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National Bureau of Economic Research

Volume Title: A New Architecture for the U.S. National
Accounts

Volume Author/Editor: Dale W. Jorgenson, J. Steven Landefeld,
and William D. Nordhaus, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-41084-6

Volume URL: <http://www.nber.org/books/jorg06-1>

Conference Date: April 16-17, 2004

Publication Date: May 2006

Title: The Architecture of the System of National Accounts:
A Three-Way International Comparison of Canada, Australia,
and the United Kingdom

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URL: <http://www.nber.org/chapters/c0134>

The Architecture of the System of National Accounts

A Three-Way International Comparison of Canada, Australia, and the United Kingdom

Karen Wilson

Since the publication of *System of National Accounts 1993* (United Nations et al. 1993; hereafter SNA93) more than a decade ago there has been considerable convergence internationally in the use of the structure, scope of accounts, and measurement methods suggested in those standards. The paper begins with a brief overview of the architecture of the SNA93 standard by relating the elements of the system to their analytic roots. Based on this description of the system, three countries' application of that standard is compared. The comparison is done from two perspectives: scope (what elements of the flow of accounts are covered and how they are structured) and integration (how the various accounts are tied together when there are discrepancies and the identities do not hold).

2.1 The Development of a “System of Accounts”

The System of National Accounts (SNA) is an economic accounting structure derived from macroeconomic analysis. Its architecture is drawn from many areas of macroeconomic study. Work in the twentieth century by Richard Stone led to the development of the concept of national income, which was the earliest aggregate measure at the root of the system of accounts. Early economics was also concerned with production of commodities and the productivity concept of turning inputs into outputs and the contributions of the factors of production to changes in output. This area of analysis eventually led to the development of input-output tables

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by Leontief, which has heavily influenced the adoption of gross domestic product as a central variable of macroeconomic analysis. And finally, Keynes's work in developing an analytic framework to explain the dynamics of the macroeconomy following the Great Depression of the 1930s introduced many of the key macroeconomic variables—like consumption, investment, savings, and wealth—that are now focal variables in today's system of accounts. Keynes introduced the concept of “sectors” or the major decision centers and therefore transactors of the economy—households, businesses, governments, and foreign economies and their dynamic effects on the economy through their propensities to consume, save, or invest out of income that flows from the productive activity. Some time in the late 1940s and early 1950s the idea of an integrated set of accounts pulling together all of these analytic underpinnings into a system of accounts became a focus of work at the international level. By 1968, the idea came together with the publication of *A System of National Accounts* (United Nations, 1968) with major contributions by a group of experts from around the world chaired by Richard Stone of Cambridge University.

This first “system of accounts” was designed and described for its analytic content and potential uses. The need for consistent accounts was described as follows: “by providing a consistent picture of the development of an economic system, a series of national accounts are useful, indeed indispensable, in describing and analyzing economic change and so contribute to many forms of economic decision making” (United Nations 1968, 12). In addition to its analytic use, the system was also described as a “scheme for collection of economic statistics.”

The system articulated the major transactions of the macroeconomy by examining activity in the economy through the production and use of incomes to the accumulation of fixed and financial assets to arrive at a closing balance for net national wealth. The fully integrated system was designed around the key macroeconomic variables: production, consumption, investment, and wealth accumulation. The various accounts were related to specific types of analysis related to research or policy management, as illustrated in table 2.1.

While the 1968 system was rich in its analytic underpinnings, the statistical infrastructure was not well developed. Since it was the early basis for a system of accounts it did not articulate the true “architecture” of the statistical system. The production boundary (the delineation between market and nonmarket production), the classification systems (industries, products, functional breakdowns), the statistical units (establishments, enterprises, institutions), and the definition of the asset boundary (produced, natural, tangible, intangible, etc.) were not fully developed.

This early system served as the foundation for the current architecture. As countries developed and applied the system and as users provided feedback on their experiences in analytic use of it, the statistical community

Table 2.1 Analytic underpinnings of the system of accounts

	Use																										
	Opening assets				Production				Consumption				Accumulation				The rest of the world				Revaluations				Closing assets		
Supply	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16											
1. Financial claims																											
2. Net assets																											
3. Commercial production																											
4. Noncommercial production																											
5. Final consumption																											
6. Income and outlay																											
7. Change in stocks																											
8. Fixed investment																											
9. Financial claims																											
10. Capital finance																											
11. Current transactions																											
12. Capital transactions																											
13. Financial claims																											
14. Net assets																											
15. Financial claims																											
16. Net assets																											

Note: Numbered columns correspond to Supply categories.

began to refine and articulate the statistical underpinnings of the system. An international effort in the mid- to late 1980s profited from the many experiences of countries in building economic accounts, and resulted in the set of accounts known today as SNA93.

2.2 The Architecture of SNA93—A Basis for Comparison

This section of the chapter describes the SNA93 architecture by first explaining the framework as it relates to its analytic underpinnings outlined above. The architecture of SNA93 can be broken down into three parts:

- The *central framework*, which translates the analytic view of a “system of accounts” into the basic accounting structure
- The *infrastructure*, which defines the building blocks needed to construct a fully consistent set of economic accounts
- The *integrated data system*, which is the set of accounts and tables that are central to describing the economic process

2.2.1 The Central Framework of SNA93

The central framework of SNA93 consists of the following elements:

1. *Integrated economic accounts* by institutional sector tracing production of income through to wealth accumulation for each institutional sector

2. *Supply and use of goods and services*, which traces production of commodities by industries through their use as intermediate inputs or final demand by institutional sectors

3. *Three-dimensional analysis of transactions*, which articulates all the transactions of the system from both the “real” side of the accounts (production, consumption, and investment) and the “financial” side of the same transactions (creation and deletion of financial claims and fixed assets), all by institutional sector (from whom, to whom), and which forces consistency on the system

4. *Functional analysis* of the purposes of spending by institutional sector; for example, spending by governments (health, education, defense, etc.), consumers (accommodation, food, transportation, health, etc.) and business (intermediate use and investment)

5. *Population and employment data* consistent with SNA concepts for analysis of the labor variables of the system and per capita analysis

These five elements of the framework reflect the analytic requirements of a macroeconomic data system as outlined in the earlier version of the SNA as reflected in table 2.1.

2.2.2 The Infrastructure of SNA93

In order to build this consistent data set for analysis, the architectural building blocks of the data system need to be well defined, as does the structure of the “accounts” or data sets included in the system. The important architectural elements that are the infrastructure of the system for each of the five elements of the central framework are as follows.

1. The institutional sectors and the institutional units that are aggregated to measure them are the building blocks of the integrated sequence of accounts. There are two basic institutional units: households and legal entities. Legal entities are units that are created to perform some economic function like production, in the case of enterprises, and governance and provision of public goods and services, in the case of government units. Each unit is capable of engaging in transactions with other units, of owning assets, and of incurring liabilities. The units reflect the decision centers in the economy for financing, saving, and investment. The units are grouped together into mutually exclusive sectors based on their economic objectives, functions, and behaviors. Carrying through on the examples of the units mentioned, corporations’ economic function is the production of goods and services for sale on the market with an objective of gaining profit for their owners. Government institutional units are quite distinct in their function and objective. They engage in nonmarket production and also have as an economic objective the redistribution of income and wealth among institutional sectors through taxation and transfers. The main institutional sectors of the system are

- a. Nonfinancial corporations
- b. Financial corporations
- c. General governments
- d. Households
- e. Nonprofit institutions serving households
- f. Rest of the world

Sectors (a) through (e) cover the domestic economy, and (f) covers the transactions of the rest of the world with the domestic economy. The main sectors can be broken down into subsectors; for example, general government into the relevant levels of government, or financial corporations into banking, insurance, and other financial institutions.

2. The supply and use analysis articulates the production of goods and services by production units. Two important elements of the system play an important role in this part of the system: the production and asset boundaries and the valuation principles.

- a. The production boundary includes the production of all individual or collective goods and services that are supplied to institutional units other than their producer. It also includes own account production of

goods that are retained by the individual unit for consumption or fixed capital formation. In the case of household units this own-account production includes production of housing services as well as own-account construction of dwellings. Any other goods produced by households for own consumption are counted only when significant. This usually means agricultural products produced and used on the farm.

b. The asset boundary defines real wealth in the system. An asset is something that is owned by a unit or units and from which economic benefits are derived over a period of time greater than one year. The benefits are often derived from use in the production process but also from holding the asset as a store of value. Financial assets and real assets that have been produced by a unit and used repeatedly in future period clearly meet the criterion. Assets that are naturally occurring (mineral deposits, forests, etc.) must be owned by an institutional unit that can exercise effective ownership rights in order to be included. Valuables are included as assets but not as capital formation.

c. Valuation of production in the supply/use framework is at basic prices, which are the prices receivable by the producer unit before taxes on those products are added, including any subsidies received. Non-market production is valued at cost when there is no market price valuation equivalent available. When production is carried forward to the sequence of accounts, the taxes on products are added in and subsidies netted out to arrive at gross domestic product (GDP) at market prices.

d. Two classification systems are at the base of this measurement: an industrial classification system (the one suggested in SNA93 is revision 3 of the International Standard Industrial Classification [ISIC Rev 3] at the two-digit level of aggregation or approximately 120 industries) and a classification of commodities (the Central Product Classification [CPC] is recommended at the three-digit level, about 300 products). The relevant statistical unit in the case of measuring output is the producer unit. This is the unit of the economy that can report on the output of products and the inputs used. The selection of the unit of statistical measure is based on homogeneous production technology, or, in SNA93 parlance, a “kind of activity unit.” There are many producer units in an economy. The majority are small units producing one type of commodity. Others are part of large complex enterprises that produce many different types of products and services and participate in many industries. These enterprises are broken down into subunits called “establishments” for the statistical purpose of articulating supply and use of homogeneous products made using homogeneous production technology.

3. The three-dimensional aspect of the infrastructure is also referred to as quadruple entry book keeping. Transactions across sectors are recorded in four counterpart transactions. This ensures consistency in measuring variables across sectors and across accounts. For example, when a corpo-

ration pays income tax to the central government, the transaction is recorded simultaneously as a transfer of income from the payer, the corporate sector, and as a receipt of income by the receiver sector, the government. It is also recorded as a decrease in cash on the financial account of the corporate sector and an increase in cash by the government sector. This ensures that the closing balance on the balance sheet of each sector also reflects the transfer of income from one sector to another, thereby imposing stock-flow consistency on the system as well. This is very important for analyzing and understanding the economic process. This feature is key to ensuring that many of the types of analyses outlined in table 2.1 provide consistent results such as multifactor productivity analysis, which relates the production activity to the service flow from the stock of fixed assets.

4. Functional analyses are designed to articulate the purpose of expenditures by sector. They are designed to aid in the analysis of the objectives and functions of the institutional sectors. There are four key classifications suggested by SNA93.

a. The classification of the functions of government (COFOG) articulates fourteen key purposes of government expenditure, like health, education, and social security.

b. The classification of individual consumption by purpose (COICOP) breaks household expenditures down into 10 main purposes (with sub-categories) such as housing, transportation, health, education, leisure, and so on.

c. The classification of purposes of nonprofit institutions by purpose (COPNI) articulates eight categories of nonprofit institution (NPI) outlays such as health, education, religious services, welfare services, and so on.

d. Classification of outlays of producers by purpose (COPP) breaks down the outlays of production units into classes such as research and development, repair and maintenance, employee training and welfare, and so on.

5. Employment and population data aligned with SNA concepts means having population data aligned with the national boundaries of the accounting system and definitions of the households sector. It also means aligning employment measures with the production boundary and labor input definition of the product account—key for the purposes of calculating and analyzing productivity trends. The definitions and classifications are outlined in chapter 17 of SNA93.

2.2.3 The Integrated Data System of SNA93

The Sequence Economic Accounts

The accounting model of the 1993 standard traces the transmission of income to wealth using a “sequence of accounts.” The building blocks of

the sequence of accounts are six major institutional sectors: households and unincorporated businesses,¹ nonprofit institutions serving households, financial corporations, nonfinancial corporations, governments, and nonresidents. The whole economic process from production of income through redistribution of income, consumption, and saving, through accumulation of fixed assets and financial assets, to the position of net worth is recorded for each institutional sector. The major macroeconomic variables are recorded or calculated as balancing items in the sequence of accounts as shown in tables 2.2 and 2.3.

The economic process of production of income, consumption, investment, and creation of wealth is reflected by the structure and the order of the sequence of accounts. Describing the economic process through a sequence of accounts imposes consistency on the data through the series of identities inherent in the system. Table 2.4 presents the main identities of the sequence of accounts.

There are three different views of the GDP aggregate, sum of value added, sum of factor incomes, and sum of final expenditures. There are two views of measuring net lending by sector, the difference of total incomes and total outlays, and the difference in transactions on assets and liabilities. The imposed consistency on the system also allows some variables to be calculated residually rather than directly; for example, savings is the residual of current incomes less consumption or current expenditure, and government deficit is the difference of total incomes and outlays of the government sector. Even detailed variables that are difficult to measure directly from administrative records or by the use of surveys can be derived. For example, inventory investment as measured by national accounting conventions is difficult to measure directly, but in a consistent set of accounts it can be arrived at residually as the difference of supply and use of a commodity. Many aspects of household wealth are also difficult to measure directly because households do not generally keep balance sheet records, but, for example, by exploiting the fundamental balance sheet identity, mortgage lending by financial institutions can be used to measure mortgage borrowing of households.

Macroeconomic analysis is greatly enhanced by the consistency of the integrated system. For example, the labor input variables can be compared to value added to analyze labor productivity trends. Debt burden of households, governments, or businesses can be measured by their debt levels from the balance sheet accounts as a ratio of their total sector income as measured in the distribution of income accounts, and at the same time

1. Unincorporated businesses are grouped with households due to the difficulty of splitting some transactions between the household and business portions. For some accounts, like the production account, it is preferable to separate the sector in two to arrive at a pure "business" sector. But for income generation and distribution accounts it is hard to delineate between the two institutional units.

Table 2.2**The sequence of economic accounts of SNA93**

Production accounts: For each institutional sector (except the nonresident sector) the value of output is recorded, and intermediate consumption (goods and services used up in the transformation of inputs to outputs) is subtracted to arrive at the balancing entry for this account—value added. The sum of value added across institutional sectors is equal to the gross domestic product for the economy.

Production of income: In the course of production, the primary inputs, labor and capital, produce income. Wages, salaries, supplementary income, and gross operating surplus are recorded for each sector. The sum of the primary incomes equals value added for each sector, and the sum of all primary incomes across sectors equals gross domestic product.

Primary distribution of income: Property income is income from lending real and financial capital. Primary income is redistributed from one sector to another in this account resulting from payment of interest through financial claims or rents and royalties on use of real property. Total sector income is the sum of primary income plus net property income received. Summation across sectors (including the nonresident sector) of total primary income equals gross national income, after which subtraction of capital consumption allowances derives net national income. This is where the flow of accounts transitions from income generated by domestic production (the domestic concept) to income accruing to residents of the national territory (the national concept).

Secondary distribution of income: In this account pure transfer of incomes across sectors is recorded. Total sector income is the sum of primary income plus net property income received. After deduction of direct taxes paid and social contributions, the balancing item on primary distribution account is disposable income. In the use of income account, current expenditures are also recorded on this account as uses of income. The balancing item on this account is savings; the sum of savings across sectors is national savings. After accounting for capital consumption allowances, the result is net national savings.

Capital accumulation accounts: Net savings from the secondary distribution of income accounts are the starting point of this account as a source of funds for capital accumulation. Depreciation and net capital transfers are added to arrive at total funds available for investment. Fixed capital formation on tangible and intangible assets is recorded as the use of funds to arrive at the net lending/borrowing position of the sector. The sum of net lending/borrowing across sectors balances to zero. Also, the sum of current expenditures from the secondary distribution of income account and capital expenditures on the capital accumulation accounts less imports equals gross domestic product calculated as the sum of final expenditures.

Financial accumulation accounts: Transactions in financial assets and liabilities are recorded for each of the institutional sectors. The balance of net changes in financial assets less changes in net financial liabilities is net changes in financial assets and is equal to net lending/borrowing of the capital accumulation accounts.

Other changes in volume of assets account: This account records holding gains and losses on financial and nonfinancial assets by institutional sectors. It also records destruction of assets due to extraordinary events. Depletion and new discoveries of nonproduced assets are also part of this account. It basically records any change in asset that is not due to a “transaction.”

Balance sheet accounts: Closing stocks are recorded here for financial assets and liabilities as well as tangible and intangible nonfinancial assets. Net worth is calculated as the balancing entry for the balance sheet of each institutional sector summing to national net worth across the sectors. National net worth is equal to national net wealth—the sum of the stock of all tangible and intangible fixed assets at market price.

Table 2.3 Summary of accounts and variables

Account	Key variables	Balancing entry
Production accounts	Gross domestic product, output	Value added
Production of income	Labor income, gross operating surplus	Gross domestic product
Primary distribution of income	Labor income, proprietor's income	Gross national income, national disposable income
Secondary distribution of income	Transfer income, consumption expenditures, transfers paid	Net disposable income net saving
Capital accumulation accounts	Gross fixed capital formation, capital transfers, capital consumption allowances	Net lending/borrowing
Financial accumulation accounts	Acquisitions of financial assets, incurrence of financial liabilities	Net financial investment
Other changes in volume of assets account	Revaluations of assets and liabilities, discoveries and destruction of assets	Net other changes in volume of assets
Balance sheet accounts	Gross and net capital stocks, net financial position	National net worth

interest burden ratios can be calculated as the ratio of interest paid to total income recorded in the distribution of income. The return to capital can be measured as a ratio of net operating surplus to the stock real assets. The imposition of common infrastructure (classifications and measurement principles) across all of the sequence of accounts adds explanatory power to the derived aggregates. These ratios are important in understanding the sustainability of the economic functioning of the various sectors.

The integrated system is also an audit and planning tool for the statistical system at its roots. Since the system is put together using a variety of data, both survey and administrative record based, all with varying levels of quality, aggregates derived from more than one approach will never be equal. But a high-quality statistical system will produce results that are within an acceptable range, and the inconsistency can be resolved through a balancing method. For example, SNA93 recommends that the level of GDP be derived using the value-added method or the so-called "production approach" and that the other measures be reconciled by allocating any statistical discrepancy to the lower-quality subaggregates of the income and expenditure methods. The allocation method used will depend on the relative quality of the elements of the statistical base. If the statistical discrepancies are not random but indicate bias, they are often used to identify gaps or emerging measurement issues in the statistical process. Later in the chapter examples of different balancing approaches and how the system has helped identify gaps and measurement problems will be given in the cross-country comparison.

Table 2.4 The identities of the sequence of accounts*Production identities*

$\text{GDP} = \text{output} - \text{taxes less subsidies on products} - \text{intermediate consumption}$

$\text{GDP} = \text{final consumption expenditures} + \text{changes in inventories} + \text{gross fixed capital formation} + \text{acquisitions less disposals of valuables} + \text{exports of goods and services} - \text{imports of goods and services}$

$\text{GDP} = \text{compensation of employees} + \text{gross operating surplus of corporations} + \text{gross mixed Income} + \text{taxes less subsidies on products}$

Income and saving identities

$\text{Gross national income (GNI)} = \text{GDP} + \text{taxes less subsidies on production and imports (net receivable from abroad)} + \text{compensation of employees (net receivable from abroad)} + \text{property income (net receivable from abroad)}$

$\text{Net national income (NNI)} = \text{GNI less consumption of fixed capital}$

$\text{Net national disposable income (NNDI)} = \text{NNI} + \text{net taxes on income and wealth receivable from abroad} + \text{net social contributions and benefits receivable from abroad}$

$\text{Net saving} = \text{NNDI} - \text{final consumption expenditure} + \text{net equity of households on pension funds receivable from abroad} + \text{net capital transfers receivable}$

$\text{Net saving} + \text{net capital transfers} = \text{changes in net worth due to savings and capital transfers}$
The income and savings identities apply to each institutional sector as well as to national estimates by changing the identities to net amounts receivable from other sectors.

Savings and investment identities

$\text{Net saving} + \text{net capital transfers receivable} = \text{gross fixed capital formation} + \text{changes in inventories} + \text{acquisitions less disposals of valuables and nonproduced nonfinancial assets} + \text{net lending/borrowing}$

$\text{Net lending (+)/borrowing (-)} = \text{net acquisitions of financial assets less net incurrence of financial liabilities}$

Wealth identities

$\text{Opening net worth} = \text{opening assets} - \text{opening liabilities}$

$\text{Changes in net worth} = \text{changes in net worth due to savings and capital transfers} + \text{changes in net worth due to other volume change in assets} + \text{changes in net worth due to holding gains or losses}$

$\text{Closing net worth} = \text{closing assets} - \text{closing liabilities}$

The “other changes in the volume of assets” account plays a big role in the stock flow consistency of the system. It can be broken down into revaluation accounts and other volume changes in assets. The revaluation account records the holding gains and losses on real and financial assets. Separating the change in wealth into components due to savings and due to holding gains and losses is central to the study of the wealth effect on the behavior of the sectors. In addition, articulating other volume changes in assets like the discovery of unknown mineral reserves or the destruction of an asset due to some catastrophic event are extremely important in the measurement of net worth and its driving factors. As will be seen later in

the chapter, this account is undervalued in many national accounts systems and represents an important data gap.

Numeric examples of how the system identities work are available in the SNA93 manual and in a more recent publication by the United Nations (2004) called *National Accounts: A Practical Introduction*.

Supply and Use Tables and Input Output

In addition to the sequence of accounts outlined, the system includes goods and services accounts, supply and use tables, and symmetric input-output tables that provide detailed analysis of industries and products. The tables are, in fact, a breakdown of the production and generation of income accounts. This is the part of the system that reflects the production function at the core of structural and productivity analysis. Table 2.5 is a simplified supply and use table that demonstrates the use of identities to balance the production and the use of products in the system.

The three-way identity of arriving at GDP is tested in the table: sum of value added by industry (5 – 1) equal to sum of incomes of primary factors of production (6) equals sum of final expenditures on domestic production (2 + 3 + 4 – 7).

The supply and use identity: outputs + imports (supply 5 + 7) = intermediate consumption (by industries) + final consumption + gross fixed capital formation + exports (demand 1 + 2 + 3 + 4)

The dimensionality of the supply and use table is usually rectangular with many more products than industries. The SNA93 recommends the use of the CPC classification, which has 1,800 commodities at its five-digit level, but for countries where less detail is collected, the three-digit level could be used (about 300 product groups). ISIC Rev 3 is recommended for the industry classification. Again, the level of detail will depend on the countries' statistical system, but a reasonable breakdown is considered to be the two-digit level or more (about twenty industries).

The supply and use tables are important statistical tools in the SNA. They are used to test and monitor the quality of the data system used to feed the sequence of accounts. For example, they can be used to

1. Identify gaps, inconsistencies, and valuation problems in the data system
2. Calculate weights for the calculation of price and volume index numbers
3. Estimate variables residually that are not captured in the statistical system for reasons of response burden or expense
4. Benchmark infra-annual data and projection systems to add consistency to short-term indicators

The supply and use tables are also used to calculate symmetric input-output tables, either product by product or industry by industry. These

Table 2.5 Simplified supply and use tables

	Products	Industries	Rest of world	Final consumption	Gross capital formation	Total
Products		1. Intermediate consumption	2. Exports	3. Final consumption expenditure	4. Gross capital formation	Total use by product
Industries	5. Output					Total output by industry
Components of value added		6. Value added				
Rest of world	7. Imports					
Total	Total supply	Total inputs by industry				

tables convert the supply and use tables from a statistical tool to an analytic tool. Input-output tables are used to do all sorts of structural analysis and when combined with the rest of the SNA framework are used to do many types of the analyses outlined in table 2.1, which showed the analytic underpinnings of the system of accounts. These include

1. Analysis of production, input structures, and multifactor productivity
2. Analysis of the structural change of components of final demand like consumer spending and investment in fixed capital
3. Analysis of impact of changes in tax rates or tax regimes on products and production
4. Analysis of impacts of changes in regulation in the economy
5. Analysis of impact of changes in technology and/or relative price change
6. And so on

The other major advantage of a set of supply and use tables and input-output tables integrated with the rest of the system is that it provides a basis for many analytic data by-products such as satellite accounts. These are usually aggregations or classifications not readily available in either a standard product or industry classification system but are of great analytic importance. These by-products often relate to activities that cross industry and product boundaries, such as tourism, transportation, communication, or health. They also form a basis for superimposing other related data on the system, such as environmental flows to measure the impact of economy on the environment.

While supply and use data systems are the most data-intensive part of the system, they are the thread that ties the system together and have a big

impact on the quality of the system in terms of both statistical integrity and analytic usefulness.

2.2.4 Functional Breakdown of Expenditures and Employment and Population Data

The last two elements of the central framework will not be described in detail here. Their purpose has already been described in the infrastructure section. Functional breakdowns add analytic depth to the purpose of expenditures in the system. For example, the purpose classification of household expenditures allows for analysis of the consumption function in the context of joint consumption (expenditures on cars and repairs grouped together) and of substitution (different modes of transportation grouped together). The alignment of population and employment data with SNA concepts facilitates many types of analysis. The employment data are essential for productivity analysis. While these data elements seem straightforward, in many statistical systems there are more than one estimate of employment—from a household survey and a business survey. Most often neither is aligned with the SNA view of hours worked or the production boundary, and work is required to create one consistent measure.

2.3 A Three-Country Comparison: Australia, Canada, and the United Kingdom

Australia, Canada, and the United Kingdom are examples of countries where the fully integrated SNA93 system has been implemented. In this section, each country's system is described to show how the system has been applied, showing to some extent how the supporting statistical system has influenced the dimensions and detail of each system.

2.3.1 Australia

The Australian System of National Accounts (ASNA) is a prime example of a system that has been designed and implemented on an integrated basis in line with SNA93—but with some differences based on what is most important to user needs and on data availability.² The data system is available from 1994–95 forward on a fully integrated SNA93 basis. Many parts of the system exist for longer time series.

The Production and Asset Boundaries

For the ASNA these boundaries are closely aligned with SNA93. The production boundary includes estimates of financial services for which no

2. The information in this section about the ASNA was found on the web site of the Australian Bureau of Statistics (<http://www.abs.gov.au>) and more specifically in two documents: *Australian National Accounts: Concepts, Sources and Methods* (Australian Bureau of Statistics 2000) and *Measuring Australia's Economy* (Australian Bureau of Statistics 2003).

explicit charge is made, the value of service of owner-occupied housing, and the service provided by homeowners in building or renovating the housing stock. No explicit estimates are made for illegal activity. This is the only exception to the SNA production boundary. The asset boundary is also largely SNA93 compliant, with the exception of the treatment of valuables, which are not as yet included as fixed assets.

Valuation Methods

The valuation methods in the ASNA are those suggested in SNA93. The accounts transactions are measured at market prices including the balance sheets. The input-output and supply and use tables use the basic price valuation as suggested in SNA93.

The ASNA Sequence of Accounts

The ASNA publishes a full sequence of accounts annually, which is a slightly modified version of the international standard. The accounts of the ASNA are as follows:

- The *gross domestic product account* records the value of production (GDP), the income from production, and the final expenditures on goods and services produced. This is a combination of the production account and production of income account of SNA93. These accounts are published by industry for GDP, by factor income type, and by final expenditure category, but not by institutional sector. This is based on the users' key demands for the three breakdowns of GDP but is less of an interest in sectoral analysis of the production account data. Volume and price measures are published based on the final expenditure approach of GDP using an annual chain-Laspeyres index formula method.
- The *income accounts* show primary and secondary income transactions, final consumption expenditures, and consumption of fixed capital. Net saving is the balancing item on this account. The ASNA income account joins the primary and secondary distribution of income accounts of SNA93 into one. These accounts are produced for four major domestic sectors: households (including nonprofit institutions serving households), financial corporations, nonfinancial corporations, and governments.
- The *capital accounts* record the net accumulation of nonfinancial assets and the financing by way of saving and capital transfers. Net lending/borrowing is the balancing item of this account. It is produced for the four domestic sectors just outlined.
- The *financial accounts* show the net acquisition of financial assets and net incurrence of financial liabilities. The balancing item is net financial position, which is equivalent to net lending/borrowing measured

in the capital accounts. This account is also recorded for the four domestic sectors of the economy.

- The *balance sheets* record the stock of assets (financial and nonfinancial) and liabilities at a point in time, and net worth is the balancing item. This account is recorded for the four domestic sectors.
- The *external account* is recorded separately from the sequence of accounts and is published according to the balance of payments manual published by the International Monetary Fund (IMF). It is fully integrated with the SNA in that common variables such as imports, exports, or interest and other income flows are equivalent in both accounts.

This sequence of accounts (missing only the other changes in volume of assets accounts) is published on a *fiscal* year basis annually with about a 150-day lag on the reference period. These are preliminary estimates until the data system matures, with all final data sources available about thirty-six months after the reference period. There are approximately twenty-four tables published that refer to the sequence of accounts, but at the same time about eighty additional tables are published that include detailed disaggregations of the many variables of the system. These include, for example, gross fixed capital formation and capital stocks by type of asset, capital consumption allowances by industry and institutional sector, household expenditure detail, and breakout of government accounts by level of government, to name just a few.

A summary version of the sequence of accounts is also published on a quarterly basis with a sixty-day lag. The quarterly sequence of accounts includes national GDP by expenditure component, projections of value added by industry, and GDP by income type. The constant price estimate of GDP is the expenditure-based GDP using an annually linked chain-Laspeyres measure. The sector accounts include a national account for current and capital accounts and income accounts for the household sector and summary income/capital accounts for the external and government sectors. The quarterly database also includes many detailed breakdowns of expenditures. The data are published on a seasonally adjusted and trend basis in addition to the original unadjusted estimates.

Supply and Use Tables and Input-Output Tables

The ASNA compiles both rectangular supply and use tables used for balancing the system and symmetrical or square industry-by-industry input-output tables. The industrial classification used is the Australian and New Zealand Industrial Classification system (ANZIC), which can be concorded to ISIC Rev 3. The commodity classification used is one designed solely for the purpose of compiling input-output and supply/use tables. The input-output and supply/use tables are closely linked. They are produced as follows:

1. The first supply and use tables for any given year are compiled about twelve months after the reference period. The dimensions are some 100 industries by 150 commodity groups. This projected annual supply and use table is used to balance the production accounts of the sequence of accounts, and no statistical discrepancy is ever shown between the three measures of GDP.

2. The “preliminary” supply/use table is compiled within twenty-four months of the reference period and is based on partial benchmark data. The rest of the system is benchmarked to these preliminary data, and therefore the quarterly system is never projected for more than seven quarters.

3. The “final” supply/use tables are produced within thirty-six months of the reference period. These are based on “final” survey and administrative data, which are as complete as the statistical system can provide. The dimensions are some 109 industries by 1,100 commodity groups. The “final” version of the sequence of accounts is benchmarked to this.

4. When and only when the supply/use tables are “final,” the industry-by-industry input-output tables are compiled and published. These are symmetrical tables with 109 industries. These are available about four months after the final supply and use tables or about forty months after the reference period. The particular form, industry-by-industry, and the dimensions have been chosen as the best compromise between response burden and analytic use to the tables. These include effects of changes in factor costs, productivity, and incidence of taxes on production and imports and primary input content of demand.

This particular production cycle of supply and use tables for balancing the ASNA with input-output tables available when the data become “final” takes advantage of the fully integrated design of the SNA architecture. It provides users with a consistent set of accounts, balanced with no statistical discrepancies, from the production accounts through to the capital accumulation accounts. Preliminary versions based on projected or incomplete data take advantage of input-output ratios to fill in data gaps.

The final supply/use tables are the most data-intensive part of the system, requiring respondents to fill in outputs and inputs by commodity. The input structure is collected by “establishment,” which is the statistical unit based on homogeneous production technology but where full data can still be collected. This means there is primary, secondary, and ancillary production in some units, but data cannot be collected to split inputs by all types of production within an establishment. To minimize response burden and to optimize the usefulness of the data, the Australian Bureau of Statistics has designed a collection strategy that rotates industries in and out of collection on a three- or five-year basis depending on the stability of the input structure. The more rapidly evolving sectors are on the three-year cycle. For each year, about 25 percent of inputs are based on collected data

as opposed to imputed or allocated input data. Since the Australian statistical system is centralized, the economic data collection is organized and oriented around the compilation of the accounts both in structure and detail and in timeliness.

Other Features of the ASNA

The integration of supply/use tables with the sequence of accounts provides a balancing tool for the sequence of accounts down to the balancing *item net lending/borrowing* of the *capital accumulation account*. Thus, the net lending/borrowing sums to zero across sectors when the external account is added in. But net lending/borrowing (net financial requirements) is also calculated from the financial accounts. Here a statistical discrepancy is shown in the financial account to equate the two balancing items. For the balance sheet, the household sector is used to balance across sectors for most instrument types due to the fact that direct balance sheet data are not generally available for households but are available for the corporate and government sectors and are collected for the external account.

In addition to the sequence of accounts, the functional breakdowns of the SNA93 architecture are available in the detailed expenditure tables of both the annual and quarterly sequence of accounts. Also, *productivity accounts* are compiled as part of the ASNA database—including the labor input as specified in SNA93.

Finally, regional or state-level production accounts are also a feature of the ASNA with some other key variables, like household and some government-sector income accounts available at the state level.

2.3.2 United Kingdom

The accounts of the United Kingdom are another example of a complete and fully integrated set of accounts.³ The design and form of the U.K. accounts conform to the European System of Accounts (ESA95), which is a version of SNA93 written specifically for the member countries of the European Union. The ESA95 is fully consistent with SNA93. It does, however, add more precision to some aspects of SNA93 that take the form of recommendations with alternative solutions. ESA95 attempts to standardize the measurement of the SNA aggregates because they are used for the calculation of contributions to the European Union and for the monitoring of the complete European Union economy. In 1998 the United Kingdom completed a set of accounts based on the ESA95. This included completion of a longer project whereby the distributed statistical system was

3. The information in this section about the U.K. national accounts was found on the web site of the U.K. National Statistics Office (<http://www.statistics.gov.uk>) and more specifically from the following two documents: *United Kingdom National Accounts: The Blue Book 2003* (U.K. National Statistics Office 2003a) and *United Kingdom National Accounts: Concepts, Sources and Methods* (U.K. National Statistics Office 2003b).

centralized over a ten-year period. This has meant that some parts of the SNA that were previously published by other institutions are now all the responsibility of the Office of National Statistics (ONS). For example, financial accounts, balance sheets, and balance-of-payment statistics were previously published by the Bank of England.

The Production and Asset Boundaries

These boundaries are closely aligned with SNA93/ESA95 for the United Kingdom. The production boundary includes estimates of financial services for which no explicit charge is made, the value of service of owner-occupied housing. No explicit estimates are made for illegal activity, but there is extensive work done on “exhaustiveness” to account for under-reporting and data gaps. Valuation of illegal activities is being worked on at the European level by Eurostat. In employing the production boundary for households producing goods for own use, by convention, only own-account construction of housing and production of agricultural goods are included. Anything else is deemed to be insignificant.

The asset boundary is also largely SNA93 compliant, including its treatment of valuables as fixed assets. The ESA95 rule for “small tools” is employed, excluding any transactions on purchases less than 500 euros, even though it may be used in the production process for more than one year.

Valuation Methods

The valuation methods in the U.K. SNA are those suggested in SNA93 and ESA95. The sequence of accounts transactions are measured at market prices, including the balance sheets. The input-output and supply and use tables use the basic price valuation.

The U.K. Sequence of Accounts

The United Kingdom publishes a full sequence of accounts annually, which is a slightly modified version of the international standard but compliant with ESA95. The sequence of accounts as follows is produced for the four domestic sectors—nonfinancial corporations, financial corporations, governments, and households and nonprofit institutions—and the external sector wherever relevant:

- The *goods and services account* is an aggregate supply and use table constructed for each institutional sector. It records the value of output at basic prices plus imports as resources (or supply), and intermediate use, consumption, investment, government expenditure and exports of commodities as use (or demand). It presents GDP at basic prices by sector, and then by adding net taxes on products and imports it also presents GDP at market prices. Volume and price measures are published based on the “final expenditures” approach to GDP using the annual chain-Laspeyres index formula.

- The *generation of income accounts* record the uses of GDP at market prices by type of factor income.
- The *allocation of primary income accounts* show primary incomes by type as resources for each sector.
- The *secondary distribution of income account* shows the redistribution of income through transfers across sectors as sources and payments of taxes and social contributions as uses to arrive at disposable income by sector.
- The *redistribution of income in kind account* shows the income in kind produced by each sector and who it is used by sector added to the disposable income of each sector.
- The *use of income account* shows consumption spending by sector out of disposable income and the adjustment for net equity of pension funds. Net saving is the balancing item on this account.
- The *acquisition of nonfinancial capital accounts* record the net accumulation of nonfinancial assets and the financing by way of saving and capital transfers. Net lending/borrowing is the balancing item of this account. It is produced for the four domestic sectors outlined previously and net lending for the external sector.
- The *financial accounts* show the net acquisition of financial assets and net incurrence of financial liabilities. The balancing item is net financial position, which is equivalent to net lending/borrowing measured in the capital accounts. This account is also recorded for the four domestic sectors of the economy.
- The *balance sheets* record the stock of assets (financial and nonfinancial) and liabilities at a point in time, and net worth is the balancing item. This account is recorded for the four domestic sectors.

This particular view of the sequence of accounts—shown for both the *resources* and the *uses* view of each account—is the ESA95 suggested presentation. Although ESA95 suggests splitting off the nonprofit institutions serving households as a sector unto itself, this is not currently done for the U.K. accounts. The sequence of accounts is first published about six months after the reference period based on preliminary data. The accounts are revised every year for the subsequent three years.

A summary version of the sequence of accounts, with the main macro variables and sector balances with sector detail for households, governments, and the external account, is published quarterly with about a fifty-five-day lag after the reference quarter. In addition, a flash estimate of GDP is published about forty days after the reference quarter.

Detailed expenditures of households by purpose (COICOP based) and government expenditure by function (COFOG) are also available, as well as expenditure by asset type.

Input-Output and Supply/Use Tables

For the United Kingdom the supply and use tables and the input-output tables are square with the same dimensionality. The supply/use tables balance the production account for 123 industries based on the NACE Rev 1 classification system (the European industry classification system, equivalent to about ISIC level 2 industries) and 123 products based on the CPA (the European product classification system). The symmetrical input-output tables are published on a product-by-product basis for the 123 products. This dimensionality and format (product-by-product input-output tables) is based on the ESA95 recommendation of using NACE at the two-digit level and CPA at the three-digit level. Most of the published supply/use and input-output tables for European countries have roughly the same dimensionality—slightly over 100 industries and commodities—following the ESA95 recommendation.

The supply and use tables are used to balance the production account. They are produced at the time of the first full annual, about eighteen months after the reference year. This means that there are no statistical discrepancies in the sequence of accounts for all of the years for which supply/use and input-output are available. The data for the supply and use tables are based on the Annual Business Enquiry, which builds estimates for all industries while using a subsample of each industry to collect data on inputs. The data collected are summary detail (not full commodity detail; therefore, the double deflation technique is not used to calculate deflated value added by industry), but the summary detail is available for all industries.

Other Features of the U.K. SNA

The full sequence of accounts is published annually in a publication called the *Blue Book*, which covers about ten years of data (available on the internet and in a printed version). The fully integrated database exists back to 1994, but many important variables such as constant price GDP are available for longer time series.

In the *Blue Book*, the sequence of accounts is published for subsector detail as well as for the financial corporate sector and for the government sector. Transparency is a key factor in the U.K. approach to balancing and publishing of data. For the supply/use tables a series of coherence adjustments are published to show how the equality of supply and demand was achieved. When the sequence of accounts is published, these adjustments are split out by sector and published as statistical adjustments necessary to offset the balancing adjustments of the production account. This process means that no statistical discrepancies exist up to the balancing item of net lending/borrowing in the sequence of accounts—but statistical discrepancies still exist between net lending/borrowing and net financial require-

ments on the financial account. The whole balancing approach for the U.K. accounts is described in detail in the “Concepts, Sources, and Methods” section, also published on the National Statistical Office (NSO) web site (<http://www.statistics.gov.uk>).

As part of the publication of the supply and use tables, employment and capital stocks consistent with the U.K. accounts are also published on a by-industry basis for productivity analysis.

2.3.3 Canada

The Canadian System of National Accounts (CSNA) is another example of a highly integrated system of accounts based on the SNA93 standard.⁴ The Canadian approach has a quarterly emphasis, the sequence of accounts being published on a quarterly basis. The supply/use and input-output tables have an important regional dimension, which is motivated in part by administrative use of the supply/use system to allocate a value-added tax system that is administered at the Canada level but harmonized with regional indirect taxes in specific regions. This administrative use means that the supply/use tables are produced on a regional basis to arrive at national supply/use tables. This imposes a cost in the form of a loss of timeliness and increased cost of data collection, as surveys are designed to produce consistent quality of value added across all regions of Canada. The Canadian system is also based on a highly centralized statistical system. The economics data system, surveys, and national accounts were designed based on the integrated framework of the 1968 system of accounts. The economic survey and administrative data collection systems have been designed and modified over the years to feed the CSNA. The CSNA is used as a quality check tool on the data collection system. The data sources are constantly monitored, and changes are applied in concert with the CSNA.

The Production and Asset Boundaries

These boundaries are closely aligned with SNA93 for Canada. The production boundary includes estimates of financial services for which there is no explicit charge and the value of service of owner-occupied housing. No imputation is made for the labor portion of own-account fixed investment by households (renovation and self home construction). Only the material portion is capitalized at present. No explicit estimates are made for illegal activity other than tobacco smuggling. Work on valuation of illegal activities is currently under review. In employing the production boundary for households producing goods for own use, by convention, only own-

4. The information in this section about the CSNA can be found on the Statistics Canada web site (<http://www.statcan.ca/english/freepub/13-010-XIE>); click on “more information” for sources and methods documents. This electronic publication is called the *Canadian Economic Accounts Quarterly Review*.

account construction of housing and production of agricultural goods are included. Anything else is deemed to be insignificant.

The asset boundary is also largely SNA93 compliant except for treatment of valuables as fixed assets. No thresholds are applied in the capitalization of fixed assets. Anything used in the production process over one year is included.

Valuation Methods

The valuation methods in the CSNA are slightly different from those suggested in SNA93. The sequence-of-accounts transactions are measured at market prices, including GDP and balance sheets, which were converted to full market value by the end of 2004 (previously measured as a mixture of market and book value). The input-output and supply and use tables use a modified basic price valuation for balancing purposes, which is a purchase price valuation by industry and product. When value added by industry is published, it is converted to the basic price concept recommended in SNA93.

The CSNA Sequence of Accounts

The CSNA publishes a full sequence of accounts quarterly, which is a slightly modified version of the international standard. The accounts of the CSNA are as follows:

- The *gross domestic product account*, which records the value of production (GDP), the income from production, and the final expenditures on goods and services produced. This is a combination of the production account and production of income accounts of SNA93. These accounts are also published monthly for value added by Industry but only in the form of chain linked value added, adjusted for inflation. No sector detail is available for the GDP account except for a business/nonbusiness split used in the production of labor and multi-factor productivity estimates. Volume and price measures are published based on the final expenditure approach of GDP using the quarterly chain-linked Fisher index formula method.
- The *income and outlay accounts*, which show primary and secondary income transactions, final consumption expenditures, and consumption of fixed capital. Net saving is the balancing item on this account. The CSNA income account joins the primary and secondary distribution of income accounts of SNA93 into one. These accounts are produced for four major sectors: households (including nonprofit institutions serving households), corporations, governments, and the external sector.
- The *capital accounts*, which record the net accumulation of nonfinancial assets and the financing by way of saving and capital transfers. Net lending/borrowing is the balancing item of this account. It is produced

for the five sectors. In addition to the sectors outlined, the corporate sector is split into financial and nonfinancial corporations.

- The *financial accounts*, which show the net acquisition of financial assets and net incurrence of financial liabilities. The balancing item is net financial position, which is equivalent to net lending/borrowing measured in the capital accounts. This account is also recorded for the five sectors of the economy. In addition, financial accounts are published for thirty-five detailed subsectors.
- The *balance sheets*, which record the stock of assets (financial and non-financial) and liabilities at a point in time; net worth is the balancing item. This account is recorded for the five major sectors on a quarterly basis. In addition, financial accounts are published for thirty-five detailed subsectors, but only on an annual basis.

This sequence of accounts (missing only the other changes in volume of assets accounts) is published up to the financial accounts with the GDP release with about a sixty-day lag on the reference quarter. The balance sheets are published quarterly with a ninety-day lag. While the GDP account is fully reconciled with the supply/use and input-output system, the Canadian approach to balancing the sequence of accounts is different from that of other countries. As many as twelve preliminary quarters could be available before a supply/use balance is available. None of the three measures of GDP is deemed to be the most accurate in the preliminary system. The final expenditure approach and the income approach are calculated independently (at market prices) and an average is published showing a statistical discrepancy of equal and opposite sign on each account. The final expenditure approach is then deflated, and the monthly GDP deflated value added by industry at basic prices is adjusted to use the more complete information of the quarterly final expenditure approach but not entirely “reconciled.” The discrepancies of the income and expenditure approach are not allocated among sectors, meaning that the net lending/borrowing of the economy across domestic sectors and the external account does not sum to zero. A separate discrepancy is also shown between the net lending/borrowing balances for the income and outlay accounts and the financial accounts. The Canadian approach is to correct data gaps and discrepancies that are specifically identifiable but to leave the basic data unadjusted to the extent that the discrepancies are not resolvable. Even after the GDP accounts have been reconciled to the supply/use tables a small discrepancy remains, as the GDP account publishes survey-based inventory change and operating surplus, which are derived residually in the supply/use system. The system then is reconciled and released on a fully consistent basis with smaller statistical discrepancies than in the preliminary years.

There is one major inconsistency in the Canadian sequence of accounts. The consumption of fixed capital recorded for corporations in the se-

quence of accounts is taken directly from business accounting records, measured based on a mixture of historical cost and book value. The capital stocks recorded on the balance sheet for the corporate sector are derived from a perpetual inventory model in which the stocks are valued at current replacement cost and the consumption of fixed capital inherent in the net stock value is a current value measure. In addition, a third capital stock measure is calculated for the purposes of measuring multifactor productivity. This is an area where the Canadian system needs further work to clean up the inconsistency.

Supply/Use and Input-Output Tables

As mentioned earlier, the supply/use tables are the statistical tool used to balance the production account but are also an important administrative tool used to allocate value-added tax collections between the federal and provincial governments. This determines the level of detail in terms of both geography and commodity dimensions. The supply/use tables for Canada are rectangular and balanced for 301 industries using the North American Industrial Classification System (NAICS) and 727 commodities using a product classification system unique to the Canadian input-output tables. Symmetrical input-output tables (coefficients) are published on an industry-by-industry basis for the 300 industries from the supply/use tables. The industry-by-industry configuration was chosen for the same reason as for the Australian accounts, so that no simplifying assumptions are made in going from the industry technology known from collecting data at the establishment level, as would be the case for separating secondary activities from industries to arrive at commodity-by-commodity tables.

This supply/use balancing is compiled annually for thirteen regions of Canada (provinces and territories) and forms the benchmark for GDP for the sequence of national accounts mentioned above. (The sequence of accounts is also published by province for the GDP, household, and government sectors up to net lending/borrowing.) This process, from data collection to the production of the tables, takes about three years for the preliminary version and four years for the final version. The additional detail of the Canadian system imposes an additional year in the finalizing of the sequence of the accounts relative to most other countries. Work is being done to upgrade the timeliness of this part of the system, and experimental work is also being done to produce preliminary versions of supply/use similar to those produced in Australia and the United Kingdom.

Other Features of the CSNA

Detailed breakdowns of household expenditure (COICOP) and capital expenditure are published as part of the sequence of accounts. No breakdown of government expenditure by function consistent with the CSNA is available, but one will be when Statistics Canada completes the production

of government financial statistics based on the GFS2001 manual published by the IMF within the next few years.

As part of the CSNA, quarterly labor productivity data are published for the “business” sector (corporations plus unincorporated business) about ten days after the quarterly GDP release. Multifactor productivity measures are also published annually for the business sector, as are the labor and capital services data used to calculate them (consistent with the CSNA). Productivity analysis is only published for the business sector because the output of the nonbusiness sector is still only measured by deflating inputs used for nonbusiness GDP, assuming no change in productivity.

Annual data on purchasing power parities are also published as part of the CSNA based on the Organisation for Economic Co-operation and Development (OECD) benchmarks available every three years (volume indexes for GDP and prices comparisons at the GDP level and for final expenditure components). A more detailed bilateral purchasing power parity database is done for the Canada–United States comparison as demanded by the key users of the CSNA.

2.4 Summary and Conclusions

The three countries compared in this paper, Australia, Canada, and the United Kingdom, all produce a highly integrated set of accounts, which greatly facilitates consistent analysis of the economy by their domestic users and across international comparisons. Three important elements of commonality are that all three countries’ systems are based on highly centralized statistical systems, all have a long track record of producing national accounts estimates, and all three countries include the balance-of-payments statistics as part of the SNA accounting system.

In each case, the balancing of the sequence of accounts is achieved using the supply/use framework as suggested in SNA93. For Australia and the United Kingdom this is a relatively new feature of the system, brought in when implementing SNA93. For Canada, the supply/use framework has been used as the official GDP benchmark of the system of accounts since 1986, and supply/use has been published annually back to 1961. Where the countries differ the most is in how the identities are used to balance the system. In both the United Kingdom and Australia, the supply and use identities are used to eliminate all discrepancies up to and including the measure of net lending/borrowing in the sequence of accounts. This is done by allocating all final demand and factor incomes in the supply/use tables and using the same estimates in other parts of the system. In Canada, the supply/use framework is based on data built from establishment-based data sources, and the institutional sector data are built from institutional unit data. The supply/use determines the level of GDP, but the variables corporate surplus and inventory change are not fully reconciled with the

data from the institutional unit-based sources (this largely relates to enterprise- versus establishment-based corporate-sector data). A statistical discrepancy is shown between final expenditure-based GDP and factor income-based GDP splitting the difference between the two measures. All countries record statistical discrepancies between the net lending/borrowing and financial requirements. The advantage of leaving statistical discrepancies is in keeping track of issues in the statistical feeder system and keeping track of quality changes from preliminary to fully benchmarked estimates. This way the system of accounts can be used to monitor the quality of the statistical data used to feed it.

While each country largely follows SNA93, the application does differ across the three countries. The sequence of accounts is presented quite differently in each case—while the major analytic aggregates such as GDP, savings, investment, consumption, net lending/borrowing, and wealth are all presented. The U.K. presentation of the flow of accounts is the most akin to the SNA93 suggested presentation. Australia has a modified flow of accounts, but one consistent presentation. In Canada the parts of the sequence are all published as separate products, making it more difficult for the user to identify the integrated nature of the various products. This will be a key focus for Canada in the upcoming years in presenting the data to users in a more integrated way.

The slight differences in application of production boundary (and in likely methodology for some aspects of the accounting system) and valuation reflect what is significant for that particular economy. Some of the differences are based on the history of the accounts prior to the SNA93 standard and what the users were accustomed to as well as the data sources available. To what extent these differences affect international comparability is difficult to assess. Even areas where the apparent application of the standard is the same, methodologies or classifications of similar entities can differ. This is where international coordination plays a key role in helping to add consistency to the various systems of accounts. The adherence to ESA95 across the European Union adds discipline to the application of the standard in that ESA95 attempts to put clarity to all of the “borderline” issues related to compiling a set of accounts.

Tables 2.6 and 2.7 summarize the key features of the three-country comparison.

While a detailed comparison of the U.S. components of the national accounts has not been done as part of this chapter, the National Income and Product Accounts (NIPAs) have been compared to the SNA structure in a recent paper called “The NIPAs and the System of National Accounts” published in the December 2004 *Survey of Current Business* (Mead, Moses, and Moulton 2004). In addition, Teplin et al. (chap. 11 in this volume) presents a proposed set of integrated accounts for the United States based on the SNA93 flow of accounts and sectoring. For the countries compared in

Table 2.6 Sequence of accounts comparison

	Canada	Australia	United Kingdom
Supply and use tables	301 industry × 727 commodity Annual $t-3$	109 industry × 1,100 commodity Annual $t-3$ 100 industry × 150 commodity Preliminary $t-2, t-1$	123 × 123 square industry supply/use tables Preliminary and final $t-2, t-1$
Input/output tables	301 industry × 727 commodity Rectangular commodity Annual $t-3$	109 × 109 square industry × industry Annual $t-2$	123 × 123 square industry × industry Annual $t-2$
GDP × sector	None	5 sectors ^a Annual $t-1$	5 sectors ^a Annual $t-1$
Primary and secondary distribution of income	4 sectors ^b One joint distribution of income account Quarterly (60-day lag)	5 sectors ^c One joint distribution of income account Annual and partial quarterly (60-day lag)	5 sectors ^d Primary and secondary income distribution accounts Annual and partial quarterly (60-day lag)
Financial accounts	35 sectors Quarterly (60-day lag)	5 sectors Annual (90-day lag)	5 sectors Annual and partial quarterly
Revaluation and OVCA			
Balance sheets	35 sectors Annual (90-day lag) 5 sectors Quarterly (90-day lag)	5 sectors Annual (90-day lag)	5 sectors Annual and partial quarterly

Note: OVCA = other volume changes in assets.

^aThe sectors are households and nonprofit institutions, financial corporations, nonfinancial corporations, governments, and rest-of world.

^bThe sectors are households and nonprofit institutions, corporations, governments, and rest of world.

^cThe sectors are the same as for GDP by sector in footnote 1 above.

^dThe sectors are the same as for GDP by sector in footnote 1 above.

Table 2.7 Boundaries and valuation comparisons

	Canada	Australia	United Kingdom
Production boundary	FISIM Some illegal exhaustiveness	FISIM No illegal	FISIM No illegal exhaustiveness
Asset boundary	No valuables Software and E&D	No valuables Software and E&D	Valuables Software and E&D Small tools threshold
Valuation methods	GDP at basic and market price IO at purchaser price Assets at mixed market/book value	GDP at basic and market price IO at purchaser price Assets at market value	GDP at basic and market price IO at purchaser price Assets at market value
Classifications	NAICS IO products	ANZIC IO products	NACE CPA

Notes: FISIM = financial intermediation services indirectly measured; E&D = exploration and development; GDP = gross domestic product; IO = input-output; NAICS = North American Industrial Classification System; ANZIC = Australia and New Zealand Industrial Classification; NACE = the industrial classification used by the European Union member countries; CPA = the product classification used by the European Union member countries.

this study, a recent phenomenon of the corporate sectors' amassing large accumulated net lending positions (surpluses) and using those surpluses to restructure balance sheets has been a very marked trend. In the current NIPAs, no measure of corporate net lending is published in order to examine this phenomenon for the United States. Evidence appears to be emerging in the "flow of funds" accounts published by the Federal Reserve Board that this trend is also emerging in the United States. The work done in the chapter by Teplin et al. shows how net lending for U.S. corporations would be presented along with the financial accounts to explicitly show how surplus funds are used to restructure balance sheets.

In all countries included in this comparison, the users are well served by a system of national accounts that is consistent and virtually complete. The statistical systems take full advantage of using the SNA as a tool for validating and augmenting the survey and administrative data systems. This helps keep the data relevant and maintains the quality of the system.

The system of accounts was designed to facilitate the analysis of the macroeconomic process from the creation of income via production through to changes in wealth and to provide detailed information on the evolution of the economy in terms of the structure of production and spending and the uses of primary factors of production. The SNA93 has achieved the buy-in of the international community as the tool for building the statistical database.

References

- Australian Bureau of Statistics. 2000. *Australian national accounts: Concepts, sources and Methods*. Canberra: Australian Bureau of Statistics.
- . 2003. *Measuring Australia's economy*. 7th ed. Canberra: Australian Bureau of Statistics.
- Mead, Charles L., Karin Moses, and Brent Moulton. 2004. The NIPAs and the System of National Accounts. *Survey of Current Business* 84 (December): 17–32.
- U.K. National Statistics Office. 2003a. *United Kingdom national accounts: The blue book 2003*. London: National Statistics Office.
- . 2003b. *United Kingdom national accounts: Concepts, sources and methods*. London: National Statistics Office.
- United Nations. 1968. *A system of national accounts*. Studies in Methods, series F, no. 2, rev. 3. New York: United Nations.
- . 2004. *National accounts: A practical introduction; Handbook of national accounting*. New York: United Nations.
- United Nations, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, and World Bank. 1993. *System of national accounts 1993*. Series F, no. 2, rev. 4. New York: United Nations.