# Quarterly National Accounts Manual

## Concepts, Data Sources, and Compilation

By Adriaan M. Bloem, Robert J. Dippelsman, and Nils Ø. Mæhle

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Although this manual has benefitted from comments from IMF colleagues, it represents the views of the authors and not necessarily those of the IMF.

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# Foreword

The recent financial crises taught us a number of important lessons. We were reminded that, for adjustment programs to be sustainable, there must be careful attention to institution-building, the social dimensions of structural change, and a country's political and cultural traditions. We have worked closely with other international organizations to develop standards and codes for sound monetary and fiscal policies, banking supervision, and economic data. Work in all of these areas helps to promote financial stability, and it helps countries take advantage of the enormous potential of private capital markets. In this context, it is important to develop instruments to improve the ability to detect sources of vulnerability and to propose timely corrective measures. One focus of the IMF's work in this area is on increasing the availability of key data.

The IMF has undertaken a range of activities in this regard. Significant among these is the development of two data initiatives, namely, the Special Data Dissemination Standard and the General Data Dissemination System. For both these initiatives it is important that international guidelines be available to help countries develop internationally comparable statistics. In several areas where international guidelines have been lacking or have become outdated, the IMF has undertaken to fill the gaps. One such area concerns quarterly national accounts, and I am very pleased to introduce the *Quarterly National Accounts Manual*, which has been drafted to help countries establish or strengthen quarterly national accounts that meet international standards. This manual takes its place alongside the other manuals prepared or being prepared in the IMF's Statistics Department, including the *Balance of Payments Manual*, the *Government Finance Statistics Manual*, and the *Monetary and Financial Statistics Manual*. Like these other manuals, this manual is fully consistent with the *System of National Accounts 1993*.

This manual is a direct result of technical assistance in support of the Special Data Dissemination Standard. It draws heavily from course material prepared for national accounts seminars for countries considering subscription to this Standard. The *Manual* has benefited from comments from country experts during these seminars and during an expert group meeting in June 2000, in which country experts and experts from other international organizations participated. I would like to thank all experts for their participation in the gestation process of this manual.

Quarterly national accounts data play a vital role in the development and monitoring of sound economic and financial programs. At this time, only a minority of Fund member countries have the benefit of a well-established system of quarterly national accounts, although their number is rapidly increasing. I hope that this trend continues and would like to commend the *Manual* to compilers as an important instrument in this work.

Horst Köhler
*Managing Director*
*International Monetary Fund*

# Preface

This *Quarterly National Accounts Manual* was developed from materials prepared for seminars in Thailand (1997 and 1998) and Jordan (2000). Like the seminars, the *Manual* is aimed particularly at compilers who already have a knowledge of national accounting concepts and methods in an annual context and are in the process of introducing or improving a quarterly national accounts (QNA) system. As well, we believe it will be of interest to national accounts compilers generally and to sophisticated QNA users. QNA are an increasingly important specialty within national accounting. More and more countries are recognizing QNA as an essential tool for the management and analysis of the economy. The *Manual* aims to complement the *System of National Accounts 1993 (1993 SNA)*, which has only limited discussion of QNA, while retaining full consistency with that document.

Some general guidelines that emerge from this manual are the following:

- QNA should be built on a foundation of timely and accurate quarterly source data that directly cover a high proportion of the totals. Econometric methods and indirect behavioral relationships are not a substitute for data collection.
- QNA should be made consistent with their annual equivalents, partly for the convenience of users and partly—and more fundamentally—because the benchmarking process incorporates the information content of the annual data into the quarterly estimates.
- Revisions are needed to allow timely release of data and to allow incorporation of new data. Possible inconvenience of revisions can best be dealt with by openness about the process.
- QNA data should be presented as consistent time series.
- The potential scope of QNA is the whole of the *1993 SNA* sequence of accounts. Although gross domestic product (GDP) and its components—the usual starting point—are important, other parts of the national accounts system are also useful and achievable.
- Seasonally adjusted data, trend data, and unadjusted data all provide useful perspectives, but the unadjusted data should be the foundation of national accounts compilation.

Within these guidelines, the sources, methods, and scope of each country's QNA system will differ according to circumstances such as user preferences, availability of source data, and economic conditions. Accordingly, our objective is not to give fixed answers but to indicate the range of alternatives and to supply general principles that can be applied to develop a QNA system suitable for each country's circumstances.

We hope that the *Manual* will find its way to a broad readership and will support the introduction, improvement, and wise use of QNA in many countries.

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# I Introduction

## A. Introduction

**1.1.** Quarterly national accounts (QNA) constitute a system of integrated quarterly time series coordinated through an accounting framework. QNA adopt the same principles, definitions, and structure as the annual national accounts (ANA). In principle, QNA cover the entire sequence of accounts and balance sheets in the *System of National Accounts 1993 (1993 SNA)*; in practice, the constraints of data availability, time, and resources mean that QNA are usually less complete than ANA. The coverage of the QNA system in a country usually evolves. In the initial stage of implementation, only estimates of gross domestic product (GDP) with a split by industry and/or type of expenditure may be derived. Gross national income (GNI), savings, and consolidated accounts for the nation can follow fairly soon. Extensions can be made as the use of the system becomes more established, resources become available, and users become more sophisticated; additional breakdowns of GDP, institutional sector accounts and balance sheets, and supply-use reconciliation may be added.[1]

**1.2.** This manual is written for both beginning and advanced compilers. In addition, it may be of interest to sophisticated data users. Most of the *Manual* addresses issues, concepts, and techniques that apply to the whole system of national accounts. The discussion of indicators in Chapter III focuses on components of GDP. Although this reflects the interest of first-stage compilers, it should not be taken to mean that QNA should stop there. As shown in Chapter IV, GNI and savings for the total economy can be readily derived in most cases, and further extensions are also feasible. In particular, the quarterly expenditure and income components of GDP, in conjunction with balance of payments data, provide all items for the full sequence of consolidated accounts for the total economy. Several countries have expanded their QNA systems to cover selected institutional sector accounts. A number of countries are currently aspiring to expand their QNA systems to include a more complete set of institutional sector accounts and balance sheets.

**1.3.** This manual is intended for readers who have a general knowledge of national accounts methodology. The *Manual* aims at full consistency with the *1993 SNA*, and duplication of material presented in the latter is avoided as much as possible. Thus, for general national accounts issues, readers are referred to the *1993 SNA*.

**1.4.** This introductory chapter discusses the main purposes of QNA and the position of QNA between ANA and short-term indicators. This chapter also discusses some important aspects of QNA, such as their relation to ANA, their time-series character, the usefulness of seasonally adjusted QNA data, and the importance of transparency.

## B. Purposes of Quarterly National Accounts

**1.5.** The main purpose of QNA is to provide a picture of current economic developments that is more timely than that provided by the ANA and more comprehensive than that provided by individual short-term indicators. To meet this purpose, QNA should be timely, coherent, accurate, comprehensive, and reasonably detailed. If QNA fulfill these criteria, they are able to serve as a framework for assessing, analyzing, and monitoring current economic developments.

[1] Another extension could be the development of monthly national accounts. This would be particularly useful in a situation of high inflation. To justify the extra resources needed, such an extension should provide a system of monthly data and not be limited to one single GDP number. A single GDP number offers little added value beyond the underlying indicators. Also, higher volatility in monthly data may make it more difficult to pick up underlying trends. Monthly national accounts compilation raises no new methodological issues compared with QNA.

Furthermore, by providing time series of quarterly data on macroeconomic aggregates in a coherent accounting framework, QNA allow analysis of the dynamic relationships between these aggregates (particularly, leads and lags). Thus, QNA provide the basic data for business cycle analysis and for economic modeling purposes. Also, QNA have a particular role to play for accounting under high inflation and where annual source data are based on varying fiscal years. In addition, as with the annual accounts, QNA provide a coordinating conceptual framework for design and collection of economic source statistics and a framework for identifying major gaps in the range of available short-term statistics.

**1.6.** QNA can be seen as positioned between ANA and specific short-term indicators in many of these purposes. QNA are commonly compiled by combining ANA data with short-term source statistics and ANA estimates, thus providing a combination that is more timely than that of the ANA and that has increased information content and quality compared with short-term source statistics.

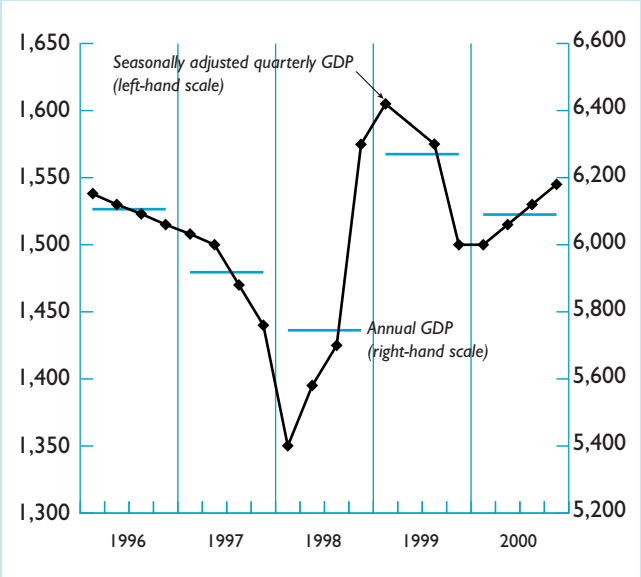
**1.7.** QNA are usually available within three months after a quarter. ANA, on the other hand, are produced with a considerable time lag. The initial ANA (accounts based on annual data as opposed to first estimates on the basis of the sum of the four quarters) are often only available six months or more after the end of the year. Thus, ANA do not provide timely information about the current economic situation, which hampers monitoring the business cycle and the timing of economic policy aimed at affecting the business cycle. The strength of the ANA is to provide information about economic structure and long-term trends, not to provide data needed for monitoring the business cycle.

**1.8.** Lack of timeliness is also a major disadvantage for the use of ANA for constructing forecasts, which are best based on up-to-date information on the current economic situation. Furthermore, quarterly data more adequately reflect the dynamic relationships between economic variables, leads and lags in particular, and they provide four times as many observations, which is very helpful when using mathematical techniques such as regression analysis.

**1.9.** ANA are less suitable than QNA for business cycle analyses because annual data mask short-term economic developments. In-year economic developments are not shown in the ANA. In addition, developments that started in one year and end in the next may not show up in the ANA (see Example 1.1[2]).

**1.10.** ANA are also less useful at times of high inflation, when QNA are virtually indispensable, for two reasons. First, in these circumstances one of the basic axioms of the ANA is violated, namely, the assumption of price homogeneity over time. Although this basic axiom never fully applies (unless there are no price changes), in times of low inflation it does not negate the usefulness of the ANA. However, in the situation of high inflation, summing of current price

**Example 1.1. Monitoring Business Cycles—Quarterly GDP Data (Seasonally Adjusted) versus Annual GDP Data**




The chart shows quarterly and annual constant price GDP for an imaginary economy and illustrates how annual data may mask the cyclical movements. In this example, the QNA data show that the economy was growing during 1998 and that the upturn from the preceding slump started around the first quarter of 1998. In contrast, the ANA data show that the economy contracted in 1998 compared with 1997. The growth during 1998 first shows up in the ANA when the annual estimates for 1999 become available.

The situation is further aggravated by the usual time lag of the ANA, with the first annual estimates for 1999 not available until 2000. While the QNA will show the upturn in the first quarter of 1998 in 1998, the ANA will not show that upturn until 2000. By that time, the economy in this example has just gone through a second downturn. Thus, an upturn in economic activity would already have changed into a downturn while the ANA would still show positive growth.

[2]The use of QNA data exemplified in the example is best made with seasonally adjusted data or trend estimates.

data over a year becomes meaningless because the prices vary so much within the year. QNA are much less affected by this situation (although under extreme circumstances the accounting period should even be shorter). Second, the problem of holding gains is much less severe for QNA than for ANA and can more easily be eliminated because changes in valuation are less in a shorter accounting period.

**1.11.** QNA are less timely than individual short-term indicators, but they provide a more comprehensive picture of current economic developments organized in an integrated framework for analyzing the data. Short-term indicators, such as price indices, labor market indicators, industrial production indices, and turnover data for retail trade are often available on a monthly basis shortly after the reference period. These short-term indicators provide invaluable information on specific aspects of current economic developments. However, for want of integration into a consistent analytical framework such as the national accounts, these indicators do not provide a coherent, comprehensive, and consistent picture of the different aspects of the current economic situation. This hampers tracing the causes of current problems and identifying potential future developments. For instance, for a country facing decreasing domestic output growth, in addition to identifying affected industries (as a detailed production index would allow), it would be helpful to identify causes, such as decreasing domestic demand or falling exports, and to further trace deeper causes, such as income, saving, and investment patterns affecting demand categories.

**1.12.** A critique of QNA is that quarterly GDP is not a good business cycle indicator because GDP includes activities such as government and agriculture that do not necessarily respond to changes in the business cycle. For this reason, it is argued that a less comprehensive measure, such as a volume index for manufacturing industries, is preferable as a business cycle indicator. This critique seems pertinent only if the QNA were to be restricted to GDP as a single indicator. However, the QNA should not be regarded as only a vehicle for compiling summary aggregates such as GDP; it also provides an integrated framework for analyzing economic statistics, thus allowing examination and analyses of developments and behavior. Furthermore, breaking down GDP into specific economic activities would allow a view of economic activities that are deemed more relevant for business cycle analyses.

## C. Quarterly National Accounts as Time Series

**1.13.** It is important for QNA to have a time-series character. A time series is defined here as a series of data obtained through measurement of the same concept over time that allows different periods to be compared. Thus, to form a time series, the data have to be comparable over time. Most important, this implies that the data have to be consistent over time with respect to concepts and measurement. Among other things, this requires that the time periods have to be identical (e.g., months, quarters). Cumulative data (that is, data that cover, for instance, January through March, January through June, January through September, and so on), as commonly used in formerly centrally planned economies, do not constitute time series. Series of measures of changes from the same period of the previous year (for instance, the growth between the third quarter of the previous year and of the current year) also do not constitute time series, because they do not allow for the comparison of different time periods. The same applies to period-to-period changes (for instance, the growth between the second and the third quarter of a year), although period-to-period changes can be linked together to form a proper time series (in the format of an index series).

**1.14.** Having QNA data in a time-series format is essential for business cycle analysis, for identifying turning points, for trend-cycle analyses, for studying the dynamic relationships between economic variables (in particular, leads and lags), and for forecasting. For these purposes it is also important that the time series are sufficiently long. In a situation where QNA have only recently been started, it is recommended to extend the series backward. As a rule of thumb, for purposes of regression analyses and seasonal adjustment, the time series should cover at least five years. A QNA series that is restricted to the quarters of the preceding year and the current year, even if it fulfills the criteria in paragraph 1.13, cannot be considered a time series, because such a presentation would not allow comparisons with previous years. This requirement for a time-series character for the QNA has important implications for the design of QNA compilation techniques, as will be evident in later chapters.

**1.15.** The importance of presenting monthly and quarterly data as time series for the purposes of analyzing trends and turning points in the data is

illustrated in Annex 1.1. The numerical example provided there shows that in measures of change from the same period of the previous year, turning points in the data show up with a systematic delay, which in most circumstances can be substantial. The average delay can be shown to be around half a year in discrete data and around three-quarters of a year in cumulative data. Thus, as shown in the example, rates of change from the same period in the previous year can, for example, indicate that an economy is still in recession when it has actually been recovering for some time.

## D. Seasonally Adjusted Data and Trend-Cycle Estimates

**1.16.** Seasonal adjustment[3] means using analytical techniques to break down a series into its seasonal, trend-cycle, and irregular components. The purpose is to identify these components and to allow, for certain uses, a view of the series where some of these components have been removed. In seasonally adjusted data, the effects of recurrent within-a-year patterns—the seasonal pattern—are removed, and in trend-cycle estimates the impact of irregular events are adjusted for as well. Seasonal patterns may be caused by economic behavior or recurrent exogenous factors such as weather patterns, holidays, religious events, and calendar effects such as variations in the number and type of trading days and paydays. Although it is feasible to focus seasonal adjustment on any of such factors in isolation or in sequence (for instance, calendar effects only or first), all seasonal patterns should be taken into account simultaneously, for reasons that are explained in Chapter VIII.

**1.17.** Opinions differ among both users and compilers on the appropriateness of statistical offices producing seasonally adjusted and trend-cycle estimates. These differences are caused both by differences in opinion over the usefulness of seasonally adjusted data as such for various uses of the data, and by differences in opinion over whether seasonal adjustment and trend-cycle estimation should be undertaken by users or by compilers of official statistics. Consequently, country practices in this respect differ. Some statistical offices do not publish any seasonally adjusted data or trend-cycle estimates at all, considering it to be outside the responsibility of producers of official statistics and part of users' analysis of the data. Others focus mainly on seasonally adjusted data/trend-cycle estimates and may not even compile or publish unadjusted QNA estimates, but rather compile seasonally adjusted QNA estimates directly from seasonally adjusted source data. Most publish seasonally adjusted and trend-cycle data at least for the main aggregates, and this practice is strongly encouraged.

**1.18.** A basic premise of this manual is to compile QNA from unadjusted source data and apply seasonal adjustment/trend-cycle estimation on the resulting estimates. The discussions on sources and methods in this manual, and in particular the discussions concerning benchmarking, are all based on this premise. This premise is derived from the need to serve different users' needs as well as from practical compilation considerations. As illustrated in Box 1.1, unadjusted data, seasonally adjusted data, and trend-cycle estimates are useful for different purposes. The unadjusted data tell what actually happened in each period, while the seasonally adjusted data and the trend-cycle estimates tell what the underlying movements in the series are. Thus, users should have access to all three sets of data. Obviously, while QNA estimates based on unadjusted data allow seasonal adjustment, deriving unadjusted QNA estimates from seasonally adjusted estimates is not possible. Thus, if QNA compilation is based on adjusted data, providing unadjusted QNA estimates necessitates a separate compilation process, using a separate set of (unadjusted) data.

**1.19.** Seasonally adjusted data and trend-cycle estimates are indispensable for identification of changes in the business cycle and turning points in particular. Identifying turning points in the business cycle is an important purpose of QNA that can be significantly impeded if seasonal patterns and one-time events in the data are not separated out. One alternative to seasonal adjustment is to use growth rates from the corresponding quarter of the previous year rather than from the previous quarter. This is not an adequate solution, as explained in paragraph 1.15 above (see Annex 1.1 for further explanation of this issue). Furthermore, growth rates from the corresponding quarter do not fully exclude seasonal elements (for instance, Easter may fall in the first or in the second quarter, and the number and type of working days in a quarter differ from year to year).

**1.20.** Unadjusted data and other components of the series are needed for other purposes, including various

[3]Well-established techniques are available for seasonal adjustment, such as the Census X11/X12 method; these will be discussed in Chapter VIII.

aspects of monitoring current economic developments. For short-term forecasting of highly seasonal series, all components may be needed, particularly the seasonal component. Economic policy formulation may also require information on all components of the series, while for analysis of the effects of particular events, identification of the irregular component may be most important. Unadjusted data are also required for purposes such as econometric modeling, where the information contained in the seasonal component of the series may play a particular role in determining the dynamic relationship among the variables.[4] A further argument for requiring that unadjusted data always be provided is that for the most recent data in the series, seasonally adjusted and trend-cycle estimates are subject to additional revisions compared with the unadjusted series (the "wagging tail" problem—see Chapter VIII.)

**1.21.** Some users may prefer the unadjusted data because they regard seasonally adjusted data as artificial and arbitrary, or they may want to seasonally adjust the data themselves by applying their own seasonal adjustment preferences. Seasonally adjusted data represent one answer of several to the hypothetical question "What would the data have been if no seasonal factors affected them?" In that respect, seasonally adjusted data are obviously artificial. However, most economic analysts find the answer to this hypothetical question indispensable for business cycle analysis. Still, various aspects of seasonal adjustment remain controversial,[5] partly reflecting the many subjective and somewhat arbitrary choices involved in seasonal adjustment, including the choice of method (e.g., X11/X12 versus TRAMO-SEATS, BV4, SABLE, STAMP) and model (additive or multiplicative), the treatment of outliers, and the choice of filter lengths. For these and other reasons it has been argued that statistical offices "should produce the raw data and the users can then use their own software for treating seasonal data in the way they want and in which their analysis calls for."[6] However, while sophisticated users can and sometimes may want to seasonally adjust the data themselves, the public at large require that the data be adjusted for them. In addition, the statistical office may have particular information about special events impacting on the series and thus have advantages in carrying out seasonal adjustment.

[4]See, for instance, Bell and Hillmer (1984), pp. 291-320.
[5]See, for instance, Chapter 5 of Alterman, Diewert, and Feenestra (1999) for a discussion of many of these controversial issues.
[6]Hyllenberg (1998), pp. 167-168.

**1.22.** Compilation considerations also support the basic premise of statistical offices compiling seasonally adjusted data and trend-cycle estimates based on unadjusted QNA estimates. When compiling QNA estimates, seasonally adjusted versions of the estimates may assist in detecting abnormalities in the data and allow better checks on plausibility of data (in particular, growth rates.) Thus, it may be easier to identify errors or discrepancies and their causes with adjusted data than with unadjusted data. On the other hand, the adjustments may obscure discrepancies and abnormalities in the unadjusted data that do not relate to seasonality. Also, it is more difficult to interpret discrepancies in the adjusted data because it is uncertain to what extent the discrepancies were already implicit in the unadjusted data. Finally, practice has shown that seasonally adjusting the data at the detailed level needed for compiling QNA estimates can leave residual seasonality in the aggregates.

**1.23.** Although seasonal adjustment removes the identifiable regular repeated influences on the series, it does not and should not remove the impact of irregular events. Consequently, if the impact of irregular events is strong, seasonally adjusted series may not represent a smooth and easily interpretable series. To further highlight the underlying trend-cycle, most standard seasonal adjustment packages also calculate a smoothed trend-cycle series running through the seasonally adjusted data (representing an estimate of the combined long-term trend and the business cycle movements in the series). Several countries include these estimates in their publications, and this practice is strongly encouraged.

## E. Conceptual Links between Quarterly and Annual Accounts

**1.24.** To avoid confusion about interpreting economic developments, it is imperative that the QNA[7] are consistent with the ANA. Differences in growth rates between QNA and ANA would perplex users and cause uncertainty about the actual situation. Concerning the level of the data, this means that the sums of the estimates for the four quarters of the year should be equal to the annual estimates. In a situation where the ANA or ANA components are built up from the QNA, this is more or less self-evident. However, more commonly, the ANA are based on different sources than the quarterly estimates, and if that is the case, differences could

[7]That is, the non-seasonally adjusted QNA.

### Box 1.1. Seasonal Adjustment: Unadjusted Data, Seasonally Adjusted Data, Trend-Cycle Estimates—What Do Users Want?

| | Components that are: | |
|---|---|---|
| **Main use of the data** | **Of interest** | **Not of interest** |
| Business cycle analysis | Trend-cycle and irregular component | Unadjusted data |
| Turning point detection | Trend-cycle and irregular component | Unadjusted data |
| Short-term and medium-term forecasts | The original unadjusted series and all its components (trend-cycle, irregular, seasonal factors, preadjustment factors, etc.) | |
| Short-term forecasts of stable but highly seasonal items such as electricity consumption | The seasonal factors plus the trend-cycle component | |
| Long-term forecasts | Annual data and possibly the trend-cycle component of monthly and quarterly data | Unadjusted monthly and quarterly data, seasonally adjusted data and the irregular components |
| Analysis of the effect of particular events, such as a strike | The irregular component and any preadjustment factors | |
| To determine what actually happened (e.g., how many people were unemployed in November) | The original unadjusted series | Seasonally adjusted data and trend-cycle data |
| Policy formulations | The original unadjusted series and all components (trend-cycle, irregular, seasonal factors, preadjustment factors, etc.) | |
| Macroeconomic model building | Could be unadjusted, adjusted, trend-cycle, or all components, depending on the main purpose of the model | |
| Estimation of behavioral relationships | Could be unadjusted, adjusted, trend-cycle, and all components, depending on the main use of the estimated relationships | |
| Data editing and reconciliation by statistical compilers | Original unadjusted series, seasonally adjusted data, irregular component, and trend-cycle component | |

develop. To avoid this, the QNA data should be aligned with the annual data; the process to achieve this is known as "benchmarking." One advantage of benchmarking is that incorporating the usually more accurate annual information into the quarterly estimates increases the accuracy of the quarterly time series. Benchmarking also ensures an optimal use of the quarterly and annual source data in a time-series context.

**1.25.** Benchmarking deals with the problem of combining a time series of high-frequency data (e.g., quarterly data) with less frequent but more accurate data (e.g., annual or less frequent data). Benchmarking issues arise both in QNA and ANA compilations. For the ANA, benchmarking arises when the estimates are anchored to more comprehensive and detailed surveys and censuses that are performed only every few years. The same basic principle applies to quarterly and annual benchmarking; however, as apparent from the technical discussion in Chapter VI, quarterly benchmarking is technically more complicated.

**1.26.** Benchmarking has two main aspects, which in the QNA context are commonly looked upon as two different topics; these are (a) *quarterization*[8] of annual data to construct time series of historical QNA estimates ("back series") and to revise preliminary QNA estimates to align them to new annual data when they become available, and (b) *extrapolation* to update the series by linking in the quarterly source data (the indicators) for the most current period ("forward series").

**1.27.** The general objective[9] of benchmarking is to preserve as much as possible the short-term movements in the source data under the restrictions

[8]Quarterization is defined here as generation of quarterly data for past periods from annual data and quarterly indicators; it encompasses the techniques of interpolation for stock data and temporal distribution for flow data. For more on this, see Chapter VI.

[9]The only exceptions to this general objective concern the rare cases where (a) the relationship between the indicator and the target variable follows a known short-term pattern or (b) knowledge about the underlying error mechanism indicates that the source data for some quarters are weaker than for others and thus should be adjusted more.

provided by the annual data and, at the same time, for forward series, ensure that the sum of the four quarters of the current year is as close as possible to the unknown future annual data. It is important to preserve as much as possible the short-term movements in the source data because the short-term movements in the series are the central interest of QNA , about which the indicator provides the only available explicit information. Optimally preserving the short-term movements in the data is one of the basic premises of this manual. Therefore, the core problem of benchmarking in a quarterly context is how to align a quarterly time series to annual data while maintaining the quarterly pattern and without creating a discontinuity in the growth rate from the last quarter of one year to the first quarter of the next year. This problem is known as the "step problem." To solve the step problem, several mathematical techniques have been developed. Chapter VI presents one technique, the proportional Denton technique with enhancements, that by logical consequence is optimal[10] under the general benchmarking objective stated above. The other techniques proposed in the literature are reviewed in Annex 6.1.

**1.28.** To be consistent, QNA and ANA should use the same concepts. As mentioned, this manual seeks full consistency with the *1993 SNA* and aims to avoid any unnecessary duplication. Nevertheless, some conceptual issues have a stronger emphasis and more substantial consequences in QNA than in ANA, which necessitates some further discussion. The most important conceptual issue in this respect is time of recording, particularly in two cases, namely, (a) long production cycles, and (b) low-frequency payments. Long production cycles, or production cycles that are longer than one accounting period, mainly concern construction, manufacturing of durable goods, and agriculture and forestry. The problems involved can be very substantial for QNA compilation and are discussed in Chapter X. Low-frequency payments are payments made on an annual basis or in infrequent installments over the year. Examples of such payments are dividends, end-of-year bonuses, vacation bonuses, and taxes on the use of fixed assets and other taxes on production. These issues are discussed in Chapter IV.

[10]The enhancements developed in Chapter VI also provide for superior solutions in the case of the two exceptions to this objective presented in footnote 9.

## F. Transparency in Quarterly National Accounting

**1.29.** Transparency[11] concerning QNA is a fundamental requirement of users, and is particularly pertinent in dealing with revisions. To achieve transparency, it is important to provide users with documentation regarding the source data used and the way they are adjusted. As well, documentation should be provided on the compilation process. This will enable users to make their own judgments on the accuracy and the reliability of the QNA and will preempt possible criticism of arbitrary data manipulation. In addition, it is important to inform the public at large about release dates so as to prevent accusations of manipulative timing of releases. To avoid misperceptions, it is advisable to take a proactive approach to educate users.

**1.30.** Revisions are undertaken to provide users with data that are as timely and accurate as possible. Resource constraints and respondent burden, in combination with user needs, cause tension between timeliness of published data, on the one hand, and reliability, accuracy, and comprehensiveness on the other hand. To balance these factors, preliminary data are compiled that later are revised when more and better source data become available. Revisions provide the possibility to incorporate new and more accurate information into the estimates, and thus to improve the accuracy of the estimates, without introducing breaks in the time series.

**1.31.** Although revisions sometimes may be perceived as reflecting negatively on the trustworthiness of official statistics, delaying the implementation of revisions may cause later revisions to be greater if successive revisions are in the same direction (because they are cumulative). In fact, experience has shown that more sophisticated users understand that letting large revisions through is a sign of integrity. Not incorporating known revisions actually reduces the trustworthiness of data because the data do not reflect the best available information, and the public may know this or find out (for instance, the public may wonder why a revision in the monthly production index is not reflected in the QNA). In a time-series-oriented compilation system, suppression of revised information can also be cumbersome and costly and can cause estimation errors.

[11]Which can be described with terms such as openness, candor, and so on.

**1.32.** To minimize the number of revisions needed without suppressing information, it is advisable to coordinate statistical activities. The revision schedule should be largely driven by arrival of source data, and coordinating their arrival would help reduce the number of revisions needed.

**1.33.** To face any concerns users may have about revisions, it is important to have both an established and transparent publication policy and a revision policy in place. In addition, users need to be educated about the causes of revisions and the policies for dealing with them. Countries have adopted different approaches to revisions in response to their own circumstances. However, some important elements that constitute best practice are (a) candid and easily available documentation of sources and methods, (b) easily available documentation of the size and causes of revisions, and (c) release and revision dates that are well known and published through an advance release calendar. These practices are all required or encouraged by the IMF's Special Data Dissemination Standard (SDDS) and the General Data Dissemination System (GDDS). In addition, electronic release of the complete time series, not only the data for the most recent periods, will make it easier for users to update their databases. These issues will be further discussed in Chapter XI.

**1.34.** To avoid unwanted perceptions, it is advisable to take a proactive approach to educate users. Educating users, while valuable for most statistical areas, is particularly important for QNA because of their policy relevance and technical complexity. This introductory chapter has emphasized the usefulness of QNA, but also has pointed out inherent weaknesses. Compilers must be candid about these issues with the public and pursue transparency of sources and methods for compiling their QNA. For instance, experience has shown that a proactive approach can help reduce complaints about revisions. Although beginning compilers may well face more difficulties in this respect than well-established ones, the valuable experience gained by the latter should be a stimulus to move to a proactive approach as soon as circumstances permit. Also, compilers are often ahead of users in terms of sophistication of analysis and potential uses of the data. Compilers should educate users about the analytical possibilities and other benefits of the QNA data. Enhanced contact with users may also help compilers detect weaknesses in the estimates or their presentation. In addition, users sometimes have their own economic information that could be helpful to compilers.

**1.35.** Users should be informed about the meaning of the data and their limits, and inappropriate uses should be discouraged. Given the likelihood of future revisions, users should be cautioned against overemphasizing the most recent release. To achieve a prudent appraisal of developments, users should be advised to consider the trend in the data over several quarters rather than the latest quarter. As well, if QNA data are presented in an annualized format, either as compounded growth rates or as levels multiplied by four, it is important to explain that this presentation magnifies the irregularity and uncertainty of QNA data (for further explanation, see Chapter VIII). Similarly, using growth rates with more than one digit behind the decimal point gives the impression that the data are significantly more precise than they generally are.

**1.36.** Several approaches can be taken to educate users. Seminars could be conducted for specific audiences, such as specialized journalists, interested parliamentarians, users within the central bank, or government agencies such as the ministry of finance or the department of commerce. Direct inquiries by users are good occasions for compilers to explain specific issues. For the general public, the occasion of new releases, which often brings the QNA to public attention, can be used to highlight points of interest. In particular, attention should be given to revisions and their causes. Also, in presenting the data, care should be taken to exemplify proper use, as indicated above. The best way to go about this is to provide press releases tailored to the style of the media, ready to print.

## G. Flash Estimates

**1.37.** In some countries, the term "flash estimates" is used for a first release of QNA data fairly shortly after the reference period. The terminology is designed to emphasize that shortcuts have been taken and that, consequently, the data are particularly subject to revision. The shortcuts usually include use of data for only one or two months of the quarter for some or all components, with the missing month(s) estimated by extrapolation using mechanical methods such as those discussed in Chapter VII. Another common shortcut is use of data with less complete response rates than the data used for subsequent QNA estimates. Because the use of shortcut sources and methods is a general feature

of QNA compilation, flash estimates only differ from subsequent QNA estimates in that they use a higher proportion of such methods. Consequently, flash estimates do not raise additional conceptual issues, although the practical concerns about informing users of their limitations and assessing the record of revisions for QNA are even more crucial. The flash estimates may be more limited in coverage of the *1993 SNA* variables (for instance, they may cover variables from the production account only) or be published in a more aggregated form. Publication of less detail is a recognition that the statistical noise is greater in disaggregated data and will emphasize the limitations of the estimates to users. Preferably, the level of compilation would be the same as for subsequent estimates, because a different level of compilation requiring use of different methods may cause unnecessary revisions.

**1.38.** In some cases, flash estimates may be used to describe data derived from aggregated econometric models that use factors such as behavioral relationships, leading indicators, or other indicators that do not have a close measurement relationship to the variable. These techniques are not a substitute for statistical measurement and are outside the scope of QNA compilation. As they require different skills from those used in statistical compilation, they are best undertaken by other agencies.

## H. An Outline of the *Manual*

**1.39.** The outline of this manual can be summarized as follows. The *Manual* discusses strategic and organizational matters (Chapter II), the source data that are the foundation of QNA (Chapters III-V), mathematical techniques that are applied to data (Chapters VI-VIII), and, finally, a number of specific issues (Chapters IX-XI).

**1.40.** Chapters II-V are intended to be of particular interest to those setting up a new system. In addition, these chapters will be useful to those reviewing existing systems. In Chapter II, strategies for a QNA system and the management of QNA compilation are discussed, with the warning that data are the foundation of QNA and mathematical techniques are not a substitute. The chapter introduces the benchmark-indicator framework used throughout the *Manual* to understand QNA compilation and its relationship to ANA. It emphasizes the nature of QNA data as time series and the necessity of closely linking QNA and ANA using benchmarking techniques.

**1.41.** The commonly used sources and the issues that arise concerning them are outlined in Chapters III (GDP and its components, according to the production, expenditure, and income approaches) and IV (institutional accounts). The *Manual* recommends that even when GDP can only be estimated from a single approach, other splits of GDP should be produced with one category as a residual. Chapter IV points out that completion of some of the institutional accounts is usually feasible and always desirable.

**1.42.** Chapter V advises on good practices for handling data through checking and reconciliation.

**1.43.** Chapters VI-VII deal with benchmarking and projection techniques. The *Manual* warns against methods that introduce a step problem and presents an optimal benchmarking technique to solve the step problem under the general benchmarking objective presented in Section C above. The technique presented should be applied even in a newly established QNA system, and an understanding of the basic aspects of the technique and its compilation implications is fundamental for QNA compilers. However, the detailed discussions of the mathematics behind it, enhancements, and possible alternatives provided toward the end of the chapter and in the annexes are considered optional and are intended for more advanced readers.

**1.44.** Basic principles of seasonal adjustment are covered in Chapter VIII. The chapter is intended particularly for those starting a new system as well as those with existing systems that do not yet have seasonally adjusted data.

**1.45.** Chapter IX deals with issues in price and volume measurement. The problem of aggregation over time is relevant to all compilers, while the issues associated with annual chaining pertain to more advanced systems.[12]

[12]The term **volume** is used for measures that exclude the effects of changes in prices of the components that make up the item. The exclusion of the effect of price changes means that changes in a time-series of volume measures are driven by quantity and quality changes. Volume can be contrasted with **quantity**, which is limited to data that can be expressed in physical units. Accordingly, quantity measures do not take into account quality change and are not applicable for unquantifiable items or aggregates of different items. Volume can also be contrasted with estimates in **real** terms which refer (in precise national accounts terminology) to measures of the purchasing power of an item, that is, in reference to prices of other items. In common usage, "real" is often used for purchasing power as well as volume measures. While constant price estimates are a common form of volume measure, the term also includes fixed-base and chain-linked volume indices.

**1.46.** Work in progress is dealt with in Chapter X. The issues are relevant to all national accounts compilers, but the degree of sophistication of methods used will depend on the stage of QNA compilation.

**1.47.** Chapter XI discusses revision policy and the compilation cycle. Although policies need to differ according to the circumstances of each country, a transparent policy is required in all cases.

# Annex 1.1. Identification of Turning Points

**1.A1.1.** This annex provides a numerical example illustrating the importance of presenting monthly and quarterly economic information as time series and the derived rates of change in the time series on a period-to-period basis, for the purposes of analyzing trends and turning points in the data, as emphasized in Chapters I and VIII. In the absence of seasonally adjusted time series and trend-cycle estimates, it is common practice to present changes from the same period in the previous year, instead of period-to-period changes. As shown in the numerical example, rates of change from the same period of the previous year can be inadequate in identifying the current trend in economic activity—indicating, for example, that an economy is still in recession when it has actually been recovering for some time. If changes from the same period of the previous year are used, turning points in the data show up with some delay, which in some circumstances can be substantial. The average delay can be shown to be around half a year in discrete data and around three-quarters of a year in cumulative data.

**1.A1.2.** In addition to delaying identification of turning points, changes from the same period of the previous year do not fully exclude all seasonal elements (e.g., Easter may fall in the first or second quarter, or the number of working days of a quarter may differ from year to year.) Moreover, in addition to any irregular events affecting the current period, these year-to-year rates of change will reflect any irregular events affecting the data for the same period of the previous year.

**1.A1.3.** Consequently, year-to-year rates of change are not suitable for business cycle analysis, and analyzing the economy on the basis of these rates of change can have an adverse impact on the soundness of macroeconomic policy.

**1.A1.4.** If the changes from the same period in the previous year are based on cumulative data (e.g., data that cover January, January through March, January through June, and so on), which has been the tradition in some countries, the delays in determining the turning points are even longer.

**1.A1.5.** The numerical example presented in Example 1.A1.1 is based on a time series of hypothetical data, starting in the first quarter of 1996, that can be viewed as representing tons of steel produced in each quarter, or, alternatively, quarterly GDP at constant prices. It contains three turning points. The first turning point occurs in quarter 1 of 1998, the second occurs in quarter 1 of 1999, and the third in quarter 4 of 1999.

**1.A1.6.** From the discrete quarterly data presented in the first column of Example 1.A1.1, these three turning points are easily seen as the series (a) turns from decreasing to increasing in quarter 1 of 1998, (b) turns from increasing to decreasing in quarter 1 of 1999, and (c) turns from decreasing to increasing in quarter 4 of 1999.

**1.A1.7.** Similarly, from the quarter-to-quarter rates of change presented in the third column of Example 1.A1.1, the first turning point is indicated by the change in quarterly rates of change from a negative rate in quarter 1 of 1996 to a positive rate in quarter 2 of 1998, the second turning point by the change from a positive to a negative rate of change between quarter 1 and quarter 2 of 1999, and the third turning point by the change from a negative to a positive rate of change between quarter 4 of 1999 and quarter 1 of 2000.

**1.A1.8.** When using changes from the same period of the previous year (e.g., the change from quarter 1 of 1996 to quarter 1 of 1997) instead of quarter-to-quarter changes, the delays in identifying the turning points can be substantial. In the example, the changes from the same quarter of the previous year are presented in the fourth column and show the third turning point as having taken place in quarter 3 of 1999—that is, three quarters after it actually occurred.

**1.A1.9.** If the changes from the same quarter in the previous year are based on cumulative data, as shown in the final column, the analysis gives the impression that the turning point took place even one quarter later.

## Example 1.A1.1. Identification of Turning Points

Tons of Steel Produced

Bold type indicates turning points.

| | | | Rates of Change | | |
|---|---|---|---|---|---|
| Quarter | Discrete Data | Cumulative Data | Quarter-to-Quarter | Changes from the Same Quarter of the Previous Year (Discrete Data) | Changes from the Same Quarter of the Previous Year (Cumulative Data) |
| q1 1996 | 1,537.9 | 1,537.9 | | | |
| q2 1996 | 1,530.2 | 3,068.1 | –0.5% | | |
| q3 1996 | 1,522.6 | 4,590.7 | –0.5% | | |
| q4 1996 | 1,515.0 | 6,105.8 | –0.5% | | |
| q1 1997 | 1,507.5 | 1,507.5 | –0.5% | –2.0% | –2.0% |
| q2 1997 | 1,500.0 | 3,007.5 | –0.5% | –2.0% | –2.0% |
| q3 1997 | 1,470.0 | 4,477.5 | –2.0% | –3.5% | –2.5% |
| q4 1997 | 1,440.0 | 5,917.5 | –2.0% | –5.0% | –3.1% |
| q1 1998 | **1,350.0** | 1,350.0 | –6.3% | –10.4% | –10.4% |
| q2 1998 | 1,395.0 | 2,745.0 | **3.3%** | –7.0% | –8.7% |
| q3 1998 | 1,425.0 | 4,170.0 | 2.2% | –3.1% | –6.9% |
| q4 1998 | 1,575.0 | 5,745.0 | 10.5% | **9.4%** | –2.9% |
| q1 1999 | **1,605.0** | 1,605.0 | 1.9% | 18.9% | **18.9%** |
| q2 1999 | 1,590.0 | 3,195.0 | **–0.9%** | 14.0% | 16.4% |
| q3 1999 | 1,575.0 | 4,770.0 | –0.9% | 10.5% | 14.4% |
| q4 1999 | **1,500.0** | 6,270.0 | –4.8% | **–4.8%** | 9.1% |
| q1 2000 | 1,500.0 | 1,500.0 | **0.0%** | –6.5% | **–6.5%** |
| q2 2000 | 1,515.0 | 3,015.0 | 1.0% | –4.7% | –5.6% |
| q3 2000 | 1,530.0 | 4,545.0 | 1.0% | –2.9% | –4.7% |
| q4 2000 | 1,545.0 | 6,090.0 | 1.0% | **3.0%** | –2.9% |

**Example 1.A1.1.** ***(continued)***