frac{M}{P_M}\right),$$

where the first term is a measure of the goods and services balance (exports of goods and services (X) less imports of goods and services (M)) using a single deflator, P, and the second term is the goods and services balance by taking the difference between a volume (say constant price) measure of exports and a volume measure of imports—that is, after X and M have been deflated by respective price indices for exports and imports, P_X and P_M. Note in the second term how, for example, as export prices increase slower than import prices, the larger is the sum deducted from the first term, and the smaller the terms of trade effect. In many economies, deflated imports may exceed deflated exports, and the second term is negative. In such cases, it is highly desirable that the economy calculate the trading loss, because the possibility exists that the loss may offset any positive growth in GDP.

Note also that the magnitude of the terms of trade effect is contingent on the deflator in the first term. Experts do not agree on the best deflator to use for this component. They have suggested both the import price index and the export price index, depending on whether the balance is negative or positive. The interpretation of the trading gain would be in terms of the gain in purchasing power with regard to a respective bundle of such goods and services. Some argue for a simple average of the import and export price indices. There is a good case, consistent with the definition of real national income, for using the implicit deflator for gross domestic expenditure.

The links between the real income aggregates are as follows:

1. Volume or constant price GDP—the GDP in the current year at prices of the base year
   plus the trading gain or loss resulting from changes in the terms of trade
2. *Equals* real gross domestic income
   plus real primary incomes from abroad
   minus real primary incomes payable abroad

3. *Equals* real gross national income
   plus real current transfers receivable from abroad
   minus real current transfers payable abroad
4. *Equals* real gross national disposable income.

The deflator used to measure these real income components is not clear, because no deflator can be directly applied to primary incomes and transfers to and from abroad. However, it is important that the deflator be broadly based, and countries often use the implicit price deflator for gross domestic expenditure.[18]

Quarterly National Accounts Data

Another important related feature of macroeconomic statistics is QNA data. National accounts data must be timely to be useful for macroeconomic planning. QNA are a natural progression once countries have established annual accounts. For QNA, the potential scope is the whole of the *1993 SNA* sequence of accounts. Although GDP and its components are the usual important starting point, the prerequisites of such accounts are the timely and accurate quarterly source data directly covering a high proportion of the totals.

National data compilers should make QNA consistent with the annual equivalents, partly for the convenience of users and partly—and more fundamentally—for the benchmarking process. The benchmarking process incorporates the information from annual data into the quarterly estimates. Also, data compilers need to use revisions to allow them to release data on a timely basis and to subsequently incorporate new data.

Important Boundaries

Note that economies use some important boundaries to define the scope and treatment of events that occur within the economy. These boundaries are the *production boundary*, defining the scope of productive activity; the *asset boundary*, distinguishing transactions in assets from income and expenditure; and the *boundary* between *current* and *capital* transfers, impacting the measure of saving.

Production boundary

The definition of production used in the national accounts determines the scope of the activities covered and the size of the economy measured in

[18]Gross domestic expenditure is GDP measured by the expenditure approach.

the accounts. The system defines production in general terms as an activity in which a unit uses inputs to produce goods and services of a kind that can be provided to other units, either individually or collectively, with or without change.

The location of the production boundary is a compromise, but a deliberate one that takes account of the needs of most users. The location strikes a balance between users' desire to make the accounts as comprehensive as possible and the need to prevent flows used for analyzing market behavior and disequilibria from being swamped by nonmonetary values. Thus, the boundary of production in the *1993 SNA* encompasses

- The production of all goods by a unit, including for own use;
- The production of services by a unit that are supplied to other units;
- The own-account production of housing services by owner-occupiers; and
- The production of domestic and personal services through the employment of paid domestic staff.

As a general principle, the boundary includes production of *goods* for own use but excludes own-produced *services.* That is, it includes goods produced for own use because units can switch goods between market and nonmarket use. However, it excludes own-produced services, because units consume them as they produce them. For example, if the boundary restricted production to only those goods and services produced by one unit and sold to another, then it would impractically exclude subsistence production (produced and consumed by the same unit). On the other hand, if production were to cover all goods and services, then it would cover subsistence production but would needlessly cover services provided by a unit to itself, such as the preparation of meals, cleaning, household repairs, child care, and so forth.

All these activities are productive in an economic sense. However, including them in the system is not simply a matter of estimating economic values for their output. If analysts are to assign values to the output, then they also need to estimate concomitant measures of income and consumption. Clearly, the economic significance of these nonmonetary flows differs from that of monetary flows. For example, incomes generated by them are automatically tied to the consumption of the output produced, having little relevance for analysts in assessing market disequilibria in the economy.

Regarding sectors and the boundary, the financial and nonfinancial corporate sectors produce most goods and services. However, it is not unusual

for the household sector to also produce a great number, particularly, but not exclusively, in developing countries.

Financial corporations may charge explicitly for their services. Under such circumstances, analysts find it straightforward to measure their output. However, financial intermediaries and insurance corporations may also charge indirectly for their services, and analysts must estimate their output. For example, financial intermediaries levy a service charge as part of the interest they pay on their borrowing (including deposits) and the interest they earn on their lending. This is known as the financial intermediation services indirectly measured (FISIM) charge, and analysts need to allocate it to the users of the financial services.

In addition, analysts need to adjust actual interest flows to take account of the service charge. For example, the premiums that insurance corporations receive include a service charge, which analysts can broadly estimate by subtracting from premiums the value of claims and changes in any reserves that belong to the policyholders.

Households essentially engage in earning income from labor services, using it for consumption and saving. However, households often engage in production that cannot be assigned to a separate institutional unit. In particular, in agriculture, part of the output is often consumed by the farmer without passing through the market. Analysts must estimate such output and consumption and include it in GDP. In developing countries, part of the population may live in the subsistence sector, and such own-account production may be quite large.

As for the general government and NPISH—for example, trade unions and charities—they engage in producing goods and services that satisfy either individual or collective needs. Although these sectors may provide such services free, the production boundary still includes them.

Asset boundary

The *asset boundary* includes financial and fixed assets and nonproduced (naturally occurring) assets over which effective ownership rights are exercised, privately or otherwise. The coverage of assets is limited to those entities subject to ownership rights and from which their owners may derive economic benefits by holding them or using them in economic activity. The owners may derive such benefits by using the assets such as buildings and machinery in production. Other assets may provide benefits in the form of property incomes (such as dividends and

interest), and still others may be held as a store of value (for example, precious metals).

The boundary includes, as the acquisition of an asset, the expenditure on mineral exploration, on the grounds that the information gained from the exploration is likely to allow the enterprise to derive future economic benefits.

Major renovations, reconstructions, and enlargements of existing assets are considered to be capital formation because they increase the performance or productive capacity of the asset involved. Regular repair and maintenance, however, are treated as current costs of production.

The asset boundary is important for helping users determine whether to record a transaction as income/expenditure in the current accounts of the system or as assets/liabilities in the accumulation accounts. As such, the boundary directly affects how users measure balances of the current accounts—GDP, national income, and savings.

Boundary between current and capital transfers

The national accounts include transfers—that is, transactions between institutional units, with one unit (say, the government) receiving nothing directly in return from the other. All transfers increase the net worth of the recipient unit.

The *1993 SNA* draws an important distinction between current and capital transfers. Current transfers contribute to disposable income (and saving), whereas capital transfers link the transfer to an asset. The payment of an inheritance tax would be an example of a capital transfer; the receipt of a social security benefit would be a current transfer. Debt forgiveness received by a country would make that country better off. However, it would be misleading to show that its saving has increased. The *1993 SNA* records debt forgiveness in the capital account as a capital transfer.

Labor Force Indicators

Another important feature of macroeconomic statistics is better knowledge of developments in the labor market. That is, with aggregate data on employment (persons employed, hours worked, earnings, and so forth), analysts have crucial inputs for assessing economic performance. Oftentimes, with these indicators, they may gauge the effectiveness of labor market policy, using data on labor market demand (employment, job vacancies, labor costs) and labor market supply (unemployment, labor force participation).

Box 8. Labor Statistics

Labor statistics extensively cover employment and unemployment from both economic and social standpoints.

A fundamental concept is the *economically active* population—defined as all persons who, during a reference period, furnish the supply of labor for the production of goods and services, as defined by the *1993 SNA*.

The currently economically active population (also known as the labor force) gives a measure of the number of persons furnishing the supply of labor at a given time. It comprises two mutually exclusive categories—employed and unemployed. For practical reasons, the labor force statistics framework specifies a minimum age for measuring economic activity—thus defining the working-age population (which may differ from country to country).

Employed persons are those above the minimum specified age who performed some work for pay, profit, or family gain during the specified reference period or who had a paid job or an enterprise but were temporarily not at work for some specified reason.

The international standards further specify that, for operational purposes, the notion of "some work" may be interpreted as work for at least one hour. This criterion is intended to cover all types of work, especially types having irregular features, and is a necessary criterion if total employment is to correspond to aggregate production.

The international standard definition of unemployment is based on three criteria to be satisfied simultaneously. *Unemployed* persons are those who are

- Without work (were not in paid employment or self-employment as specified by the definition of employment),

To draw up labor statistics, statisticians use business surveys, household surveys, and administrative sources. Successive conferences of labor statisticians under the auspices of the International Labor Organization (ILO) have developed concepts and definitions of labor statistics (Box 8).

Multifactor Productivity

In macroeconomics, two useful measurement tools are *productivity comparisons* and *productivity indices*. Productivity *comparisons* (comparing productivity for a given period between, say, economic sectors, institutions, or regions) use the ratio of output over inputs. To measure output and inputs, analysts may use nominal and/or quantity terms, such as value

- Currently available for work (were available for paid employment or self-employment during the reference period), and
- Seeking work (had taken specific steps in a specified recent period to seek paid employment or self-employment).

Persons in the working-age population who satisfy neither the definition of employment nor that of unemployment are classified as *economically inactive* or not in the labor force.

Three principal *classifications* are used to categorize data collected in surveys of the economically active population:

- *Status in employment*. Persons may be classified as an employee (receives payment for work in wages, salaries, commission, tips, piece rates, or pay in-kind), employer (with one or more employees), own-account worker, unpaid family worker, and other categories of nonemployees.
- *Branch of economic activity (industry)*. Industry refers to the activity (kind of goods produced or services supplied) of the economic unit in which the employed person worked.
- *Occupation.* Occupation refers to the kind of work done during the reference period, irrespective of the industry or the person's status in employment.

The ILO's Bureau of Statistics has extensive material on definitions, concepts, and classification standards available on its website (http://www.ilo.org/public/english/bureau/stat/index.htm) and in printed publications.

added divided by hours worked. Productivity *indices* track trends in the ratio of output over input. Analysts have produced variants of productivity indices by considering gross or net output measures and input measures of differing kind and scope (see Box 9 for more details).

In terms of these tools, *output* may be output volume (the volume of gross production), or it may be value added volume (the volume of net production after accounting for intermediate consumption). The latter measure has particular appeal to policymakers—it is related directly to GDP, which, as discussed earlier, is the sum of the value added produced by the establishments resident in an economic territory. This, in particular, makes productivity measures relevant to a range of economic policy considerations. For example, rapid growth in GDP volume accompanied by a

Box 9. Productivity Indices

The most widely used productivity measures focus on labor productivity, or output over labor input, where output is either gross or net:

$$\text{Gross labor productivity} = \frac{\text{Output volume index}}{\text{Labor input volume index}}$$

$$\text{Net labor productivity} = \frac{\text{Value added volume}}{\text{Labor input volume index}}$$

Productivity measures may gauge labor input as a stock or adjust it for its flow of services in terms of hours worked, education, occupation, gender, and other such compositions. However, analysts find the productivity measures that take into account the full array of inputs more useful than the single input measures, such as labor productivity.

The input scope of these multifactor productivity (MFP) indices may be defined in two ways according to the output concept:

$$\text{Gross MFP} = \frac{\text{Output volume index}}{\text{Primary (including labor) and intermediate input volume index}}$$

$$\text{Net MFP} = \frac{\text{Value added volume index}}{\text{Primary (including labor) input volume index}}$$

The measures just described presume that the economy operates at constant, unitary *returns to scale*—that is, scaling inputs by a given factor results in an increase in potential output by the same factor. Economists have noted that returns to scale affect productivity measures, both single factor and multifactor. That is, decreasing the returns to scale blunts the impact of growth in inputs in the denominator of the productivity index, and thus input growth offsets output growth to a lesser extent than under constant, unitary returns to scale. Increasing the returns to scale magnifies the impact of the growth of the inputs in the denominator and thus offsets the growth of output in the numerator more than under constant, unitary returns to scale. The returns-to-scale concept is the main unknown parameter in computing productivity indices, though economists may determine it simply from measured prices and quantities of inputs and outputs under decreasing or constant returns to scale. Most published indicators make no returns-to-scale adjustment, thus assuming constant, unitary returns to scale.

When implementing MFP indices, economies use index numbers to aggregate the relative changes in many types of outputs, intermediate inputs, and primary inputs typical of most economies and captured at some level of detail by the compiling statistical systems. Multifactor productivity indices generally use the so-called Törnqvist formula, because it has exceptional index number properties from a microeconomic point of view and thus is in the class of formulas Diewert (1976) terms *superlative*.

productivity increase will cause less demand pressure on inputs (and thus less cost-push inflation) than rapid growth in the absence of a productivity increase.

The OECD manual *Measuring Productivity* (2001) gives users additional guidance on measuring productivity growth at the aggregate and industry level.

Environmental and Economic Accounting

Increased recognition of the need to sustain economic development has generated a growing demand for data that highlight how the economy and the environment interact. Depletion of subsoil assets, depletion of fisheries, and damage to the physical environment give rise to serious policy concerns, increasing needs for data and analytical accounting frameworks to help policymakers develop and monitor sound policies.

Such considerations have an impact on welfare extending beyond the boundaries of the *1993 SNA,* and the United Nations' System of Environmental and Economic Accounting (SEEA; UN and others, 2003; see also UN, 2004) provides a common framework for economic and environmental information, permitting analysts to consistently assess the contribution of the environment to the economy and the impact of the economy on the environment. The UN's website provides extensive material on definitions, concepts, and classification standards for environmental and economic accounting.

The Informal Sector and Illegal Activities

One of many issues under consideration in a current review of the *1993 SNA* is more detail on the treatment of the informal economy and illegal activities. The *1993 SNA* does not adequately cover such economic activity; other handbooks cover some of it. For example, the *1993 SNA* makes no methodological recommendations per se on the informal sector, aside from referring (*1993 SNA,* paragraph 4.159) to ILO guidelines on employment in the sector. And it recommends little on illegal activities (*1993 SNA,* paragraphs 6.30–6.33). Yet the informal sector and illegal activities can account for a substantial portion of economic activity, especially in developing and transition countries.

Draft papers, handbooks, and guidelines on the subject are available (for example, see OECD and others, 2002).

Annex: Supply and Use Tables

The illustration of the goods and services account in Table 2 showed for the total economy how total supply (output at basic prices plus taxes less subsidies on products plus imports) equals total use at purchasers' prices (intermediate consumption plus final consumption plus capital formation plus exports). Supply and use tables (SUTs) disaggregate this presentation to present the data at a commodity and industry level.

SUTs are rectangular matrices. They consist of a supply table, with products in the rows and producing industries[19] in the columns, and a use table, with the same products in the rows but intermediate consumption (by industry) and final uses in the columns.

SUTs serve two purposes—statistical and analytical. For statistical use, they facilitate the checking of consistency among statistics on the flow of goods and services obtained from quite different statistical sources, such as industrial surveys, household expenditure inquiries, investment surveys, and foreign trade. As such, they provide an appropriate framework for economists to calculate much of the production data included in the national accounts and identify weaknesses in the underlying data. For the analytic purpose, economists can directly integrate SUTs into macroeconomic models of the economy, converting them into square input-output tables to study the link between final demand and industry output.

Economists traditionally refer to compiling detailed product flows—to verify the estimates of commodity use—as the commodity-flow method. Using an economy's basic statistics on the supply and use of goods and services, it involves four basic steps:

- Estimating supply at basic prices for commodities (or commodity groupings),
- Adjusting these estimates to purchaser prices,
- Estimating the uses of the commodities, and
- Comparing the results.

Economists obtain the full power of this method when they independently estimate different uses of the commodity that they then reconcile

[19]Institutional units may engage in several different kinds of productive activity simultaneously. For detailed analysis of production, therefore, the *1993 SNA* recommends that economists partition them into separate establishments, each of which engages in a single type of productive activity at a single location. Industries are then defined as groups of establishments engaged in the same kind of productive activities.

with estimates of its supply. Even when they do not have full information (such as when they have estimated a use residually), the method provides a good check on the "reasonableness" of the data and can help to identify major weaknesses.

The greater the level of detail applied to the matrices, the clearer will be the view presented of the economy. Nonetheless, the usefulness of SUTs in a commodity-flow environment is still apparent even at fairly high levels of aggregation.