



# 2

## Strategic Issues in Quarterly National Accounts

*This chapter highlights some key statistical and administrative issues that compilers should consider when establishing or operating a quarterly national accounts (QNA) compilation system. It seeks to ensure that the compilation system is built on sound statistical standards and that good management practices are employed to facilitate the efficient operation of the system. There is no single best way of organizing a QNA compilation system and countries develop their system based on their needs and circumstances. This chapter should not be considered prescriptive or exhaustive. The issues and suggestions presented should be of benefit not only to agencies that are setting up a compilation system for the first time but also to agencies seeking to improve the efficiency of the compilation system and the overall quality of the QNA statistics.*

### Introduction

**2.1** Compilers must address strategic statistical and organizational issues to facilitate an efficient operation of the QNA compilation system. These issues arise when a QNA compilation system is being set up and should be revisited from time to time during the operational phase. The most important statistical issues to be considered are as follows: (i) coverage of the QNA and (ii) assessment of quarterly source data and the compilation process. Key organizational aspects are resource requirements, the compilation schedule, and the release cycle.

**2.2** The overall process involves two phases: a development phase and an operational phase. In the development phase, the compiler should develop and assess the compilation approach, select source data, and establish a back series of QNA data. An important first step in this phase is to consult with potential users to determine how they may use the QNA data. User needs evolve over time and users may have a

better understanding of their needs after new data become available; therefore, consultation with users should proceed on an ongoing basis. The main steps in establishing and maintaining QNA are summarized in Box 2.1. In the operational phase, estimates are compiled for the reference quarter and estimates for previous quarters may be revised when new quarterly and annual information becomes available. The data sources, statistical techniques, and compilation system used for establishing the back series in the development phase and for updating the series in the operational phase should be identical, as far as possible.

### Statistical Issues

#### Coverage of the QNA

##### General Issues

**2.3** When establishing the QNA, one of the first decisions that the compiler has to make is which parts of the 2008 SNA should be implemented. The choice will depend on availability of quarterly source data, the ANA system in place, resource availability, and user needs. As mentioned in the introduction to this chapter, an important first step is to consult with potential users to see what kind of use they could make of QNA data. This implies assessing what level of detail users would find desirable.

**2.4** The annual national accounts (ANA)—along with supporting source data—are usually already in place when the QNA compilation system is being established. Therefore, the next step in designing a QNA compilation system is to take an inventory of available source data to determine which parts of the ANA can be implemented on a quarterly basis. The initial design of QNA should be based on the ANA as much as possible, although it is usually simpler and more aggregated.

### Box 2.1 Main Steps to Establish and Maintain Quarterly National Accounts

#### To Establish QNA

1. **Consult potential users**
  - Concerning possible uses
  - Concerning required coverage, detail, and so on
2. **Take inventory**
  - Of annual compilation methods
  - Of available quarterly and annual source data
3. **Design compilation methods and procedures**
  - Consider relationship to sources and methods used in the annual accounts
  - Decide coverage of QNA, including which parts of the *2008 SNA* are to be implemented
  - Determine compilation level
  - Choose integrated or separate ANA and QNA compilation system
  - Design compilation schedule, including timeliness of first estimates and revision policy
4. **Review the quality of source data and compilation procedures**
  - Study correlation between annual and quarterly source data
  - Study revisions to main aggregates based on historic data (historic simulation of the compilation system)
    - Revisions to the quarterly compilation system
5. **Generate time series of QNA data for past years (“back series”)**
  - Benchmark the time series of quarterly source data to the time series of annual data (using methods such as the enhanced proportional Denton method or the Cholette–Dagum method)
    - To be done for a sufficiently long time series
    - To be done at the most detailed compilation level
6. **Perform real-time test runs and update the quarterly time series with estimates for the quarters of the current year (year  $y$ )**
  - Link monthly and quarterly source data for the current quarters with estimates for the back series
    - Extrapolation with indicators—benchmark the same series of quarterly source data to the series of annual data (using methods such as the proportional Denton method or the Cholette–Dagum method)
  - Fill information gaps
7. **First release**

#### To Maintain QNA

1. **Revise the quarterly estimates for the current year when new quarterly data become available**
  - Link monthly and quarterly source data for the current quarters with estimates for the back series
    - Extrapolation with indicators—benchmark the same series of quarterly source data to the series of annual data (using methods such as the enhanced proportional Denton method or the Cholette–Dagum method)
2. **Revise the quarterly estimates when new annual data become available**
  - Revise the quarterly estimates for year  $y$  (and preceding years) to incorporate new benchmark data without introducing steps in the series
    - Benchmark the time series of quarterly source data to the time series of annual data
    - To be done at the most detailed compilation level
3. **Update the quarterly time series with estimates for the next current year (year  $y + 1$ )**
  - Compile quarterly estimates for year  $y + 1$  by linking monthly and quarterly source data for the quarters of year  $y + 1$  with the revised and benchmarked QNA estimates for year 1 to year  $y$ 
    - Extrapolation with indicators—benchmark the time series of quarterly source data to the series of annual data
    - To be done at the most detailed compilation level

**2.5** In the initial stage of implementation, only estimates of value added or expenditure on gross domestic product (GDP) may be estimated. In some countries, it is desirable to start off with a limited system: for example, just volumes by industry expressed in index form without seasonal adjustment, initially labeled as experimental and only circulated to major economic policy agencies. While this system would not meet Special Data Dissemination Standard requirements, it would be a practical first step. The techniques would resemble those for flash estimates of GDP (as discussed in Chapter 10): that is, with less detail and more gaps. As users recognize the usefulness of quarterly data and the compilers gain experience, the country can move on to second or third phase extensions, such as improving data sources and adding current prices.

**2.6** Since the QNA should be anchored to the ANA, the coverage of the QNA should then be consistent with the coverage of the ANA. This means that the coverage should either be the same as the ANA or constitute a subset of the ANA. For instance, if the ANA covers only compilation of value added, then the initial coverage of the QNA should be restricted to compilation of value added.

**2.7** Developing a system of QNA requires additional resources, as current resources used for ANA compilation will need to continue. If additional resources are not forthcoming, the agency may consider efficiency gains or reprioritizing the ANA or other statistics tasks. However, it may not be possible to realize efficiency gains because the available resources being used for the statistics compilation may already be stretched to their limits. Further, the agency may already be compiling only the basic ANA aggregates and reprioritizing may therefore not be an option.

### Measuring GDP and Its Components

**2.8** QNA are almost always compiled at a lesser level of detail than the annual estimates, but it is not easy to draw the line on the level of detail required. Occasionally, the same data are available quarterly and annually: for example, merchandise trade statistics, government accounts, and selected financial statistics. In these cases, it is best to use the same level of detail as the ANA. The estimates should maintain separate data for items that are large, of interest to users, or behave in atypical ways. Less detail does not always

mean making the compilation process simpler, faster, and less resource demanding, because sometimes a more detailed level of compilation makes it easier to eliminate differences between indicators. For instance, when balancing the supply and use of vehicles, having more detail about different types of vehicles (such as trucks and passenger cars) makes balancing of supply and use easier (the use of trucks is mostly for fixed capital formation, while use of passenger cars can be both for fixed capital formation and for household consumption). Also, in automated compilation processes, more detail need not make much of a difference in compilation speed and resource needs.

**2.9** Measurement of GDP constitutes a core part of the national accounts system. Traditionally, a distinction is made among three approaches to GDP measurement: (a) the production approach, (b) the expenditure approach, and (c) the income approach. This distinction is somewhat artificial because these three approaches often use the same source data. For instance, government output and government consumption estimates are often based on the same source data; the estimates of fixed capital formation for the expenditure approach are partly based on output estimates of construction and production of machinery, which are also used in the production approach; and the wages and salaries estimates used in the income approach are often derived from the same statistics that provide the data on industry output and value added that are used in the production approach. However, the various approaches also use specific source data and allow a distinct perspective on development and level of GDP. Although, as argued, these approaches are not fully independent, applying various approaches facilitates cross-checking of data. Therefore, this manual recommends that countries estimate GDP using at least two of the three approaches. Because of their relative strengths, the production and expenditure approaches are preferred in the QNA.

**2.10** Another important reason to apply at least the production and expenditure approaches is that they provide different breakdowns of GDP. To the extent that demand is driving short-term changes in the economy, the expenditure split provides particularly useful data for business-cycle and macroeconomic policy analysis and for forecasting. The production approach is widely used for measuring quarterly GDP, in part because of a traditional focus in many countries

on short-term statistics on indicators of production. This approach involves calculating output, intermediate consumption, and value added at current prices as well as in volume terms by kind of economic activity. In most countries, output data are reasonably well covered for manufacturing, but the coverage of construction and services is usually less comprehensive. Components missing from output, intermediate consumption, and value added are estimated using ratios that reflect fixed input–output coefficients. Single-indicator-based estimates will be biased to the extent that the ratios vary with factors such as seasonal effects, capacity utilization, input composition, technological change, and productivity trends.

**2.11** The production approach is used more widely to compile QNA relative to the expenditure approach. This is because of problems in availability, timing, valuation, and coverage in expenditure source data. The expenditure approach usually has two strong pillars of quarterly data: namely, merchandise trade and government consumption. The other categories—in particular, household final consumption—are often less well covered. The major components of external transactions are usually available from the balance of payments and through merchandise trade statistics that often have a strong basis in comprehensive data collection for customs purposes. Data on government consumption can be derived from government administrative data, but directly observed data on fixed capital formation and changes in inventories may be lacking.

**2.12** Nevertheless, it may still be possible to derive a useful split of GDP by categories of expenditure. For example, if GDP is estimated using the production approach and the compiler can estimate key expenditure components using available source, then the missing components may be presented as a residual. One such missing component may be changes in inventories, because the source data are usually incomplete or inadequate. Although not an independent check of the GDP estimates, incomplete estimates of GDP by categories of expenditure (i.e., with some components derived as a residual) are useful for analysis in addition to providing some plausibility checks of GDP.

**2.13** The expenditure split is, in some ways, the most practical to measure in constant price or volume terms because there is a relatively clear concept of price and valuation for each demand category. In contrast, the price and volume dimensions of value added are more

complex because value added cannot be directly observed. The income approach is not suited for price and volume measures, although some analysts may be interested in deriving estimates of real income. As mentioned, the expenditure split also provides particularly useful data for business-cycle and macroeconomic policy analysis and for forecasting. Also, this split is most useful for policy reasons because, over the short term, demand can be more easily influenced than supply.

**2.14** The income approach is the least commonly used of the three approaches but is potentially useful as an alternative measure of GDP. The income approach avoids some of the problems that may arise in using the production and expenditure approaches, such as the reliance on fixed input–output ratios in production data. However, it requires that businesses have quarterly data on profits and some expenses.

**2.15** The income approach may have a sound underpinning in wage statistics or in administrative data on wages (for instance, for social security purposes), but quarterly observations of operating surplus/mixed income are often unavailable although the increasing use of business accounting software is leading to the wider availability of income data on a quarterly basis, even for many small businesses in the formal sector.

**2.16** Even if income data are incomplete, it may still be possible to derive an income split where one of the categories (usually gross operating surplus) is derived as a residual. The distribution of income from GDP provides a useful alternative perspective on economic development. For a country interested in issues such as profitability and wage bargaining, this could be an important economic statistic. It also shows the link between business accounting and the national accounts, particularly if a bridge table from profits to operating surplus/mixed income is provided.

**2.17** The weaknesses of the various methods for compiling GDP can be mitigated by combining production and expenditure data using the commodity flow method. This method is based on the fundamental national accounting identity shown in the goods and services account and supply and use tables (SUT): namely, that total supply (by-product) must equal total use. The commodity flow method can be applied on different levels: for instance, for groups of commodities or for individual commodities. The more detailed the level at which the method is applied, the more accurate the

result (detailed information requires fewer assumptions on origin and use). This method is particularly strong if applied in supply and use framework, even one of limited dimensions. Production and income data can be checked if both are classified by industry, which is particularly meaningful if the value-added data for industries can be broken down into compensation of employees, operating surplus, and mixed income. Chapter 9 provides further details on how to use SUT in the compilation and validation of QNA.

**2.18** In measuring GDP, compilers of QNA should ensure that the informal economy is covered and well represented. A common assumption in the QNA is that informal activities move together with formal ones. This assumption is not always plausible across time, particularly in countries with large shares of informality undergoing rapid changes in the economy. Box 2.2 provides some general principles on how to cover the informal economy in the QNA.

### Box 2.2 Covering Informal Activity in the Quarterly National Accounts

Covering the informal economy is an essential step to improve the comprehensiveness of the GDP data. For countries with a significant share of informal activity, not including an estimate of informal activities will lead to an understatement of the GDP levels. Further, it may increase uncertainty in the analysis of trends when activities in the informal sector evolve with a different pattern from the formal sector. International comparability of country data also call for an estimate of the informal economy in the official GDP data.

Measuring the informal economy in the QNA is particularly challenging due to the scarcity of direct information on informal activities on a monthly or quarterly basis. Country practices are diverse and adapt to the specific circumstances faced by each country. Nonetheless, some general principles can be useful to guide countries that are planning to include (or have implemented) estimates of the informal sector in the QNA:

1. Prior to developing quarterly estimates, benchmark estimates of informal activities should be compiled as part of the annual compilation process or at the time of a major rebasing/benchmarking exercise. These benchmark estimates should be based on direct measurement of informal activities. Surveys of informal activity, with samples designed for this purpose, usually provide accurate results. However, new surveys are resource intensive. Alternatively, ad hoc modules on the informal economy can be added to regular household surveys (e.g., labor force survey, household income, and expenditure survey) or business surveys. Mixed household business surveys may also be conducted. Tax data can be used to complement regular survey data for uncovered units.
2. Countries with significant shares of informal activity should develop a QNA system where informal activities are distinguished from formal activity and are extrapolated using specific indicators. The identification of suitable proxy indicators for informal activities is of great importance. The need for formal/informal breakdown should be based on the share of informality by economic activity, usually available from the annual GDP compilation by production. The breakdown should be consistent with the annual accounts. When formal and informal activities present similar evolutions, the informal economy can be estimated based on the quarterly evolution observed in the corresponding formal activity (or the use of fixed ratios between formal and informal production). However, these assumptions can produce inaccurate results when the share of informal activity in the economy is expected to deviate from the share of formal activity during upturns or downturns in the economy.
3. Short-term indicators of informal activity should be derived indirectly, as observed data are usually not available quarterly. The indirect methods generally rely on comparisons between household surveys (e.g., labor force surveys) and establishment surveys at a disaggregated level. Regression models can also be developed to estimate informal activity based on proxy indicators and behavioral assumptions relative to formal activity. However, such models should be used with caution as strong assumptions are needed and the estimated coefficients may no longer be valid during sudden changes in the economy. For countries with quarterly household surveys, specific modules on the informal activity may be incorporated on an experimental basis to allow for a direct measurement of informal activities in the QNA.

References on the concepts and measurement of informal activities:

European Commission, IMF, Organisation for Economic Co-operation and Development, United Nations, and World Bank, 2008, *The System of National Accounts, 2008*, Chapter 25, New York: United Nations.

Organisation for Economic Co-operation and Development, 2002, *Measuring the Non-Observed Economy: A Handbook*, Paris: Organisation for Economic Co-operation and Development.

International Labour Organization, 2013, *Measuring Informality: A Statistical Manual on the Informal Sector and Informal Employment*, Geneva: International Labour Organization.

### **Assessing Source Data and the Compilation System**

**2.19** Before compiling the QNA estimates, the quality of both source data and the proposed compilation procedures must be reviewed going back as many years as feasible to produce a long time series. The main purpose of the review is to identify weaknesses in the quarterly compilation system and possibilities for improvements to minimize future revisions of the main aggregates. It is important to establish whether the source data properly indicate the direction and overall size of changes and whether they enable the identification of turning points. The review also gives an indication of the quality of the estimates and the degree of revisions that can be expected in the future. However, revisions are inevitable because of resource constraints, and accurate and detailed source data will be generated on a continuous basis. Thus, when the first quarterly estimates are released, users should be well informed of the accuracy and the reliability of the estimates and the possibility of revisions to the estimates.

**2.20** When assessing the quality of statistics, “accuracy” is used to mean “closeness to the truth,” while “reliability” is used to mean “degree of revisions to which the series is subjected.” The QNA estimates are anchored to the ANA; therefore, the accuracy of the ANA sets a ceiling on the accuracy of the QNA; the reliability of the QNA is also thus determined because the extent of revisions depends on the closeness of the initial QNA estimates to the ANA estimates and the extent of revisions to the ANA estimates (for a more comprehensive discussion of revisions, see Chapter 12).

**2.21** The use of sources and methods should be well documented. The documentation is useful for compilers when problems arise or when there is staff turnover or absence. It also provides the basis for documentation for users, who often wish to know more about the data.

**2.22** The compiler should conduct the following tracking exercises to assess the source data and the compilation system:

- a. assess how the quarterly source data for individual series track the annual estimates,
- b. assess how preliminary quarterly source data for the individual series track the final quarterly source data, and

- c. assess how the overall compilation system track the annual estimates for major aggregates.

The overall tracking exercise will also provide a measure of the reliability of the QNA. Assessing the source data and the compilation system should be seen as a continuing process that should also be conducted regularly during the operational phase.

### **Assessing Individual Source Data**

**2.23** Source data should be assessed for accuracy, reliability, and timeliness. Such an assessment is important because of the following reasons: (i) it will reveal whether a specific series of source data is suitable for QNA purposes; (ii) where more than one data source is available for a particular variable, it will aid in choosing among them; (iii) when source data are conflicting, it will facilitate a choice on where to adjust; (iv) it will help to identify areas for improvement; and (v) it will facilitate informing users about the quality of the estimates and expected future revisions. In many cases, the compilers will not have options among different data sources; however, it is still necessary to assess indicators that could possibly be used. These assessments should be discussed with the data providers, who may be able to give additional background information.

**2.24** The main criterion for assessing the accuracy of quarterly source data is the extent to which these data track annual movements. This criterion follows from the need to keep QNA consistent with ANA and the assumed higher quality of the annual source data. The accuracy of the short-term source statistics as indicators for the annual movements depends on definitions and specification of the variables and on issues such as coverage, units, and classifications.

**2.25** The ability of the quarterly source data to track the annual estimates should be assessed by comparing the growth rates in the annual sum of the quarterly source data with growth rates in the corresponding ANA estimates. Large differences in the rates of change indicate inconsistencies between the quarterly and annual source data for that series and potential weaknesses in the quality of either the quarterly or the annual source data. Large differences in the annual rates of change in the quarterly and annual source data for the back series also indicate that large revisions can be expected in the future as additional

source data become available. Mathematical techniques can be used to more formally study the correlation between annual and quarterly data and to identify and remove any systematic errors (i.e., bias) in the quarterly source data's long-term movements.

**2.26** Specific problems may arise if annual reporting is on a fiscal year basis rather than a calendar year basis. The main problem is that in annual statistics, respondents with a nonstandard reporting year (i.e., a reporting year that differs from the rest of the industry) are usually included in the statistics for the year that has the largest overlap, which will then create a mismatch with the sum of the quarters. A solution to this problem with the annual data could be found if the annual source statistics use the information from the quarterly source statistics to allocate the data of an individual respondent to the standard accounting period using the benchmarking techniques presented in Chapter 6.

**2.27** The reliability of the quarterly source data has important implications for how early sufficiently reliable initial QNA estimates can be prepared. Often the first estimates will have to be based on preliminary versions of source data that are still open to revisions. One important reason for such revisions to the source data is that early response rates are lower, and estimates may change as response increases. These changes may follow a consistent pattern, which implies a "bias" in the preliminary estimates, or the changes may be irregular, which implies "noise." A bias in early estimates of an indicator may be caused by selectivity in the response. The reliability of the quarterly source data can be assessed by comparing period-to-period rates of change in the preliminary versions with the corresponding rates of change in the final versions of the series. This can only be done if the preliminary versions of the data have been retained in the databases rather than being continually overwritten. These results will also help identify where new data sources may be needed. From time to time in national accounts compilation, assumptions and methods that appear plausible turn out to be unsuitable, while others are initially suitable but later are not because of changing economic circumstances.

**2.28** The timeliness of the quarterly source data also has important implications for how early sufficiently reliable initial QNA estimates can be prepared.

Often the first estimates will have to be based on an incomplete set of source data. For some series, data may only be available for two months of the reference quarter, while data for other series may be unavailable altogether. To fill these source data gaps, provisional estimates will have to be made based on simple trend extrapolation or on alternative indicators that are more timely but less accurate. For each individual variable, the impact of these provisional estimates on the reliability of the first estimates can be assessed by constructing provisional estimates for the past years as if one were in the past and comparing the period-to-period rate of change in those estimates with corresponding rates of change in the final quarterly source data for that variable. In some countries, less reliable early data are published but labeled as "flash estimates" to highlight the lower level of reliability (see Chapter 10).

**2.29** The assessment of possible source data will determine what source data are suitable for QNA purposes and, from there, which parts of the 2008 SNA can be implemented. Sometimes, the assessment will lead to the conclusion that biases and noise are too substantial for a particular set of data to be used to compile QNA data. This can imply that the QNA compilers have no other choice other than to not use these data, but it would be important to discuss with the compilers of the source data whether improvements can be made (see paragraph 2.31). While the decision not to use a certain dataset might mean that the system cannot be fully implemented—until a later stage when a new data source is introduced—this is likely to be preferable to the use of data that can result in misleading results.

**2.30** If alternative indicators are available for the same variable, it is important to have some knowledge of their accuracy and reliability to choose between them. The lesser quality data may still be useful as a check on the preferred series. QNA compilers may need to adjust the source data in the QNA compilation process. Inconsistencies in the data may be revealed through a SUT balancing or in a commodity flow equation, and in such cases, knowledge about the accuracy and reliability of the data will provide guidance on how much leeway there is for adjusting the data.

**2.31** Assessment of the source data may also help identify areas that need improvement, both for the

QNA and the ANA. Necessary improvements may concern coverage, definitions, units, and so on. Obviously, it will be easier for QNA compilers to request improvement of statistics collected by the same agency, but even data from other agencies may be improved. Agencies collecting data for their own use that do not fit well into the QNA compilation might adapt their questionnaires to allow use in the QNA context rather than having their respondents exposed to a new survey.

**2.32** In setting priorities for improvements, the relative importance of an indicator should be one of the considerations. For some components, the basic data may be so poor that refinement of methods would be of doubtful benefit. There are also likely to be components of little economic significance that have poor data. National accountants need to be careful about expending too much effort on numerous, trivial items at the expense of large, important items. Of course, the fact that an item is small cannot be an excuse for deliberately choosing a poor method when a better one is available, and compilers should be able to explain and defend the methods used to derive the estimates of even the smallest components. Further, it should be noted that some small items can have a substantial effect on the estimates of growth (e.g., changes in inventories).

**2.33** In some cases, the development of QNA methods also leads to improvements in the ANA. The process of review often brings to light outdated or unrealistic assumptions in annual estimation, as well as faulty annual compilation practices. In a few cases, the quarterly data may be superior and so may be used to replace the annual data. QNA can also contribute to an improved allocation of fiscal year data to calendar years in cases where the two do not coincide.

### Assessing the Overall Compilation System

**2.34** Before QNA estimates are published, an aggregate tracking exercise should be undertaken to assess the overall consistency of the quarterly and annual source data and compilation systems with respect to annual rates of change for major aggregates. Errors in the individual series may go in opposite directions and, thus, may not give a good indication of the degree of future revisions of the main aggregates that can be expected. To undertake an aggregate tracking

exercise, the entire compilation process needs to be simulated on historic data to produce time series of non-benchmarked estimates for the major aggregates. The QNA compilation system should be used to produce estimates of QNA aggregates for the past years as if one were in the past and producing the first preliminary sum of four quarter estimates for those years without later annual benchmarks. If feasible, it is preferable to perform the aggregate tracking exercise based on the incomplete set of source data that would actually have been available when the first sum of four quarter estimates would have been produced.

**2.35** Later, in the operational phase, the aggregate tracking exercise should be repeated by comparing the various releases of annual data from the QNA system with the eventual ANA data. As emphasized in Chapter 12 and in the IMF's Data Quality Assessment Framework, best practice also involves periodically conducting and publishing studies of long-term trends in the revision patterns. Summaries of these studies may accompany the regular quarterly release of data to remind users that data are subject to revisions and to provide some indication of the potential range.

**2.36** It is advisable to also perform test runs in real time before going public with the QNA. Only experience from such test runs can sufficiently ensure the robustness of a QNA system and its ability to cope with unexpected problems. QNA compilers should endeavor to schedule sufficient time to run one or two real-time test runs in the establishment phase.

**2.37** The tracking exercise on the aggregate level can be used to remove weaknesses in the system overall. For instance, the exercise may indicate that estimates from the production approach are more robust than the estimates from the expenditure approach, which would provide guidance to adjustments in the course of the compilation process.

### Statistical Processing

**2.38** Statistical processing encompasses the assembly of data, benchmarking, deflation, seasonal adjustment, aggregation, and other calculations. In designing a processing system, it is useful to anticipate the differences and links between the preparatory and operational phases of QNA compilation so that different needs can be satisfied using the same processing



system. In general, the processes for compiling data in the preparatory and operational phases will be the same. However, the operational phase has some extra complexities that may not be evident in the preparatory phase.

**2.39** In the QNA preparatory phase, the objective is to compile data on past years (back series). Compilation of QNA data for a single quarter or year is of little value. The back series of historical data provide greater perspective on economic developments and, for that reason, should go as far back as feasible. Long back series also allow compilers setting up a new system to check the data, gain experience in the behavior of the series, and support seasonal adjustment.

**2.40** In the operational phase, the objective is to update the time series with data for the current quarters as well as revising the data for past years. The operational phase differs from the preparatory phase in several respects. These differences arise because, in the preparatory phase, compilation was done after the fact with existing ANA totals as benchmarks, which would not be available for the most recent quarters. Other differences are that in the operational phase, the data will be less complete for the most recent quarters, data source revisions will be an issue, and the timing of data supply in a proper sequence becomes much more important. Only running the quarterly compilation system in real time will reveal all the implications. A trial run of a quarter or two before the official release (as recommended above) will allow these problems to be identified and resolved without delays that the public may notice.

**2.41** For the operational phase, the forward or extrapolation part of the series presents its own difficulties because there will be no annual benchmarks for that part of the series. The challenge is to extend the series beyond the end of the last benchmark, tracking the likely future ANA estimates so that future revisions are minimized while preserving the short-term movements in the quarterly source data (to the extent possible).

**2.42** Finally, during the operational phase, there are continuing cycles of revisions to quarterly indicators, revisions to annual benchmarks, and the receipt of annual benchmarks for the most recent years. This new information needs to be incorporated in the QNA estimates as it becomes available.

**2.43** The calculations applied to the data are diverse and depend on the characteristics of the series. Some data will be received in a form ready to use without adjustment, but more commonly there will be the straightforward manipulations familiar in annual compilation—addition, subtraction, multiplication (whether called scaling, grossing up, or quantity revaluation), and division (e.g., deflation). However, the mathematical techniques used to produce QNA estimates by combining a quarterly indicator and an annual benchmark series are more complex. Inevitably, the movements in any two nonidentical quarterly and annual series will differ. The challenge is to align the QNA estimate to the ANA estimate while preserving the time-series properties of the data. This process—called benchmarking—is not an easy matter because simple methods such as pro rata distribution of the annual total introduce a discontinuity in the series between years—the “step problem.” Benchmarking improves the quarterly data by taking into account the superior annual information.

**2.44** It should be emphasized that in the case of incorporation of revised or new benchmarks, the calculations should be based on the original quarterly indicator, not on the preliminary QNA estimates that have already been adjusted. Otherwise, the compilation process risks deteriorating into an unorganized data hashing, in which the compilers lose track of the original data, the effects of benchmarking, and the effects of other adjustments.

**2.45** To avoid introducing distortions in the series, incorporation of new annual data for one year will generally require previously published quarterly data for the past several years to be revised. This is a basic feature of all acceptable benchmarking methods. As explained in Chapter 12, the compiler may have to revise the quarterly estimates for the year for which new annual data are to be incorporated as well as the quarterly data for one or several preceding and following years. In principle, QNA estimates for all preceding and following years may have to be adjusted to preserve the short-term movements in the indicator if the errors in the indicator are large. However, in practice, the impact of new annual data will gradually diminish until it no longer has any impact on sufficiently distant past years.

### ***Relationship Between QNA and Source Data***

**2.46** As a consequence of benchmarking and calculations in the QNA compilation process, the QNA data may differ from the source statistics. Subjecting data to a balancing process in a commodity flow or SUT framework will also generate differences with the source data. Users may find these differences puzzling and the compiler should make every effort to explain these differences. However, if the variables in the QNA are basically identical to those in the source statistics, then consistency should be pursued. This consistency should be pursued through adjustments in the source statistics. For instance, a monthly or quarterly production index should be benchmarked to the same annual or less frequent census data as used in the QNA. At the very minimum, causes for differences should be explored, and they should be documented in a way that facilitates access by users.

**2.47** Initially, working the differences resulting from the benchmarks used in the QNA compilation process back into the source statistics may appear cumbersome. However, adjusting their statistics to the benchmarks used in the QNA is beneficial to the consistency of the statistical system and to the quality of their own statistics. One important effect of adjustment may be an increased awareness among the compilers of source statistics of the need to ensure consistency between data from high-frequency statistics (monthly and quarterly data) and annual data; these compilers may also be encouraged to apply benchmarking procedures. Discussions with the compilers of source statistics about the differences will most likely increase their involvement in the way their data are used in the QNA compilation process. For instance, they may develop an interest in participating in the deliberations during the balancing process, for which they could provide valuable input. Obviously, the adjustment process of the QNA source statistics will be easier to establish if a similar process is in place for the ANA. If this is not the case, starting a QNA system is a good opportunity to initiate an adjustment process for the ANA source statistics as well.

### **Dissemination**

**2.48** Dissemination of QNA has much in common with dissemination of other statistics. The IMF's

dissemination standards provide some general guidance on the coverage, frequency, and timeliness considerations for the dissemination of the QNA estimates. In addition, the Data Quality Assessment Framework provides guidance on good dissemination practices.

**2.49** This section focuses on some QNA-specific dissemination issues, especially concerning release and presentation. With regard to release, owing to the nature of QNA and their importance for decision making, the predominant condition is that the release should be timely. The statistical agency should establish and publicize a release calendar with a release schedule that meets or exceeds the timeliness requirements established in the IMF's dissemination standards (where relevant) and every effort should be made to release the data according to the preannounced schedule.

**2.50** The first release of the QNA statistics may be a rather limited one, focusing on the most important data. For instance, the focus could be on GDP growth in current prices and in volume terms (both seasonally adjusted and nonadjusted) as well as on trend estimates. As a further extension, it could include breakdowns by expenditure categories and type of activity. Also, it is important to mention the most important revisions concerning earlier releases.

**2.51** The quickest ways to release these data are simultaneously through a press release, via social media, and on the agency's website. The press release text should be short and ready for use without rewriting. These conditions promote acceptance by the media and also prevent misrepresentation by less knowledgeable media staff. Media often mention the source of press releases, which may generate the perception that the published article reflects the view of the statistical agency. Press releases should have a catchy heading; if they do not have one, the media will make one up that might be more creative than statisticians would like. Furthermore, it is advisable to support the press release with a small table containing the most important data. For easy recognition by the public, it makes sense to standardize such a table and to consult with media staff about its content. Publication through the internet should be simultaneous with the press release and preferably using the same text. Preparation of the releases should start as early

as possible and need not wait until all the publishable data are ready; usually an impression of the important news can be developed on the basis of the data that become available in the last phases of the compilation process.

**2.52** Many countries also publish a more comprehensive quarterly statistical publication dedicated to the QNA. These publications provide a more thorough analysis of the data, supported by charts depicting the economic developments in various ways, such as contributions to GDP growth from demand categories or from industries are often used. The extent to which statisticians comment on the data differs among countries. In some countries, statistical offices basically provide only the data with technical explanations as needed, some countries identify the highlights, and in others, statistical organizations see it as their task to interpret economic developments. Either way, national accountants should keep close to the facts to avoid giving the impression that the statistical agency wishes to influence public opinion by taking a position on economic and political issues.

## Organizational Issues

### General

**2.53** Management of QNA differs from ANA because of the greater intensity of work and tighter deadlines. Also, compilation of QNA requires more assumptions and the greater use of indirect indicators. In addition, because of the more intensive use of mathematical techniques, some staff with a background in time series and regression analysis may be useful. The pattern of workload peaks is quite different for QNA than for ANA. A statistical office that produces only annual estimates is accustomed to a production cycle spread over a year. The annual estimation may often have some clustering of tasks toward the end of the cycle and there may be tight deadlines to be met.

**2.54** For both ANA and QNA compilation, data from a wide range of sources are brought together. In many cases, the compilers are responsible for data collection, but typically, data may come from other parts of the same agency or from other agencies. The sequencing and timing of QNA compilation are complex because the QNA should be built around the arrival of the results from numerous collections and suppliers.

**2.55** An important organizational issue to be dealt with at an early stage concerns the release cycle—the timing of the first release of the data for the reference quarter and of subsequent revised versions of the data. The release cycle will also depend on the release cycle of the ANA. After the first release, revisions are usually needed, depending on, among other things, the arrival of new or revised source data and, eventually, the arrival of annual data. The release cycle derives directly from the revision policy, which is discussed in Chapter 12.

### Timing of the Compilation Process

#### Structuring the Compilation Process

**2.56** Sequential and “big bang” processing are alternative ways to structure the compilation process. The sequential approach involves processing in stages (data entry, basic checks, aggregation at lower levels, deflation, seasonal adjustment, and overall aggregation). In contrast, with the big bang approach, the data are entered and the whole system is run simultaneously; the results are then viewed in detail in the context of the aggregate trends. This may be done iteratively several times as new data arrive and adjustments are made. In practice, there may be some blending of these two approaches. Some of the considerations to be taken into account in designing the processing system are whether the source data arrive within a short period of time or over several weeks, how much checking of source data is necessary, and the nature of the computer system being used. The big bang approach lends itself to SUT methods because it emphasizes interrelationships between different data.

#### Planning Workloads

**2.57** QNA compilers are subject to short and tight deadlines. QNA compilation is also particularly vulnerable to delays in major data inputs or bugs in computing systems. To deal with timing problems, a quarterly work schedule should be drawn up. The schedule should take account of the release calendar, the expected availability of required source data, the period required to carry out each process, and the flow of data from one stage to the next. In this way, it is possible to predict when the results will be ready for publication. It will also help in identifying the

sequence of tasks and calculating the effects of delays. The work schedule should identify the following:

- the data inputs and when they are expected to arrive;
- the tasks of the national accounts compilers, including how long each task is expected to take and the order in which they are carried out; and
- the delineation of responsibility for each task.

**2.58** The work schedule should account for unforeseen delays. As required by the IMF's data dissemination standards, release dates should be preannounced. However, unforeseen problems may occur and failure to release the estimates as announced may create suspicion of manipulation for political reasons. When compilers first start compiling QNA, there is a greater potential for unforeseen problems. Therefore, countries might initially provide for a longer compilation period and greater margin for delay and gradually improve timeliness as they gain QNA compilation experience.

### Methods of Speeding Compilation

**2.59** Compilation is concentrated in a short period because source data are often released only after the end of the quarter and QNA are produced quickly. This situation makes accelerating tasks particularly important. The compilation process can be speeded in two important ways.

**2.60** First is by reducing peaks in processing workloads. One way to reduce the burden during the peak processing period is to do as much work as possible in advance. For example, monthly data for the first one or two months of the quarter can be processed as soon as they are received or before the end of the quarter. Similarly, it may be possible to implement revisions made to data for earlier quarters before compilation for the new quarter begins. Some problems in data can be foreseen and dealt with in advance. For example, if a series will be rebased or its coverage changed, it may be possible to set up a program that splices together the old and new series before the data become available.

**2.61** Second is by improving the arrangements for the supply of source data. Data suppliers may be able to provide preliminary or unprocessed data. The compiling agency may then be able to select and process

the relevant data from a larger database, instead of waiting to have the complete dataset processed. This may require the development of special data sharing arrangements with the relevant agencies that would allow the compiling agency to access the unprocessed data.

### Organizing Staff

**2.62** The most common situation is for all national accounts data, including QNA, to be compiled in the national statistics agency. In a few cases, compilation of quarterly accounts is done in the central bank and the ANA by the statistics agency. It is generally undesirable to have different organizations involved because of the potential problems of inconsistent data and methods as well as the loss of synergies between the annual and quarterly systems.

**2.63** The organization of national accounting divisions varies. In a small agency, there may be no division. In a larger organization, units can be divided in one or more of the following ways:

- detailed sources/integrating data and working on aggregates,
- quarterly data/annual data,
- industries/expenditure components/income components,
- current price data/constant price data,
- orientation on process/orientation on product, and
- development and analyses/operational work.

**2.64** Some of the considerations regarding allocation of staff are balancing peaks and troughs in workloads, linking common subject matters and techniques, and having teams that are easy to manage (too large makes communication harder, too small means fewer skills and more vulnerability to absences and departures). When different teams address related issues, there is a risk of duplication or conflicting opinions about methods.

**2.65** An important organizational choice to be made is whether there should be a unit focused specifically on QNA or whether QNA or ANA should be compiled within the same unit by the same staff. The pattern of workload peaks is quite different, so peaks in the annual compilation may not crowd out activities in QNA (and

vice versa). An advantage of combining both functions is that harmonization between QNA and ANA is more likely if the same staff are working on both.

**2.66** When setting up a new QNA system, it is often desirable to identify a separate QNA team. Otherwise, the developmental work may be hampered if staff are continually being called to other, more urgent tasks. The development of a new system requires a high level of conceptual ability, so the staff should have a good knowledge of the *2008 SNA* and the annual compilation system. QNA compilation uses some specialized approaches and techniques not used in ANA, so assigning ANA compilers for each component to develop the corresponding QNA component will be less efficient in taking advantage of the synergies of QNA techniques that could be achieved with a specialized QNA team. Some staff with good background knowledge on monthly and quarterly surveys may complement the knowledge of ANA compilers.

### ***Organizing Data Supply***

**2.67** Coordination with data suppliers is one of the important tasks of the QNA compilers as the timing of QNA compilation is typically more critical than the

timing of ANA. Compilers need to be in close contact with their suppliers so that both sides understand the other's needs. Data sources can have changes in coverage, definitions, procedures, and classifications that need to be identified in advance and well before the compilation process is initiated. Data suppliers can also provide information on what is happening in the economy, shortcomings of the data, and how to deal with problems such as breaks in the series.

**2.68** It is also a good idea to keep the data supplier informed of how the data are being used and how the estimates may be used in policy analysis. This would help data suppliers appreciate the usefulness of their data. The compiling agency may provide this information through discussions with data suppliers or through special brochures that are sent out to suppliers.

**2.69** In some countries, a memorandum of understanding is established with each data supplier, stating aspects of the relationship such as data specifications, timetables, notification of changes, and regular meetings. Such a process should be considered, though some countries find that informal procedures may also be effective.