

# Chapter 5

## Assessing the Quality of Economic Statistics

*How can we distinguish between high-quality statistics and data whose quality is poor? And what exactly do we mean by the “quality” of statistical data? Do quality standards exist for statistics? If so, who established them? At present, when users have practically unlimited access to statistical information but often feel bombarded by the media with sometimes conflicting data, the ability to identify high-quality statistics is of paramount importance. This chapter illustrates the basic concepts developed to ascertain the quality of statistical data, and the initiatives launched at the international level to assess the quality of statistics produced by national statistical offices and other producers of official statistics. Given that the international comparability of statistics plays a key role in the decision-making process of major international organisations, the IMF, the OECD and European authorities have worked particularly hard to develop models for assessing statistical quality.*

## 5.1. The dimensions of quality

From the 1980s onwards, driven by the reorganisation of industrial production in which many developed countries were at that time engaged, the concept of “total quality” passed into the public domain; extensive literature analysed the various aspects of this term, including the application of so-called *Total Quality Management (TQM)* to various fields of activity. Statistics, too, were involved in the revolution triggered by the TQM approach, indeed to such an extent that various national statistical offices and international organisations developed systematic approaches to the quality management of statistics, as well as evaluation frameworks for data quality, particularly that of economic statistics. Furthermore, in the age of the “information society”, in which many suppliers of statistical data co-exist and the scarcity of data has given way to an apparent over-abundance, the end users’ ability to assess the quality of the statistics has become a prerequisite for selecting the most relevant data for their needs.

According to the definition published by the International Standards Office (ISO) in 1986, quality is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs (ISO 8402). Therefore, a product’s ability to satisfy user needs determines its quality, and therefore makes the user the sole judge of overall product quality. This contrasts with other approaches that consider the producer best-qualified to assess the quality of the product, on the grounds that the producer alone has knowledge of the production processes.

In a statistical context, for a large part of the last century the term “quality” was primarily seen as a synonym for “accuracy”. This view derived from statistical sample surveys in which sampling “errors” (attributable to the incorrect use of benchmarking and to the characteristics of the sample used) could be compounded by more significant non-sampling errors relating to the various stages in the statistical production cycle (activities of interviewers, programming errors in computer procedures, etc.). Typically, in this context, there was conflict between the quality and the timeliness of data, *i.e.* between the accuracy of data and the time needed to produce and disseminate those data.

As a result of work carried out over the past 20 years, the concept of quality in statistics now has much broader significance and is based on a series of “dimensions”. For example, according to a survey conducted in 2001, the dimensions most frequently used by European statistical offices to define quality were: relevance, accuracy, timeliness, availability, comparability, coherence, completeness. Similar concepts are used by statistical offices in Canada, the United States and Australia and also by the European Statistical System.

The box on the next page provides short definitions of the various dimensions of quality used by the OECD. In accordance with the central role played by users in the evaluation of quality, these definitions tend to underline the importance of subjective dimensions that go well beyond those of accuracy alone. For example, the same information can be deemed extremely relevant by one user but completely useless by another. The accessibility of a database may be judged positively by a user with good computer skills, but negatively by somebody not used to navigating through databanks.

### Main dimensions of quality for OECD statistics

#### Relevance

The relevance of a statistic reflects its ability to satisfy the needs of users. This depends on its utility in helping to add to the users' knowledge with regard to the topics of greatest importance to them. The evaluation of relevance is subjective and varies according to the user's needs.

#### Accuracy

Accuracy represents the level at which the statistical information correctly describes the phenomenon it has been developed to measure. It is normally expressed in terms of the "error" in the statistical data, which can in turn be broken down into different components.

#### Timeliness and Punctuality

The timeliness of a statistic is the time it takes to disseminate it with regard to the reference period. The timeliness of a statistic has a significant impact on its relevance. In addition, there is a clear trade-off between the timeliness and the accuracy of a statistic. Punctuality implies the existence of a timetable for releasing statistical information and measures the degree to which that timetable is adhered to by the data producer.

#### Accessibility

The accessibility of a statistic reflects the ease with which it can be identified and utilised by a user. Accessibility therefore depends on the means with which the statistic is made available to the user (paper, electronic medium, etc.), the search procedures required, the user's ability to make use of the statistic, the existence of barriers to access (cost, for example), the provision of user-support services, etc.

#### Interpretability

Interpretability reflects the ease with which the users can understand the basic characteristics of the statistic and thereby evaluate its utility for their own needs. The adequacy of the information (metadata) provided regarding the coverage of the statistic with regard to the reference universe, its comparability over time and in space, the methods used to collect and generate data, the accuracy of data, etc., are all fundamental factors of interpretability.

#### Coherence

Coherence relates to the degree to which a particular statistic can be analysed from a temporal and spatial standpoint, or related to other information within analytical and interpretation models. The use of standard concepts, definitions and classifications increases the coherence of the information supplied by various sources, while the existence of changes in methodology can impede the comparability over time of historical series relating to the same parameter.

#### Credibility

The credibility of a statistic refers to the confidence that users have in the person or entity producing that statistic. It is normally based on the reputation of the producer as demonstrated over time, which in turn relates to factors such as the objectivity, scientific independence, professionalism and transparency shown by the producer in the course of his or her activities.

The assessment of interpretability can vary substantially between an expert in statistical terms, who has no difficulty reading the methodological notes accompanying statistical tables, and someone without such knowledge. It should also be noted that the credibility dimension of a given statistic does not depend so much on its technical qualities as on the characteristics of the data producer and its reputation, which in turn depend on how the user population perceives the overall quality of the statistics produced.

It is clear how such a multi-faceted definition of quality poses a much greater challenge to producers of statistics than a simple demand to merely produce “accurate” data. This challenge addresses the entire statistical production cycle, from the initial design of statistics to their collection, compilation, dissemination and communication. To meet such an ambitious objective, some statistical offices have developed systematic approaches to quality, such as quality frameworks, which tend to combine technical aspects with those relating to management. These pay constant attention to introducing improvements at every stage of the statistical production process, through methodological, technological and organisational innovations, or by investment in staff training at all levels of the management hierarchy, combined with the adoption of innovative public communication, marketing and data dissemination strategies.

Moreover, some international organisations such as the OECD and Eurostat, have developed and adopted *quality frameworks*. These are designed to enhance the quality of their statistics, through the revision and improvement of internal procedures used to collect, transform and disseminate statistical data sent to them by their member countries, and through the adoption of technologically more advanced instruments to improve data accessibility and interpretability.

### 5.2. International initiatives for the evaluation of quality

Given the importance of the end user’s perspective in quality evaluation, the data dissemination phase becomes crucial in the statistical production cycle: accurate data that are not timely, hard to access and can only be interpreted in parts would indeed be considered of poor quality by most users and would probably be disregarded in favour of data that are more timely and easier to access and read, even if they were only partly accurate. This is where the main risk lies for the producers and the users of official statistical products in the modern “information society”: the former risk seeing their efforts to produce accurate statistics facing competition from other producers with less well endowed methodology but better able to deploy aggressive marketing techniques to impose their own products on the media and the general public. The public (because of its limited knowledge of statistical techniques) finds it increasingly difficult to distinguish between information of high technical quality and information based on less rigorous scientific criteria, but with apparently greater relevance and timeliness. The result: users run the risk of making decisions based on approximate or even incorrect data.

Over the past 10 years, national producers of official statistics and international organisations have given greater attention to the formulation of quality evaluation procedures based on: *a)* critical analyses of national statistical systems (or of specific subject areas) conducted by commissions composed of internationally recognised experts; *b)* multilateral systems for monitoring the quality of the principal economic statistics, as well as the practical application of the UN *Fundamental Principles of Official Statistics*. These procedures have been added to the quality checks regularly carried out by international organisations on the statistics they receive from national producers, as well as to user-satisfaction surveys for statistical information.

International organisations are frequently requested to review and analyse the institutional, methodological and organisational aspects of the production of national statistics. This analysis often entails a series of visits to national statistical offices and other producers of official statistics and the preparation of reports on their various activities and processes, which are then critically assessed by the international organisation and by user groups. The exercise concludes with the drafting of a final report that is normally made public. The statistical systems of Switzerland, Hungary and Portugal have been the subject, within the past decade, of such reviews requested by the country concerned, while all the statistical systems of the European Union were analysed in depth by Eurostat, with regard to both institutional and technical issues. Similar analyses have been made by the OECD of the systems of countries wishing to join that Organisation.

A second type of statistical-quality analysis by international organisations was the initiative launched in 1995 by the IMF following the Mexican financial crisis. Since one of the causes of that crisis was the highly unreliable statistical data on key elements of the economic and financial situation in that country, the IMF launched a project to oblige national producers of economic statistics to improve the information provided on the availability and quality of macroeconomic statistics, and to comply with the UN *Fundamental Principles of Official Statistics*. Under this initiative, known as the *Special Data Dissemination Standard (SDDS)*, individual countries update at pre-determined intervals a publicly accessible Internet site (<http://dsbb.imf.org>) displaying statistics relating to 18 parameters (Gross Domestic Product, prices, public deficit, etc.), which are accompanied by appropriate information (metadata) on the methods used to produce those statistics, the organisational procedures governing their release and the institutional status of the producers of official statistics. Given this information, users can more accurately assess the quality of the data provided.

### The role of metadata

The provision of methodological information, or metadata, that define the concepts and methods used in the collection, compilation, transformation, revision and dissemination of statistics, is an essential function of all agencies disseminating statistics at both the national and international levels. A distinction can be made between “structural” metadata – that act as data identifiers and descriptors (needed to identify, use and process data matrixes and cubes) – and “reference” metadata, which describe statistical concepts and methodologies for the collection and generation of data and provide information on data quality.

The need for such methodological information arises from a desire to lend transparency to economic, social and population statistics so that the typical end user can make an informed assessment of their usefulness and relevance to his or her purpose. In recognition of this, methodological transparency is embodied as one of the UN *Fundamental Principles of Official Statistics*. The provision of metadata is therefore an inescapable responsibility of all statistical agencies, in both developed and developing countries, and one that requires adequate planning and resources. In recognition of this, many statistical agencies have embodied their policy on the provision of metadata in their dissemination standards and author guides.

Users of metadata are generally depicted as falling into two broad groups: producers of statistics responsible for designing statistical collections, collecting, processing and evaluating statistics, and disseminating data; and end-users of statistics comprising policy analysts, media, academics, students, etc. The statistical functions of international organisations often fall somewhere in the middle of these broad groups, in that they also perform the role of disseminators of statistics to internal or external end-users. International organisations also use metadata in evaluations and assessments of the comparability of statistics among countries.

The need for the provision of more extensive methodological information is now receiving greater recognition. But actual practices in this area vary considerably in the statistical systems of both developed and developing countries; there are significant differences, for instance, in the amount of methodological detail provided on their websites and in other disseminating media (even in the national language), the frequency of updating, the proximity to the statistics described and ease of access by users.

The four key elements of recommended practice in the compilation and dissemination of metadata relate to the need for the compilation of up-to-date metadata by international organisations and national agencies; providing access to metadata; the methodological items (or metadata elements) that should be incorporated in metadata disseminated; and the use of a common terminology.

The role of metadata and recommended practices in the compilation and dissemination of metadata are outlined in more detail in the recent OECD publication *Data and Metadata Reporting and Presentation Handbook* (available at [http://www.oecd.org/findDocument/0\\_2350,en\\_2649\\_34257\\_1\\_119669\\_1\\_1\\_1,00.html](http://www.oecd.org/findDocument/0_2350,en_2649_34257_1_119669_1_1_1,00.html)).

Going into greater detail, the IMF dissemination standards cover four aspects: the content, periodicity and timeliness of economic and financial data; public access; procedures for communicating data to the public; and the intrinsic quality of the data disseminated. For each of these aspects, the standards define from two to four quantitative aspects that can be verified by users (for example, the timeliness of a statistic expressed as the number of days since the reference period). In addition, the standards provide that producers: issue a timetable for the release of statistical data at least three months in advance (to avoid political pressure being applied to delay dissemination); disseminate data simultaneously to all users, or state publicly whether, and under what conditions, politicians or civil servants can have access to the data before other citizens; provide an adequate explanation of the sources and any revisions to data; disseminate comprehensive methodological notes allowing users to understand the methods used to produce data, etc. According to the degree to which these standards are respected, the IMF then carries out an independent assessment of the overall quality of the national statistical system and the statistical data.

The IMF also carries out quality analyses for a number of key economic statistics (national accounts, prices, government accounts, etc.) as part of its Review of Observation of Standards and Codes (ROSC) programme, although in this instance publication of the final report is subject to the approval of the government of the country being examined.

Initially greeted with some scepticism, the IMF's SDDS initiative proved to be highly effective in creating a culture of greater transparency and rigour in the production of statistical data. For example, the requirement to issue a timetable beforehand for the various statistical data or to describe the procedures for releasing data has posed serious problems to some statistical offices, central banks and Finance Ministries, which used to release survey statistics without following a predetermined timetable or to disseminate them first to the government, thereby raising suspicions about the use of statistical information to influence the financial markets or to exert political control over the statistics themselves. Despite the difficulties encountered during the launching stage, the IMF Standards can now be considered part of the common legacy of the producers of statistical information, or at least as goals to work towards. SDDS has undoubtedly helped to increase the transparency of the statistical process, and have facilitated access to data.

In addition, Eurostat has launched initiatives in various statistical domains aimed at assessing the quality of data produced by national statistical offices and by Eurostat itself. This included the development of composite indicators to monitor changes in the various dimensions of quality over time.

However, the careful attention paid by Eurostat to the quality control of national accounts failed to avoid a very real scandal erupting in 2004 regarding the accuracy of data supplied by Greece in support of its accession to the euro area. The decision regarding European Monetary Union and the number of countries who would have taken part in it from 1 January 1999 was taken in May 1998 on the basis of a detailed analysis of the economic and financial position of European member states.

According to the provisions of the Maastricht Treaty, five basic indicators had to be taken into consideration when assessing the eligibility of the candidacy of an EU member state: the rate of inflation, rate of interest, exchange rate, public deficit/GDP in current prices and public debt/GDP in current prices.

Eleven countries were initially chosen to enter the Monetary Union on 1 January 1999 (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain while the assessment for Greece was postponed until 2001 with a view to accession from 2002 onwards. In 2001, however, Greece too was allowed to take part in the Monetary Union, although in 2004 it became clear that the statistics relating to Greece's deficit and public debt supplied by the Greek statistical authorities, validated by Eurostat and used as the basis for the decision by the European Council, were not accurate. In particular, based on the revised data, the public deficit/GDP ratio turned out to be well above the maximum 3% threshold established for accession to the Monetary Union.

This discovery cast doubt on both Eurostat's ability to properly assess the quality of the data provided by national statistical offices and the independence of the latter vis-à-vis their governments. The European Council therefore asked the statistical authorities to draw up a Code of Conduct, which was officially approved by the Statistical Programme Committee in February 2005 and promulgated by the European Commission as the "Recommendation on the independence, integrity and accountability of the national and European Community statistical authorities". The Code sets out principles for the functioning of national statistical institutes and of Eurostat itself, underlining the importance of their scientific and organisational independence, the need for them to have adequate resources, etc., and refers to a number of indicators with which to monitor the practical implementation of these principles. Furthermore, the Commission and the European Council gave a mandate to Eurostat to increase the stringency of their qualitative controls on the statistics produced by national statistical authorities, particularly those relating to economic and financial aggregates. New surveillance and verification procedures for statistical processes have been drawn up with the aim of increasing the overall quality and credibility of European statistics.

It is therefore clear that the drive to improve the quality of statistical data is a continuous process, aimed at both national statistical authorities and international and supranational organisations. However, users also need to be vigilant with regard to statistical quality, and the processes used in compilation, by paying close attention to the metadata provided alongside statistical data. Metadata can be used to assess not only the technical characteristics of the statistics, but also the overall credibility of the producer.

### The IMF's Data Quality Assurance Framework (DQAF)

In addition to the SDDS initiative, the IMF has also developed a useful conceptual approach for assessing the quality of statistics produced by national statistical offices, central banks and other producers of official statistics. The DQAF approach provides for three levels of detail: definition of the dimensions of quality; more precise elements that help to define each dimension of quality; indicators to be calculated to assess the degree to which the actual situation matches that which could ideally be predicted on the basis of quality objectives. The first two levels of the DQAF are described below.

Dimensions of quality	Elements
1. Prerequisites of quality	1.1. Legal and institutional environment 1.2. Resources available 1.3. Relevance of the information produced 1.4. Other aspects of <i>quality management</i>
2. Assurance of integrity	2.1. Professionalism of statistical work 2.2. Transparency 2.3. Ethical standards
3. Methodological soundness	3.1. Use of international standards 3.2. Scope 3.3. Use of international classifications 3.4. Use of international accounting principles
4. Accuracy and reliability	4.1. Source data 4.2. Critical assessment of source data 4.3. Statistical techniques used 4.4. Assessment and validation of intermediate data and statistical outputs 4.5. Revision studies
5. Serviceability	5.1. Periodicity and timeliness 5.2. Coherence 5.3. Revision policy and practice
6. Accessibility	6.1. Data accessibility 6.2. Metadata accessibility 6.3. Assistance to users

Source: IMF.

### The Quality Framework and Guidelines for OECD Statistics

The quality of statistics disseminated by an international organization depends on two aspects: the quality of national statistics received; and the quality of internal processes for the collection, processing, analysis and dissemination of data and metadata. The *Quality Framework and Guidelines for OECD Statistics* (QFOS) focuses on improving the quality of data collected, compiled and disseminated by the OECD through an improvement in the Organisation's internal statistical processes and management, though there is a positive spillover effect on the quality of data compiled at the national level.

In the context of the OECD's decentralised statistical environment, the QFOS provides a common framework which can be used to systematically assess, compare and further improve OECD statistics. The QFOS has four elements: a definition of quality and its dimensions; a set of broad principles or core values on which OECD statistical activities are to be conducted and quality guidelines covering all phases of the statistical production process; procedure for assuring the quality of proposed new statistical activities; procedure for evaluating the quality of existing statistical activities on a regular basis.

The OECD views quality in terms of seven dimensions: relevance; accuracy; credibility; timeliness; accessibility; interpretability; and coherence. Another factor is that of cost-efficiency, which is not strictly a quality dimension, but it is still an important consideration in the possible application of one or more of the seven dimensions cited previously for OECD statistical output. In addition to quality dimensions, some "core values" for OECD statisticians have been identified, using the UN *Fundamental Principles of Official Statistics* as the key reference.

To develop specific guidelines, statistical activities have been articulated in seven main phases: definition of the data requirements in general terms; evaluation of other data currently available; planning and design of the statistical activity; extraction of data and metadata from databases within and external to OECD; implementation of specific data and metadata collection mechanisms; data and metadata verification, analysis and evaluation; data and metadata dissemination. For each step the quality concerns and the instruments available to help in addressing them are identified in the QFOS. In particular, a set of guidelines and concrete procedures have been prepared for each step, taking into account good existing practices within the OECD and in other statistical agencies.

All new activities have to be designed and carried out following the quality guidelines. Moreover, existing statistical activities are subject to periodic quality reviews, on a rotation basis over a number of years. The stages envisaged for quality reviews are as follows:

1. identification of the statistical activities for review during the course of the following year;
2. self-assessment by the statistical activity manager and staff, resulting in a brief report that includes a summary of quality problems and a prioritised list of possible improvements;
3. review of, and comments on, the self-assessment report by major users, as well as by the statistical, information technology, and dissemination staff of the OECD;
4. preparation of the final quality report, combining all comments;
5. assignment of resources for selected quality improvement initiatives;
6. feedback by the Chief Statistician to stakeholders on the implementation of quality improvement initiatives proposed.

As was the case with the authorities responsible for monetary policy, establishing the credibility of national statistical institutes and other producers of economic statistics is a long and complex process that requires an appropriate level of funding. In contrast, as in cases such as that of Greece, the loss of credibility can prove to be an extremely rapid and destructive process, which takes considerable time to recover.

In April 2007, in preparation for the second OECD World Forum on “Statistics, Knowledge and Policy”, upon request of the OECD, the European Commission (Eurobarometer) carried out a survey on what citizens know about key economic indicators (GDP, unemployment rate and inflation) in 27 countries. In this context, one of the questions investigated the extent to which citizens trust official statistics. The results show significant differences between countries and a higher level of trust in Nordic countries, while the new EU countries (Romania, Bulgaria, etc.) are at the other end of the scale. On average, 45% of European citizens do not tend to trust official statistics. The results also show a clear positive relation between the level of trust and citizens’ belief that policy makers use statistics to make decisions, as well as between the trust in official statistics and thye trust in national governments. These results clearly show how challenging it is for official statisticians to find an institutional set up that can ensure a true independence from government, to communicate the quality of their work and to be perceived as a credible source by citizens.

**Figure 5.1 – Trust in official statistics and belief that policy decisions are based on statistics**

European countries – April 2007

