1. General sources and methods used for compiling the national accounts, covering data sources, scope and institutional arrangements

I. Analytical Framework, Concepts, Definitions, and Classifications

Concepts and definitions
Analytical framework: The System of National Accounts (SNA) is used as the overall conceptual framework. Singapore has been implementing progressively the recommendations of the 1993 SNA; several important recommendations (e.g. valuation of value-added at basic prices and capitalisation of software expenditure) have already been adopted.

Classification/sectorization
Classification systems: Industrial activities are classified using the Singapore Standard Industrial Classification 2005 which is adapted from the International Standard Industrial Classification, Revision 4.

The breakdown of private consumption expenditure and gross fixed capital formation follows closely the classification system used in the SNA. The classification of exports and imports of goods uses the Standard International Trade Classification, Revision 4.

II. Scope of the data

Transactions coverage: Includes (as far as possible) all activities within the production boundary as set out in the SNA 1993.
Geographic coverage: Whole of Singapore.
Unrecorded activity: Estimates are made for services of ownership of dwellings, and production of own-account workers.

III. Accounting Conventions

Valuation:
Production approach: Valuation for final use is at basic prices; intermediate consumption at purchaser’s prices; ownership of dwellings at comparable rental value; and non-market services at cost. Expenditure approach: Transactions are mostly valued at purchaser’s prices. Income approach: The income estimates of GDP are compiled at current market prices.

Time of recording:
Production approach: The accrual basis is used for most transactions while the cash basis is used for some government transactions.
Expenditure approach: Primary accounting method used is accrual basis except for government consumption expenditure which is recorded on a cash basis.
Income approach: The accrual basis is used for most transactions while the cash basis is used for some government transactions.

**IV. Nature of the Basic Data Sources**

**Production approach:**
The quarterly GDP estimates are compiled using a wide range of data sources, including both administrative data and monthly and quarterly surveys. Income and expenditure statements of statutory boards and other companies are also used. The specific data sources for each industry are elaborated.

Manufacturing: data on the manufacturing industry are mainly collected through the Monthly Survey of Manufacturing Activities, which is used to derive the monthly index of industrial production. Construction: monthly certified progress payments constitute the main data source. Utilities: the performance of utilities is estimated based on data on electricity, gas and water consumption, as well as utilities companies’ statements of income and expenditure. Agriculture: data on production quantity is obtained from the Agri-Food and Veterinary Authority of Singapore. Wholesale and Retail Trade: the wholesale trade index, the index of industrial production, retail sales index and data on external trade are used to derive the quarterly GDP estimates. Transport and Storage: income and expenditure statements of major transport companies and statutory boards are the main data sources. Volume indicators used include volume of cargo, passenger-kilometres and number of postal articles. Hotels and Restaurants: estimates are compiled based on indicators such as hotel and restaurant turnover, room days occupied, average room rates and visitor arrivals. The Catering Trade Index, which reflects receipts of restaurants, fast food outlets and food caterers, is also used. Information and Communications: statements of income and expenditure are provided by the telecommunication companies. In addition, volume indicators such as international call usage, mobile phone and broadband subscriptions are used. Financial Services: data on the financial services industry are collected via the quarterly survey of financial institutions. Administrative data such as loans and advances, and volume of stocks transactions are used as supplementary indicators. Business Services: income and expenditure statements and data on property transactions and employment are the main data sources. Other Services Industries: estimates on public administration and defence are mainly compiled based on administrative data on wages. Information from the income and expenditure statements of statutory boards is also used. Other indicators include number of students, number of outpatient visits and admission tickets. Ownership of dwellings: the estimates of ownership of dwellings are imputed based on the annual value of properties as assessed for property taxation, and information on housing stock.
Expenditure approach:
The expenditure measure of GDP is compiled using a wide range of data sources, for example, external trade statistics, annual economic surveys, government and statutory boards’ financial statements, balance of payment statistics and administrative data. The specific data sources for each expenditure component are elaborated.

Private Consumption Expenditure: Main data sources include external trade statistics, Census of Manufacturing Activities, Survey of Services, administrative data on motor vehicles registered and balance of payment statistics on travel services.

Gross Fixed Capital Formation: Comprises (i) Construction & Works, (ii) Transport Equipment and (iii) Machinery, Equipment & Software. The main data sources of the individual components of GFCF are as follows:
(i) Construction & Works: Administrative data on certified progress payments on construction projects and the Survey of Real Estate Developers.
(ii) Transport Equipment: External trade statistics, Census of Manufacturing Activities, administrative data on motor vehicles, ships and boats registered and Survey of Capital Expenditure in the Public Sector.

Changes in inventories: Main data sources include the Census of Manufacturing Activities, Wholesale Trade Survey and Retail Trade Survey.

Government Consumption Expenditure: Estimates are largely compiled from detailed income and expenditure statements of government ministries, departments and non-profit-non-market statutory boards.

Exports and imports: Data on exports and imports of goods and services are based on the balance of payment statistics.

Income approach:
The income-based GDP estimates are compiled on an annual basis using a wide range of data sources, including government administrative data and surveys. Income and expenditure statements of statutory boards and other companies are also used.

Compensation of Employees: Largely compiled from government administrative data (e.g., employment statistics and average monthly earnings) and surveys (e.g., Census of Manufacturing Activities and Surveys of Services).

Gross Operating Surplus: Largely based on survey sources (e.g., Census of Manufacturing Activities and Surveys of Services) except for agriculture and construction. For these industries, the residual method is used, i.e., by deducting the sum of other income components from the estimates of value added of the production approach.

Taxes on Production and Imports: Compiled from government administrative data.
V. Compilation Practices

Production approach:
The main statistical procedures for quarterly VA estimates by the production approach are described below. Estimates are also made on production of own-account workers.

Manufacturing: constant price estimates are derived through extrapolation with the index of industrial production. Current price estimates are then obtained through inflation with appropriate price indicators.

Construction: data on certified progress payments are used to extrapolate current price estimates. Constant price estimates are mainly derived through deflation with appropriate price indicators. Additional estimates are made for alterations, maintenance and repair works which may not be reflected in the certified progress payments.

Utilities: current price estimates are derived directly from utilities companies’ income and expenditure statements. Constant price estimates are derived by extrapolation with volume indicators on the consumption of electricity, gas and water.

Agriculture: current price estimates are obtained through inflating constant price estimates with the price indices of local farm products. Constant price estimates are derived by extrapolation with volume indicators such as the quantity of farm production.

Wholesale and Retail Trade: value added estimates are obtained by extrapolation with the Wholesale Trade Index, Retail Sales Index and external trade statistics.

Transport and Storage: current price estimates are derived directly from the statements of income and expenditure, and inflating constant price estimates with appropriate price indicators. Constant price estimates are derived by extrapolating with volume indicators, such as volume of cargo, passenger-kilometres and number of postal articles.

Hotels and Restaurants: data on hotel revenue and restaurant turnover are used to derive current price estimates. Constant price estimates are obtained by extrapolation with indicators such as room days occupied, visitor arrivals and the Catering Trade Index.

Information and Communications: current price estimates are derived directly from statements of income and expenditure from telecommunications companies and through inflating constant price estimates by appropriate price indicators. Constant price estimates are derived from the extrapolation of volume indicators such as international call usage, mobile phone and broadband subscriptions.

Financial Services: current price estimates are mainly derived from the quarterly survey of financial institutions. Constant price estimates are mainly derived through deflation with appropriate price indices and extrapolation with volume indicators.

Business Services: current price estimates are mainly derived from income and expenditure statements and inflating constant price estimates. Constant price estimates are mainly derived through extrapolation with volume indicators such as number of property transactions and employment.

Other Services Industries: current price estimates are derived from government administrative data on wages, income and expenditure statements of statutory boards, and inflating constant price estimates with appropriate price indicators. Constant price estimates are mainly derived from extrapolation with volume indicators such as
employment, number of students, number of outpatient visits and admission tickets to performances.
Ownership of dwellings: assessed annual values of properties are used to derive the current price estimates. Movements in the housing stock are used to derive the constant price estimates.

**Expenditure approach:**
The main statistical procedures for the expenditure components of GDP are described below:

Private consumption expenditure (PCE): PCE refers to the final consumption expenditures of resident households and non-profit institutions serving households (NPISHs). In practice, PCE is obtained as the sum of domestic consumption expenditure and residents’ expenditure abroad less non-residents’ expenditure locally. Domestic consumption expenditure on goods and services is derived using the commodity flow approach where the supply of goods from local production and from imports, derived from the Census of Manufacturing Activities and external trade statistics respectively, are examined to determine the proportion meant for household consumption. The value of these consumer goods is then marked up by trade and transport margins and taxes on products to derive consumption expenditure on goods at purchasers’ prices. Consumption expenditure on services is derived mainly from the survey of services. Estimates on residents’ expenditure abroad and non-residents’ expenditure locally are compiled from the balance of payment statistics on travel services. Constant price estimates on private consumption expenditure are mainly obtained by deflating the corresponding current price estimates by relevant sub-components of the Consumer Price Index (CPI).

Government Consumption Expenditure (GCE): GCE is estimated based on the cost of production approach, that is, the sum of compensation of employees, other costs and taxes on production less receipts from sales of goods and services. Appropriate price indices such as the implicit government wage index and sub-indices of the CPI are used to deflate the relevant GCE at current market prices.

Gross Fixed Capital Formation (GFCF):

- Construction & Works:
GFCF on construction & works refers to the value of construction work put in place with respect to residential buildings, non-residential buildings and civil engineering and the costs of ownership transfer of existing buildings. The value of construction work put in place comprises of certified progress payments to contractors, real estate developers’ margin and other costs incurred on the property development. Data on real estate developers’ margin and other construction-related costs are obtained from the Survey of Real Estate Developers.

- Machinery & Equipment (including Transport Equipment):
The commodity-flow approach is used extensively to measure capital formation on machinery & equipment. The supply of machinery & equipment from local production
and from imports are first measured and examined to determine the proportion meant for capital formation. Trade and transport margins are then added to derive the market value of these capital goods. Data on the production and imports of machinery & equipment are mainly from the Census of Manufacturing Activity, external trade statistics and other administrative data.

- Software: Estimates on the expenditure on purchased software are based on companies’ survey returns while the expenditure on in-house software development is derived using the cost of production approach (ie sum of labor and non-labor costs on software development).

- Exports and Imports: Data at constant prices are computed by deflation using relevant price indices.

**Income approach:**
The main statistical procedures for the compilation of income-based GDP are described below. Estimates are also made on production of own-account workers.

Compensation of employees is defined as the total remuneration, in cash or in kind, payable by an establishment to an employee for work done in the reference period. This includes wages and salaries, employers’ contribution to Central Provident Fund (CPF) and pension funds, and benefits in kind. In line with the SNA, compensation of employees excludes incomes received by self-employed workers or own-account workers (which are classified as operating surplus). It also excludes any taxes (such as foreign worker’s levy) payable by the employer. In addition, wages and salaries are recorded before the deduction of employees’ contribution to CPF.

Gross operating surplus is defined as the value of the output at basic price (measured in terms of receipts from the sales of goods and services produced) less compensation of employees, intermediate consumption, and other taxes on production. It does not include property incomes (such as interest, dividends and rent of land), transfers and capital gains and losses that do not constitute output of goods and services.

Taxes on production and imports are compulsory payments levied by the government on the establishment or enterprise for the use of factors of production and for importing goods and services to be used in the production of goods and services. They include taxes on products and services. Examples of such taxes are import and excise duties, foreign workers’ levy, stamp duties and property tax.

**Assessment of discrepancies and other problems in statistical outputs**

**Reconciliation:**
Differences between GDP compiled from the production approach and GDP compiled from the expenditure approach as well as GDP compiled from the income approach are allocated to a statistical discrepancy item in the expenditure-based estimates and income-based estimates respectively. The reconciliation of the separate measures of GDP
(production, expenditure and income) is conducted once every 5 years. The last reconciliation was carried out for the year 2000, on the basis of 2000 input-output tables.

2. Specific compilation practices regarding

2a. Seasonal adjustment
Production approach: Seasonal adjustment is performed on each component breakdown (described in 5.1.1). The various components are then aggregated to obtain total GDP. Expenditure approach: Seasonal adjustment is performed on the following expenditure components:
Private consumption expenditure.
Government consumption expenditure.
Gross fixed capital formation in residential buildings; non-residential buildings; other construction and works; and machinery, equipment and software.
Exports of goods and services.
Imports of goods and services.

2b. Base year and update cycle:
The current base year is 2000. The frequency of update is once every 5 years.

2c. Volume measures
See above on V. Compilation practices (section 1.5.1).

2d. Consumption of fixed capital
Consumption of fixed capital is derived indirectly from the computation of net capital stock estimates. To estimate net capital stock from gross capital stock, the assumption of straight-line depreciation is used. This basically means that the value of an asset is taken to decline by equal amounts each year over its service life until its net value is zero. The assumed service lives of assets range from 80 years for residential buildings to 10 years for road vehicles.

2e. Capital stock and capital services
The Perpetual Inventory Method (PIM) is adopted to estimate capital stock. The PIM involves adding, for each type of capital asset, capital formation to an initial estimate of the capital stock and subtracting capital assets that are withdrawn. The capital stock estimates of each asset type are then summed up to obtain the economy-wide capital stock estimates.

2f. Research and development
Research and development expenditure is presently treated as intermediate consumption in the national accounts.
3. Quality assurance of NA compilation

3.1 Periodicity
Quarterly/Annual.

3.2 Timeliness
Not later than 8 weeks after the end of the reference quarter for the "Preliminary Estimates".
(Not later than 10 days after the end of the reference quarter for the "Advance Estimates". If the 10th falls on a Saturday, Sunday or public holiday, the advance estimates are released not later than the next working day after the 10th).

3.3 Revision schedule
The data are provisional when first released, and this status is indicated in the quarterly Economic Survey of Singapore (QES). Quarterly and annual data for earlier years are revised at the time of publication of the annual Economic Survey of Singapore (AES). The data usually become final 2 years after first release, and the final data are published in the QES and AES publications, as well as in the DOS on-line database, SingStat Time Series (STS) Online System.

3.4 Identification of preliminary and/or revised data
The data are provisional when first released, and this status is indicated in the quarterly Economic Survey of Singapore (QES).

3.5 Accessibility
Data are disseminated in two formats: the "Advance Estimates" and the "Preliminary Estimates". In both formats, data are disseminated in millions of Singapore dollars.

The "Advance Estimates" publishes only output-based GDP at constant 2000 prices. The categories for which data are published include: Manufacturing, Construction, and Services Producing Industries.

The "Preliminary Estimates" publishes the full output-based GDP in current and constant prices and the expenditure-based GDP at constant price.

The full output-based GDP are disseminated showing a breakdown by productive activity based on the Singapore Standard Industrial Classification, 2005 as follows: manufacturing; construction; utilities; other goods industries; wholesale and retail trade; transport and storage, hotels and restaurants; information and communications; financial services; business services; other services industries; and ownership of dwellings.

Data on the expenditure-based constant price GDP are disseminated showing the following breakdown: private consumption expenditure; government consumption expenditure; gross fixed capital formation (which is further broken down into residential buildings, non-residential buildings, other construction and works, transport equipment, and machinery, equipment and software); changes in inventories; net exports of goods and services with breakdown into exports and imports of goods and services.
Quarterly data in the "Preliminary Estimates" are disseminated in both a non-seasonally adjusted format and a seasonally adjusted format.

Annual data on income-based GDP are disseminated showing the following breakdown: compensation of employees, gross operating surplus [further breakdown into financial corporations; non-financial corporations and others (i.e. unincorporated enterprises and non-profit institutions)] and taxes on production and imports.

References

Pls see Singapore submission to IMF DSBB at:
http://dsbb.imf.org/Applications/web/basepagesmreport/?strcode=SGP&strcat=NAG00

“Seasonal Adjustment of Economic Time Series”

Information on more recent improvements and changes in methodology are disseminated through the "Papers & Analyses" section that is available on our website
http://www.singstat.gov.sg/pubn/papers/economy.html#nationalaccounts

Information on the capitalisation of software expenditure and other methodological/classification changes is available in the information paper “Rebasing of Singapore’s National Accounts to Reference Year 2000”.

Information on the adoption of basic price and other recent methodological/classification changes is available in the information paper “Rebasing of the Singapore System of National Accounts to Reference Year 1995”.

An update to the methodology used in measuring the output of financial services is available in an information paper “Value-added of Financial Services: Revision in Methodology and Estimates”.

Information on the methodology used to compile the quarterly estimates of nominal GDP is available in an information paper “Quarterly Estimates of Output-based GDP at Current Prices (or Nominal GDP)”.

Information on the methodology used to compile the annual estimates of income-based GDP is available in a report “The Income Approach to Gross Domestic Product”.