Consistency of ESA 2010 based national accounts

2020 edition

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Foreword

The European system of accounts 2010 (ESA 2010) is a system of consistent concepts and definitions. This is clearly defined in the methodology described in Annex A of Regulation (EC) No 549/2013[1]. The ESA 2010 Transmission Programme defined in Annex B of the same regulation requires that variables which describe the same economic phenomena are transmitted and published in different accounts and data tables.

To produce high quality statistics, Member States would ensure that data transmissions use the consistent concepts and definitions and that related datasets are consistent with each other. Due to the size and complexity of the system of national accounts, in practice compilers face challenges arising from data source updates, arrival of new data, revisions of other statistics, new or improved methods, vintage effects arising from the usual sequence in compiling national accounts, etc.

In this context, the present handbook on consistency of ESA 2010-based national accounts is very important to bring clarity on when and how the numerical consistency of national accounts is ensured. While recommendations and good practices are primarily addressed to national compilers, users of national accounts will also find helpful explanations to better understand the data.

[1] OJ L 174, 16.6.2013, p. 1.

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Contents

Executive summary

The purpose of these guidelines is to support compilers' efforts to improve the consistency of the national accounts (NAs). It contains definitions, explanations, recommendations and examples of good practice under the current 2010 European system of national and regional accounts (ESA 2010). All recommendations aim to ensure that the output of NA compilation is numerically consistent.

The idea for the guidelines came up when the directors of macroeconomic statistics (DMESs) asked the Commission to propose measures to improve consistency between identical variables in different NA datasets at national and EU levels by 2020. A dedicated task force worked in 2018 and 2019 to analyse challenges, develop recommendations and find examples of good practice. The guidelines on consistency of ESA 2010 based national accounts are presented in three parts.

Firstly the application of the concept of consistency in national accounts is clarified, in particular:

- consistency in methodology implies logical consistency of concepts, definitions and classifications, consistency of data sources and consistency of methods used;
- published NAs should be characterised by numerical consistency and plausibility; and
- data consistency is further characterised contextually: over time, between data of different periodicity, between NA domains, between national and regional data, across countries and between NA and balance of payments (BoP) statistics.

ESA 2010-based NAs are therefore expected to be numerically consistent in relation to the above contextual dimensions and consistent in methodology. Consistency is not expected in relation to data sources and some methods. Overall, theoretical dimensions of consistency apply comprehensively to national accounts as a system.

Secondly, the reasons why it is difficult to achieve numerical consistency in output data are looked in detail:

- national constraints;
- the particularities of the ESA 2010 transmission programme (TP); and
- the use of NA data for EU administrative purposes.

National approaches to consistency vary according to national release calendars. Therefore, a common pattern of national data consistency is observed in data disseminated by Eurostat, as follows:

- the highest consistency of annual data across all accounts is ensured for publications from October to February (corresponding to data transmissions from September to December);
- consistency between quarterly data is ensured for releases in all quarters; and
- consistency between quarterly and annual data is strongest with the October Eurostat publications (corresponding to data transmissions in September).

Thirdly, the guidelines set out 27 specific recommendations on how to achieve, sustain and improve the consistency of national accounts:

Nine recommendations and good practices focus on essential organisational factors to enforce a corporate data consistency policy in NA departments:

- staffing, procedures, infrastructure and internal coordination of NA departments; and
- collaboration and communication with users, Eurostat and data providers.

Twelve recommendations relate to aspects of the national compilation process:

- integrating NA compilation in terms of process, data flows and IT;

- dealing with input data, balancing and checking the accounts; and
- automating the compilation steps.

The last six recommendations call for transparent and clear communication on NA consistency to users through metadata.

Most of the recommendations are supported by examples of practice in Member States. The application of recommendations are illustrated for non-financial sector accounts (NFSAs), NA main aggregates (MAs), MAs of general government, and financial sector accounts.

Table: Overview of recommendations and good practices on consistency of national accounts

Management, coordination and cooperation		National compilation process		Communication and metadata	
1	Adequate suitably trained staff with clear responsibilities	10	Integration of all accounts	22	Communication adapted to users
2	Adequate statistical procedures	11	Process mapping	23	Metadata on inconsistencies
3	Adequate IT support and budget for IT infrastructure	12	Accessibility of input data	24	Metadata for dissemination
4	Communication and coordination within NA department	13	Processing of input data	25	Metadata in inventories
5	Critical periods for coordination	14	Reconciliation of sources	26	Metadata to Eurostat
6	Essential aspects of data compilation that require coordination	15	Quality control of input data	27	Bridge tables
7	Coordinated communication with users	16	Consistency checks		
8	Timely and effective communication with Eurostat	17	Checks on data changes in production process		
9	Documented, comprehensive and up-to-date arrangements with data providers	18	Balancing of final results		
		19	Automated quality controls		
		20	IT framework		
		21	Achieving consistency according to the national release schedule		

Source: Eurostat

The guidelines draw conclusions and recommend that future efforts should focus on:

- bringing about a shift towards integrated NA compilation and modernising infrastructure;
- overcoming the difficulties encountered with the input data;
- improving quality controls at all stages of NA compilation;
- increasing transparency towards users on data consistency; and
- continuing the review of the ESA 2010 TP as regards consistency, including possible amendments to Regulation (EU) No 549/2013[2].

2 Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union (OJ L 174, 26.6.2013, p. 1).

1 Introduction

High-quality national accounts are key to the day-to-day reliability of policy and business decisions. Today's users require more and better statistics, and statisticians need to be proactive in addressing the growing demand for macroeconomic data.

While NAs (like any statistics) have various quality dimensions, consistency is their most distinctive characteristic. The 2010 European system of national and regional accounts (ESA 2010)[3] lays down consistent concepts and definitions in order to produce the high-quality instruments that provide the EU institutions, governments, economic and social operators, and analysts with harmonised and reliable statistics on which to base their decisions and policy advice. Consistency is ensured internationally, because ESA 2010 is aligned to the 2008 system of national accounts (SNA 2008)[4]. National accounts compiled according to ESA 2010 allow for economic analysis of a vast number of indicators for a country or between countries, precisely because the framework is consistent.

In practice, compilers face various challenges in ensuring data consistency, due to the size and complexity of SNA 2008:

- national accounts are inevitably dependent on the large number of statistical or administrative data collections that are used as data sources;
- indicators of the same concept are included in different NA datasets and are compiled and published at different points in time;
- compilers may be constrained by national publication schedules, national revision policies and deadlines for transmitting data to Eurostat and other international organisations;
- compilation may be prone to data inconsistency due to the level of integration and automation, and the sophistication of quality controls; and
- staffing for NA compilation is often scarce and this may mean that some compilation tasks are prioritised over others.

Against this background, these guidelines have been prepared to help NA compilers take measures to improve the numerical consistency of the accounts. It contains definitions, explanations, practical recommendations and examples of good practice in the ESA 2010 framework. All recommendations aim to ensure that the output of NA compilation is numerically consistent.

Chapter 2 provides background information on technical discussions on the consistency of accounts in the European statistical system (ESS). Chapter 3 clarifies the definitions of coherence and consistency, and their application in ESA 2010-based national accounts. Chapter 4 outlines how the numerical consistency of national accounts is achieved in practice in the light of users' expectations and compilers' constraints.

The last four chapters make recommendations for achieving consistency in national accounts. Chapter 5 suggests management, coordination and cooperation arrangements. Chapter 6 focuses

3 ESA 2010 manual.

4 SNA 2008 manual.

on the overall organisation of the compilation process at national level and discusses specific aspects, such as steps to take, the automation of tasks, quality controls and data revisions. Chapter 7 provides recommendations for the consistency of certain datasets selected on the basis of a prioritisation exercise with national statistical institutes (NSIs). The focus is on the consistency of NFSAs, NA MAs, government finance statistics (GFS) and financial accounts[5]. Chapter 8 suggests how to communicate effectively on the consistency of the accounts.

Chapter 9 draws conclusions and recommends improvements at national and European levels.

While the focus of the guidelines is on ESA 2010-based national accounts compiled nationally, numerous references are made to the administrative uses of data at EU level. This is particularly the case as regards data used for reporting gross national income-based EU own resource (GNI OR) and excessive deficit procedure (EDP) covered by reinforced quality controls.

It should be noted that consistency and plausibility are separate quality features characterising the output of NA compilation. While consistency contributes to plausibility, it does not ensure it *per se*.

5 The European Central Bank (ECB), Eurostat and the Member States will be working together on a separate document on the coherence of non-financial and financial accounts by institutional sector.

2 Background

The consistency of ESA 2010-based national accounts is ensured through the application of harmonised methodology and appropriate tools and procedures during data compilation.

Member States document the use of concepts and methods in metadata and dedicated inventories on sources and methods for specific parts of the accounts. Eurostat reviews the inventories and publishes them on its website. Methods and sources referred to in the inventories on GNI and EDP are subject to verification in line with the relevant regulations.

Data compilation at country level is organised so as to ensure that high-quality NA data are published nationally and transmitted to Eurostat. Due to the complexity of the NA system, many interdependencies exist between the datasets (see Fig. 2.1), as different accounts include identical variables of the same concepts. Member States organise the compilation process and implement procedures and tools to guarantee data consistency. They also follow harmonised ESS guidelines (e.g. on data validation), the harmonised European revision policy (HERP), reference metadata, etc.

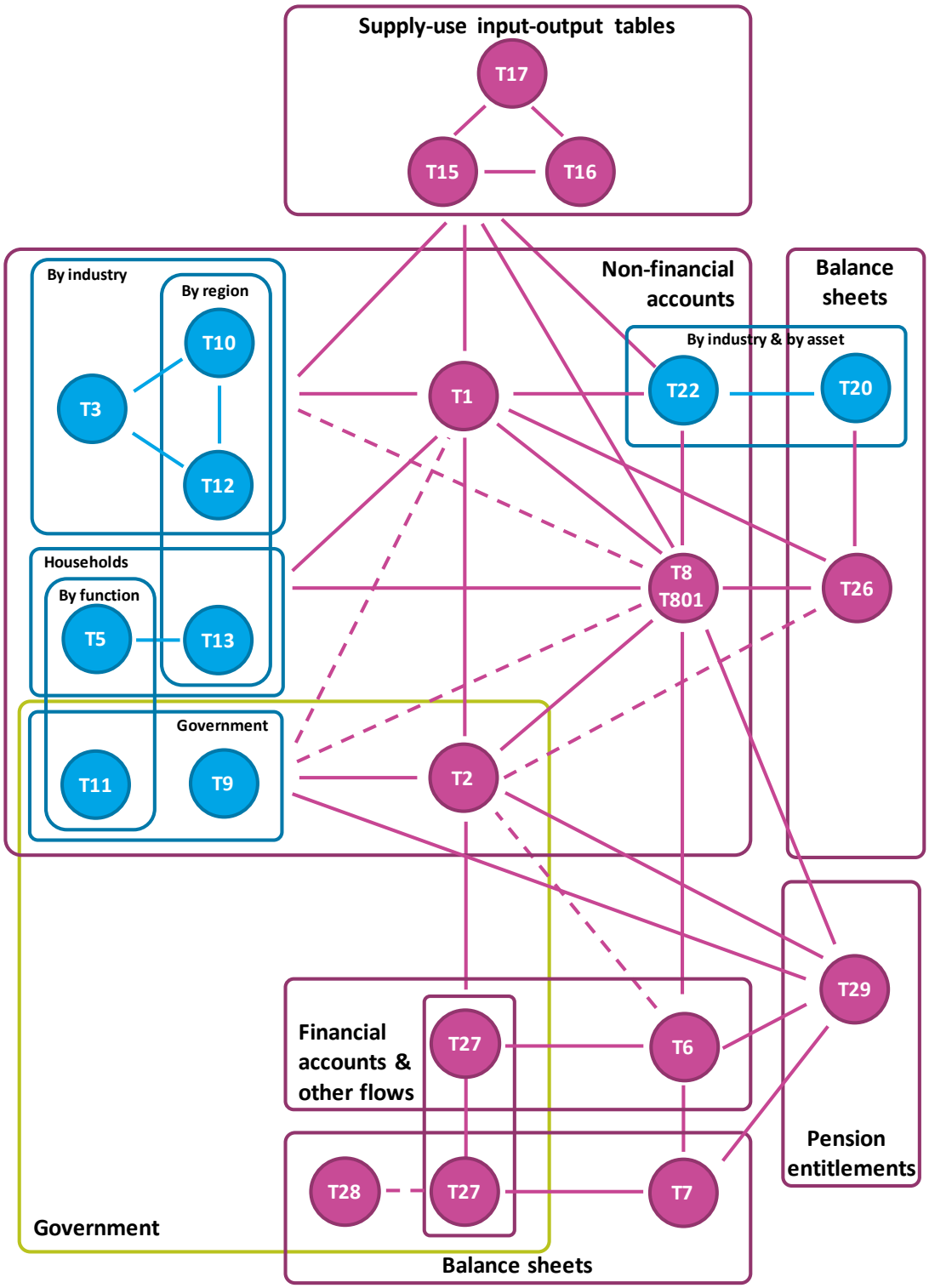
Eurostat monitors the consistency of country data through data validation and quality analysis and assessment. Validation rules target consistency within datasets, between data frequencies and between related datasets. Where discrepancies are observed, Eurostat publishes explanatory information in its metadata. In-depth analyses of data consistency are discussed in various working groups and help to identify cases where more recommendations on the harmonised implementation of ESA 2010 are required. Eurostat also provides information on data consistency in its annual assessment reports on the quality of NA data transmitted by Member States[6]. Where necessary, it sends Member States recommendations for improving the consistency of the accounts.

In practice, when compiling ESA 2010-based national accounts, countries conduct balancing and reconciliation to ensure:

- the internal consistency of each account;
- the consistency of time series of each account over time;
- the alignment of annual and quarterly data for each account;
- the cross-domain consistency of accounts within ESA 2010, e.g. consistency of annual national accounts (ANAs) and supply and use tables (SUTs), consistency of NFSAs with NA and general government MAs, consistency of NFSAs with financial sector accounts;
- consistency between BoP statistics and ‘rest of the world’ (RoW) accounts; and
- consistency between NAs and data for administrative purposes (GNI OR/EDP).

6 https://ec.europa.eu/eurostat/web/esa-2010/esa-2010-implementation-and-data-quality

Figure 2.1: Interdependencies within the ESA 2010 TP[7]



Source: Eurostat

7 This figure reproduces Figure 4.2 in the *Practical guidelines for revising ESA 2010 data* (2019 edition).

In November 2017, Eurostat carried out an analysis of the consistency of selected datasets from the ESA 2010 TP[8]. The aim was to establish whether GDP and net lending / net borrowing were reported consistently in quarterly and annual transmissions of ESA 2010 tables on GDP and its MAs, general government MAs, NFSAs and financial sector accounts. This consistency between identical variables in different datasets was referred to as 'cross-domain consistency'.

The results were more reassuring for the quality of European aggregates than for the national data. Numerical differences between the same variables in national annual and quarterly statistics for 2010-2016 were observed for 12 countries (10 EU Member States and 2 EFTA countries), with the quarterly data more generally affected. The situation appeared to compromise the quality of policy indicators compiled on the basis of inconsistent national data for these countries. Consistency is generally greater between sector accounts and NA MAs than between sector accounts and general government MAs. However, the overall extent of inconsistencies from an EU perspective seemed negligible in relative terms and thus did not constitute a risk for the quality of European aggregates.

To address the situation with national data, the directors of macroeconomic statistics (DMESs) asked Eurostat to collect more information from the countries and carry out a prioritisation exercise on data consistency issues. The top three priority areas that affect cross-domain consistency were:

- EDP requirements;
- ESA 2010 TP transmission deadlines; and
- resources at national level.

Secondary challenges were:

- the availability of data sources;
- revision policies at national and EU levels;
- IT tools, cooperation and coordination; and
- GNI requirements.

The priority ESA 2010 TP tables were T1, T2, T8, T6 and T801. The pairs for which countries reported most challenges in achieving cross-domain consistency were T1 vs T2, T1 vs T8, T2 vs T8, T6 vs T8, T1q vs T801, and T25 vs T801. From an ESA 2010 quality reporting point of view, Member States reported high cross-domain consistency for T1 vs T10 and T1 vs T12, but considered that improvements were needed for all other tables.

The DMESs set up a dedicated task force on ESA 2010 cross-domain consistency in 2018 to propose improvements at national and EU levels by 2020. They asked it to make one set of recommendations for improving consistency under the current legal framework and another set aimed at designing an ESA TP with a better balance between the (EU policy) uses of data, compilers' constraints and cross-domain consistency. The recommendations were to place equal emphasis on intra-table, intra-domain and cross-domain consistency.

As regards compilation practices under the current ESA TP, the task force was to suggest:

- practical measures for organising, coordinating and automating the production process in order to reduce the burden on resources at national level;
- practical improvements to the national and Eurostat validation and revision of data in the priority tables; maintaining consistency between the tables; and
- other improvements (e.g. methodological, communication, cooperation) to enhance cross-domain consistency.

The task force met between October 2018 and October 2019. It collected information on national compilation processes by means of a questionnaire sent to Member States. Several countries

8 For an overview of the ESA 2010 TP tables, see Table 2.1.

presented their national practices. The task force sought to identify good practices at national level. The output of its discussions is presented below.

Work continues on possible data consistency improvements to the ESA 2010 TP. Results are expected in early 2021 and may lead to a proposal for amendments to Regulation (EU) No 549/2013.

Table 2.2: Overview of ESA 2010 TP tables

Table no	Subject
1	MAs — quarterly
1	MAs — annual
2	MAs of general government — annual
3	Tables by industry — annual
5	HFCE by purpose — annual
6	FAs by sector (transactions) — annual
7	Balance sheets for financial assets and liabilities — annual
8	Non-financial accounts by sector — annual
801	Non-financial accounts by sector — quarterly
9	Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification — annual
10	Tables by industry and by region, NUTS level 2 — annual
11	General government expenditure by function — annual
12	Tables by industry and by region, NUTS level 3 — annual
13	Household accounts by region, NUTS level 2 — annual
15	Supply table at basic prices, including transformation into purchasers' prices - annual
16	Use table at purchasers' prices — annual
17	Symmetric input-output (IO) table at basic prices — 5-yearly
20	Cross-classification of fixed assets by industry and by asset — annual
22	Cross-classification of gross fixed capital formation (GFCF) by industry and by asset — annual
26	Balance sheets for non-financial assets — annual
27	FAs of general government — quarterly
28	Government debt (Maastricht debt) for general government — quarterly
29	Accrued-to-date pension entitlements in social insurance — 3-yearly

Source: ESA2010 TP

3 Definitions of consistency and their application in ESA 2010

The DMES task force on cross-domain consistency raised questions regarding definitions of coherence, consistency and vintages, and their practical implementation in ESA 2010. It reviewed relevant definitions in the ESA 2010 Regulation[9], ESS manuals and guidelines[10,11,12,13,14] and the OECD glossary of statistical terms[15].

The following sections aim to clarify the application of the various definitions in national accounts.

3.1. Reference documents

In this section, we review the use of the definitions of 'coherence', 'consistency' and 'vintages' in the ESS common quality framework.

The Statistical Law

Regulation (EC) No 223/2009 on European statistics ('the Statistical Law') is an important step towards improving efficiency and quality in statistical production, by ensuring closer cooperation between all partners in the ESS.

In Article 12 (on statistical quality), it sets out a basis of uniform standards and harmonised methods on which European statistics are to be developed, produced and disseminated. The following quality criteria are to apply:

(f) 'comparability', which refers to the measurement of the impact of differences in applied statistical concepts, measurement tools and procedures where statistics are compared between geographical areas, sectoral domains or over time;

(g) 'coherence', which refers to the adequacy of the data to be reliably combined in different ways and for various uses.

European statistics code of practice

The common quality framework of the ESS is composed of:

- the European statistics code of practice;

9 Regulation (EC) No 223/2009 of the European Parliament and of the Council of 11 March 2009 on European statistics (OJ L 87, 31.3.2009, p. 164).

10 European statistics code of practice for the national statistical authorities and Eurostat (EU statistical authority), 2017.

11 Quality assurance framework of the European statistical system, v. 1.2.

12 ESS handbook for quality and metadata reports, 2020.

13 Commission Recommendation on reference metadata for the European statistical system (2009/498/EC).

14 ESS guidelines on revision policy for PEEIs, 2013.

15 OECD glossary of statistical terms, 2007.

- the ESS quality assurance framework (QAF); and
- the general quality management principles.

The European statistics code of practice is the cornerstone of the framework. It is a self-regulatory instrument based on 16 principles covering the institutional environment, statistical processes and statistical outputs. A set of indicators of best practice and standards for each of the principles provides guidance and reference for reviewing its implementation, increasing transparency in the ESS.

The code of practice includes the following principle and indicators for measuring output quality by the extent to which statistics are coherent and comparable:

> *Principle 14: Coherence and comparability*. European statistics are consistent internally, over time and comparable between regions and countries; it is possible to combine and make joint use of related data from different data sources.

- Indicator 14.1: Statistics are internally coherent and consistent (i.e. arithmetic and accounting identities observed).
- Indicator 14.2: Statistics are comparable over a reasonable period of time.
- Indicator 14.3: Statistics are compiled on the basis of common standards with respect to scope, definitions, units and classifications in the different surveys and data sources.
- Indicator 14.4: Statistics from the different data sources and of different periodicity are compared and reconciled.
- Indicator 14.5: Cross-national comparability of the data is ensured within the ESS through periodical exchanges between the ESS and other statistical systems. Methodological studies are carried out in close cooperation between the Member States and Eurostat.

Indicator 14 is developed further by the self-regulatory QAF, which complements the extensive legal framework of the ESS on the basis of the Statistical Law.

Under the QAF, '[p]rocedures and guidelines to monitor internal coherence are developed and monitoring is carried out in a systematic way. Where appropriate, guidelines should deal with consistency between microdata and aggregated data, between annual, quarterly and monthly data or other periodicity, between national and regional data, between domain statistics and national accounts and within national accounts, and with consistency in terms of relationships between related phenomena'.

3.2. Dimensions of consistency

Analysis of the legal framework on the quality of statistics gives rise to the following observations:

- it is not easy to disentangle the terms 'coherence', 'consistency' and 'comparability'. They are often used interchangeably, although one or other seems to fit better in specific contexts, e.g. 'comparability' is used mainly in relation to the time and space dimension, while 'coherence' is the main term used when studying the relationship between statistical domains;
- the framework refers to various aspects of consistency, including:
    - numerical consistency;
    - consistency of data sources;
    - consistency in concepts, definitions and classifications;
    - consistency over time;

- consistency between annual, quarterly and monthly data or data with other periodicity;
- consistency within national accounts;
- consistency between domain statistics and national accounts;
- consistency between national and regional data;
- consistency across countries (cross-national comparability); and
- consistency in terms of relationships between related phenomena (plausibility of results), etc.

The contextual use of the different terms and the multiple aspects of consistency create a need to differentiate broadly between:

- consistency in methodology:
  - logical consistency, i.e. consistency in concepts, definitions and classifications;
  - consistency of data sources, including between microdata and aggregated data; and
  - consistency of methods used;
- contextual consistency:
  - over time;
  - between annual, quarterly and monthly data or data with other periodicity;
  - within national accounts;
  - between domain statistics and national accounts;
  - between national and regional data; and
  - across countries; and
- consistency of output:
  - numerical consistency; and
  - plausibility of results.

The statistical production process

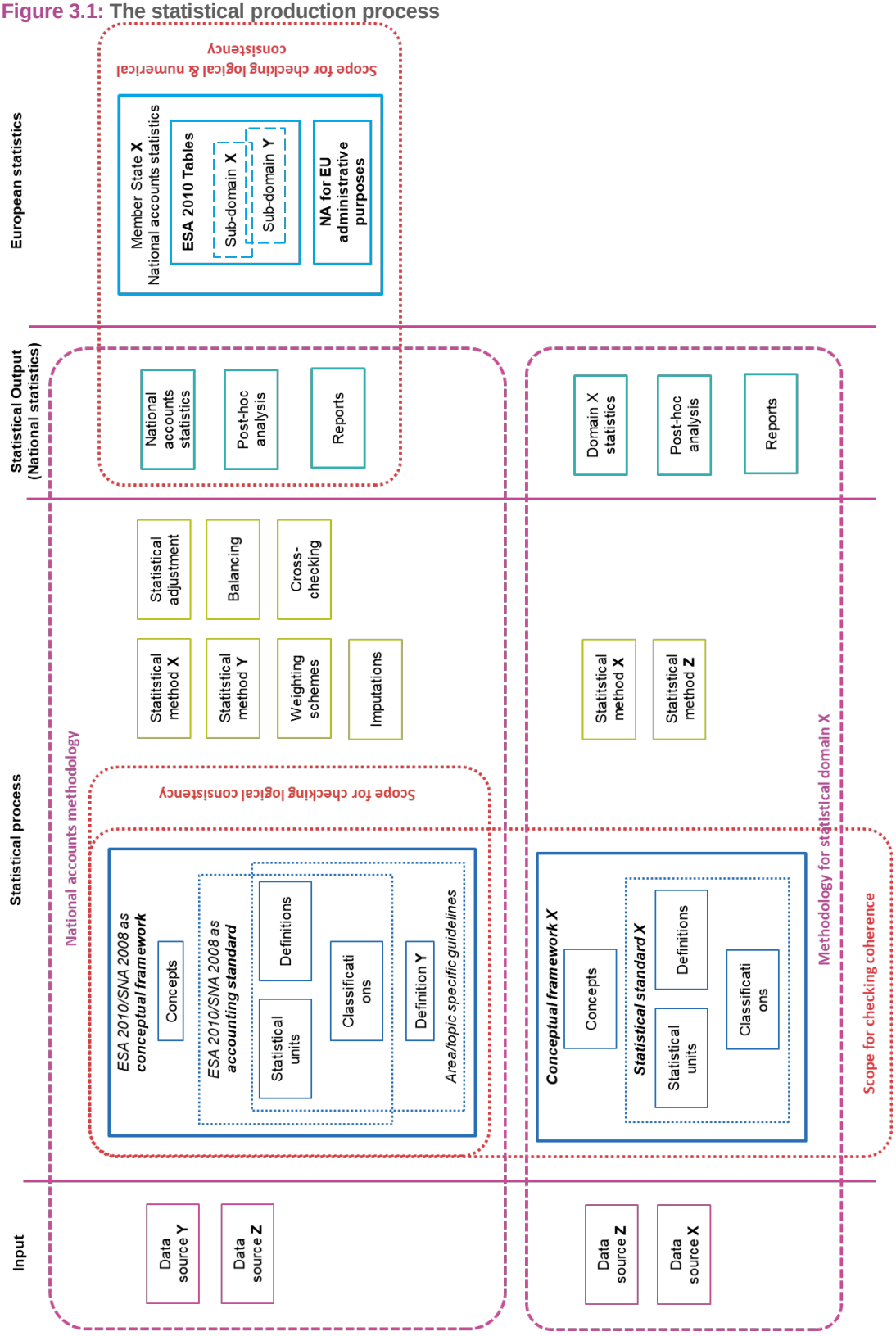
To understand how the consistency of production output depends on the interaction of the factors that define consistency in methodology, we need to describe the production of national accounts (see Figure 3.1).

The aim of any statistical process is to define 'a complete set of interrelated or interacting sub-processes (activities) that transform inputs into outputs / statistical products in the regulated environment (characterised by external or internal regulative) using necessary resources (HR, financial, infrastructure, etc.).'[16]

In the case of national accounts, the regulated environment is provided by the SNA 2008/ESA 2010. The SNA 2008 manual stipulates that the SNA should be seen as both a conceptual framework and an accounting standard: 'In the first place, the SNA is seen as the conceptual framework for ensuring the consistency of the definitions and classifications used in different, but related, fields of statistics. Secondly, the SNA acts as an accounting framework to ensure the numerical consistency of data drawn from different sources, such as industrial inquiries, household surveys, merchandise trade statistics, VAT returns and other administrative sources.'

([16]) ESS Quality Glossary, 2010

Figure 3.1: The statistical production process



Source: Eurostat

The ESA 2010 manual does not give a comprehensive definition of the process of producing NA statistics. Many statistical methods (e.g. temporal disaggregation, seasonal adjustment, imputations, balancing, etc.) are not explicitly defined; their implementation is at the discretion of data compilers.

Therefore, the NA methodology extends beyond the ESA 2010 manual covering 'theory and methods of data collection, processing and analysis'. Consistency in the application of NA methodology requires:

- consistency in (the use of) data sources;
- consistency in (the use of) statistical methods; and
- logical consistency, i.e. consistency in the application of concepts, definitions, classifications and statistical units.

3.3. Consistency in ESA 2010

When studying the consistency of statistics, users will normally check the numerical consistency of the output and look for direct confirmation of plausibility. However, consistency of output depends both on consistency in methodology and the context in which consistency is examined.

In the following sections, we analyse how the consistency of the output (produced statistics) depends on the consistency of the methodology applied in each specific context.

Table 3.1 summarises the pre-requisites in terms of consistency in methodology, for each specific context, in order to achieve consistency of output.

Consistency over time

Users often examine whether statistics produced at different times are consistent, e.g. is a country's GDP for a certain period, as produced in 2005 under ESA 95, consistent with that produced in 2015 under ESA 2010?

A second aspect of consistency over time is whether there is consistency for all reference periods in a time series.

CONSISTENCY IN METHODOLOGY

Logical consistency

When studying consistency over time, logical consistency (i.e. consistency of concepts, definitions, classifications and units) is expected unless there is a change in statistical manuals.

Consistency in data sources

For a stable statistical production system, consistency in data sources over time is expected. Data compilers normally introduce new data sources as part of a major revision, be it on a routine (i.e. benchmark revision) or *ad hoc* basis (e.g. change of statistical manual).

However, even if data sources used to produce statistics at different times are consistent, their values may be different due to data revisions.

When new data sources are introduced, data compilers aim to apply them for the whole time series, in order to avoid having breaks/discontinuities in the time series. If the new sources are not applied in the same way for all reference periods in the same series, the series is essentially a mixture of data compiled at different times. This inevitably results in numerical inconsistency over time.

Table 3.1: Consistency in ESA 2010

Contextual dimensions			Production process (consistency in methodology)			Output		other term used
			logical consistency					
			consistency in concepts, definitions, classifications, units	consistency in data sources	consistency in methods	numerical consistency	plausibility of results	
Time	over time	no change in methodology	expected	expected (but data can be revised)	expected	expected (if data have not been revised)	-	
		change in methodology	not expected	irrelevant	irrelevant	not expected	expected	comparability
Frequency	between annual and quarterly data		expected	not necessarily expected	not necessarily expected	expected (most often through benchmarking)	-	
Statistical domain	within national accounts	a single sub-domain	expected	expected	expected	expected	-	
		different subdomains	expected	expected (though justifiable differences could be observed)	expected	expected	-	
	between domain statistics and national accounts	with methodological compatibility	expected	expected to a certain extent	expected in certain cases	expected	-	
		without methodological compatibility	not expected	not expected	not expected	-	expected	coherence
Space	between national and regional data		expected	not expected	not necessarily expected	expected (through benchmarking)	-	
	across countries		expected	not expected	not expected	-	expected	comparability

Source: Eurostat

Consistency in methods

As with data sources, consistency in statistical methods over time is expected for a stable production system. Data compilers normally apply changes in statistical methods as part of a major revision.

CONSISTENCY OF OUTPUT

Numerical consistency

As part of routine data production, users expect numerical consistency over time for the reference periods that are not subject to revision, i.e. for the whole time series excluding the most recent 3-4 reference years reported.

Numerical consistency over time depends on logical consistency, consistency in data sources and methods, and unrevised data.

Numerical inconsistency over time is also referred to as 'vintage difference' (see section 3.4).

Plausibility of results

In many cases where there is numerical inconsistency over time, users are still interested in verifying the plausibility of results. For example, with the change of the NA standard to SNA 2008/ESA 2010, users were interested in verifying that the observed revisions to GDP were plausible given the list of methodological changes compared to the previous standard.

In such cases, users may still be interested in the 'comparability' of results, i.e. whether results derived at different moments in time can be compared and used to draw meaningful conclusions, even without an assurance of logical consistency and consistency in sources and methods. For example, a user may still wish to compare employee compensation statistics derived at different times under different methodological manuals, on the assumption that any inconsistencies in methodology will not substantially impair the meaningfulness of the comparison.

Consistency between annual vs sub-annual data

Consistency between annual vs sub-annual data is important for users, as it allows them to combine information on the structure of an economy (from annual data) with short-term developments (from quarterly data).

CONSISTENCY IN METHODOLOGY

Logical consistency

Logical consistency in the production of annual vs sub-annual data is expected at all times.

Consistency in data sources

While desirable, consistency in data sources for the production of annual and sub-annual data is often not feasible. In many cases, different data sources are used to compile annual and sub-annual NAs on the basis of the most appropriate available information for each frequency.

Consistency in methods

As a general rule, consistency in methods is expected for the production of annual and sub-annual data. However, there may be acceptable differences due to the data sources used (e.g. different conceptual adjustment methods used due to different data sources) or the specificities of the dataset (e.g. differences in the balancing process to avoid negative numbers for quarterly data).

CONSISTENCY OF OUTPUT

Numerical consistency

Numerical consistency is expected between annual and the sum of sub-annual data. In many cases, this is achieved through benchmarking, where annual data are used as a constraint and sub-annual data are adjusted to match the annual figures, even if there is some inconsistency in the use of data sources and statistical methods.

Consistency within NAs

Consistency within national accounts is examined in detail in the following chapters.

CONSISTENCY IN METHODOLOGY

Logical consistency

Logical consistency within national accounts is expected at all times.

Consistency in data sources

Data sources used for national accounts are expected to be consistent. However, differences may be observed in some cases for those used to compile data for different parts, e.g. financial and non-financial accounts.

Consistency in methods

Statistical methods used for national accounts are expected to be consistent.

CONSISTENCY OF OUTPUT

Numerical consistency

Numerical consistency within national accounts is expected.

Consistency between domain statistics and NAs

Users often compare information from national accounts with information in other statistical datasets, e.g. they may examine whether there is consistency between RoW accounts and BoP, or whether NA information is consistent with relevant information in satellite accounts.

CONSISTENCY IN METHODOLOGY

Logical consistency

Full logical consistency between domain statistics and NAs is expected in the case of BoP statistics. Consistency in certain concepts and definitions can be expected between NAs and other statistical domains.

Consistency in data sources

NAs and other statistical domains may use the same data sources, but full consistency cannot be expected.

Consistency in methods

NAs and other statistical domains may use the same methods, but full consistency cannot be

expected.

CONSISTENCY OF OUTPUT

Numerical consistency

Numerical consistency should be expected in the case of NAs and BoP statistics, but practical compilation specificities may result in numerical differences.

Plausibility of results

Where numerical consistency is not to be expected, users may still examine the plausibility of results from NAs and other statistical domains. In this context, the use of the term 'coherence' may be more appropriate, in the sense that 'different statistics can be combined and their differences be reconciled'.

Consistency between national and regional data

Regional data provide a more detailed breakdown of national data, so users often want to know whether national and regional data are consistent.

CONSISTENCY IN METHODOLOGY

Logical consistency

Logical consistency in the production of national and regional data is expected at all times.

Consistency in data sources

While the same data sources may be used for compiling national and regional data, this is often not the case.

Consistency in methods

As a general rule, consistency in methods is expected for the production of national and regional data. However, in many cases this depends on what data sources are available.

CONSISTENCY OF OUTPUT

Numerical consistency

Numerical consistency of national and regional data is expected. In most cases, this is achieved through benchmarking, where national data are used as a constraint and regional data are adjusted to match the national figures, even if there is some inconsistency in data sources and statistical methods.

Cross-country consistency

Cross-country comparisons are very often conducted in users' analyses.

CONSISTENCY IN METHODOLOGY

Logical consistency

Logical consistency is expected in the production of NA data by different countries. This is achieved through the adoption and implementation of the same standards by all countries, i.e. currently the SNA 2008/ESA 2010 standards.

Consistency in data sources

Consistency in data sources for the production of NA data by different countries is not expected. However, many data sources (e.g. primary statistics) are common across countries.

Consistency in methods

Different countries are expected to use different statistical methods for the production of NA data, as the methods largely depend on the availability of data sources. However, countries share best practices and it is not uncommon for different countries to use the same methods or variations.

CONSISTENCY OF OUTPUT

Numerical consistency

Numerical cross-country consistency is not relevant.

Plausibility of results

Users examine whether the figures provided accurately describe observed differences in the same economic phenomenon in different countries. The term ‘comparability’ is more appropriate in this context.

3.4. Vintage

The ESS guidelines on revision policy for principal European economic indicators (PEEIs) define data vintages as ‘snapshots of a variable's observations containing all information available to data producers at the time of their identification’.

A definition of ‘vintage’ was also given in a document submitted to the OECD/Eurostat task force on performing revisions analysis for sub-annual economic statistics: ‘For a given time series we define vintage as the set of data (sequence of values) that represented the latest estimate for each reference point in the time series at a particular moment in time’.

In line with these definitions, the task force took the view that a vintage is defined by time series and release dates, and relates to a single variable or set of variables. A revision or vintage difference is the difference between two vintages of release data, the same variable or the whole set of data.

Therefore, the use of the term ‘vintage difference’ is mostly appropriate when referring to a single time series or dataset. In this case, the only contextual dimension is *time*.

In some cases, data compilers may abusively refer to vintage differences when examining two different datasets. This often happens where one dataset serves as input to the statistical process that produces the second. In such cases, two different contextual dimensions of consistency are mixed: *consistency over time* and *consistency within national accounts*. Consequently, the observed differences may not be explained by the timing dimension, but may be the result of inconsistencies within national accounts and the corresponding statistical processes that generate the two statistical outputs. It is therefore advisable to use the term ‘vintage difference’ only where the single contextual dimension in which consistency is examined is *time*.

4 Practical approach to numerically consistent national accounts

The previous chapter highlighted how consistency applies to ESA 2010-based national accounts from a theoretical point of view. This chapter examines the practical aspects of the numerical consistency of data. It analyses user expectations and compilers' constraints, suggesting measures to overcome the latter so as to satisfy the former as much as possible.

4.1. User expectations

We know that users require high-quality statistics, but there is no homogeneous 'user group' and individual users may have different expectations and emphasise different aspects of data quality. According to Eurostat's regular user satisfaction surveys, national accounts are well appreciated and ranked among the top-quality statistical domains. The surveys collect feedback on overall data quality, data timeliness, completeness and comparability. It is assumed that users consider the consistency of the accounts as a feature relating to comparability.

More specific feedback on consistency is collected through regular contacts with users and spontaneous user questions. Overall, users want timely data that are stable, accurate, comparable and consistent. When asked what is most important, they point to different quality features of national accounts. For some, consistency is uppermost and they clearly identify datasets where any inconsistency would be a problem. Others are not so concerned, as they understand that data may not be consistent at all points in time.

In general, users recognise that inconsistencies pose a problem for data usage. Analytical work with data is constrained by the need to look for explanatory information and make additional data confrontations. Major inconsistencies can even put a question mark over the credibility of the statistical provider.

International statistical agencies are not typical data users, but they do receive, process, validate and disseminate national data and deserve to be mentioned in this context. When confronting datasets from one or more countries, agencies make observations on data consistency. Some consider only discrepancies within a single dataset to be critical. Others, such as Eurostat, assess more dimensions of discrepancy (intra-table, intra-domain and cross-domain consistency) and implement advanced quality checks.

The difference in the agencies' approaches may be explained by the level of harmonisation in the incoming national data. In the ESS, ESA 2010-based NAs are closely harmonised thanks to:

- common legally binding concepts, definitions and methodology;
- provisions in EU regulations on the consistency of certain datasets;
- the availability of comprehensive guidelines and recommendations;
- the mechanisms for the verification, quality reporting and assessment of transmitted data;
- technical cooperation between national experts and Eurostat in various working groups and task forces; and

- regular feedback from policy users as a result of the prominent use of NA indicators for EU policy purposes.

Therefore, expectations as to the quality of incoming national data are high and numerical consistency, in its various dimensions, is closely monitored in the course of data validation.

4.2. Numerical consistency in ESA 2010 TP

Meeting all consistency requirements in practice is a major task for statistical compilers. On the one hand, in terms of data availability and quality, the ESA 2010 TP is designed to ensure the most appropriate match between what compilers can realistically provide and what users at EU level need. On the other hand, it has embedded trade-offs (see below, Table 4.1).

OVERALL LOGIC OF DATA TRANSMISSIONS

The ESA 2010 TP requires that:

- accounts are compiled gradually and fully available 36 months after the reference year;
- entire datasets (time series) are transmitted at each deadline and when released nationally, and, in most cases, undergo several transmissions and updates; and
- while quarterly data are released each calendar quarter, annual data normally come three times each calendar year (March-April, September and December) – see Table 4.1.

Quarterly data are short-term indicators. They are produced on the basis of very limited source data and provide quite generalised information. At the time of the first release, timeliness is the priority. The transmission pattern repeats each calendar quarter, when data for a new quarter are reported and the data for the previous quarters are revised.

While annual data come with a bigger time lag, the level of detail corresponds to the full NA framework and can also be extended to satellite accounts. The first set of annual data for a reference year mostly includes MAs derived from the quarterly data and limited data sources. The second available set is more detailed and provides a basis for the first estimates for the reference year and, together with other data sources, for revising the estimates for past reference years. With each subsequent transmission, the accuracy and level of detail of the annual data improve, thanks to the availability of data sources. Some datasets (e.g. the NA and general government MAs) are transmitted at least six times before the full set of accounts becomes available 36 months after the reference year.

In summary, as the data sources for the compilation of ESA 2010-based NAs improve over time, the overall quality of data improves along with data availability. In terms of numerical consistency, this suggests that:

- the first releases are more likely to show differences between identical variables in different datasets; and
- where the first releases exhibit inconsistencies, the differences are expected to decrease gradually and reach a minimum upon availability of the full set of accounts.

TRANSMISSION DEADLINES

Data transmission deadlines ensure that Eurostat has access to national data for publication and the compilation of European aggregates. They are set out in the ESA 2010 TP[17] and apply to data tables representing datasets of the accounts.

Some countries' release calendars differ from Eurostat's for national reasons. They usually publish in

17 Flash estimates of national accounts indicators such as GDP and total employment are not part of the ESA 2010 TP. They are not covered here, because the consistency requirements are not relevant to them.

advance and transmit their data to Eurostat no later than the day they are published nationally. The same rule applies for revisions of data previously sent to Eurostat. Some Member States were granted temporary derogations from the ESA 2010 TP until 1 January 2020 that involved extended transmission deadlines.

Even if the data transmission deadlines are met, the logical links between the tables (see Figure 2.1) still give rise to constraints (see Table 4.1).

Impact on quarterly data

Tables representing NA MAs (T1), general government MAs (T25), NFSAs (T801) and FAs of general government (T27) are transmitted for each quarter.

T1 is available 25 days before the other tables. This creates a consistency challenge for data compilers, because T1, T25[18] and T801 contain important identical variables (e.g. GDP, net lending / net borrowing, etc.).

Impact on annual data

Similar cases exist for annual data.

At the beginning of the year following the reference year, the annual tables on NA MAs (T1) are available 1 month before those on general government MAs (T2). This is a consistency challenge, since the tables contain identical variables.

This challenge does not apply to the September data transmissions, which are all covered by the same deadline.

In December, challenges exist for the consistency of data by industry and by region (T10), and NA MAs (T1) reported in September and detailed tables for general government vs T2 and T8, due to the 3-month transmission difference.

The above challenges also apply in the 2nd year following the reference year. In addition, at the beginning of that year, there is inconsistency between the NFSAs (T8) reported in September and the newly reported NA and general government MAs (T1, T2), since T8 is not mandatorily updated/transmitted.

In December, additional challenges exist for the following tables:

- regional household accounts (T13) vs household data reported in T8;
- more detailed RAs (T10 and T12) vs NA MAs (T1); and
- detailed tables by industry and by assets (T20, T22, T26) vs T1, T3 and/or T8.

The above challenges apply in the 3rd year following the reference year. The consistency of the supply, use and input-output tables (SUIOTs) with four related tables is also a challenge.

18 T25 is presented in Table 4.1 because it provides data used for fiscal policy analysis, even though it is not part of the ESA 2010 TP.

Table 4.1: Tables for which consistency is expected, by typical transmission time

Month	Deadline, n+months	Tables for admin. uses of data	Annual tables	Deadline, q+days	Quarterly tables
May				q+60	T1
June				q+85	T25, T801, T27, T28
July					
August				q+60	T1
September				q+85	T25, T801, T27, T28
October					
November				q+60	T1
December				q+85	T25, T801, T27, T28
January	n+1				
February	n+2		T1	q+60	T1
March	n+3	EDP	T2	q+85	T25, T801, T27, T28
April	n+4	EDP verification			
May	n+5			q+60	T1
June	n+6			q+85	T25, T801, T27, T28
July	n+7				
August	n+8			q+60	T1
September	n+9	GNI, EDP	T1, T2, T3, T5, T6, T7, T8, T9	q+85	T25, T801, T27, T28
October	n+10	EDP verification			
November	n+11			q+60	T1
December	n+12		T10, T11	q+85	T25, T801, T27, T28
January	n+13				
February	n+14		T1	q+60	T1
March	n+15	EDP	T2	q+85	T25, T801, T27, T28
April	n+16	EDP verification			
May	n+17			q+60	T1
June	n+18			q+85	T25, T801, T27, T28
July	n+19				
August	n+20			q+60	T1
September	n+21	GNI,EDP	T1, T2, T3, T5, T6, T7, T8, T9	q+85	T25, T801, T27, T28
October	n+22	EDP verification			
November	n+23			q+60	T1
December	n+24		T10, T12, T13, T20, T22, T26, T29, T11	q+85	T25, T801, T27, T28
January	n+25				
February	n+26		T1	q+60	T1
March	n+27	EDP	T2	q+85	T25, T801, T27, T28
April	n+28	EDP verification			
May	n+29			q+60	T1
June	n+30			q+85	T25, T801, T27, T28
July	n+31				
August	n+32			q+60	T1
September	n+33	GNI, EDP	T1, T2, T3, T5, T6, T7, T8, T9	q+85	T25, T801, T27, T28
October	n+34	EDP verification			
November	n+35			q+60	T1
December	n+36		T15, T16, T17, T10, T12, T13	q+85	T25, T801, T27, T28

Legend: n-year ; q - quarter

Recommended by HERP

Recommendations agreed with NAWG

Source: Eurostat

Table 4.2: Transmission, validation and publication of some ESA 2010 data in relation to EDP/GNI OR

	Table	Incoming national data	Validation process	Eurostat publications	
		Deadline		Type	Timeliness*
April production rounds	**ESA 2010-based NAs**				
	T1 A	2 months after reference year		Database	Upon validation
	T25	3 months after reference quarter	Aligned with EDP verification	News release/database	115 days after reference quarter
	T2	3 months after reference year	Aligned with EDP verification	Database	Same as for T25
	T801	85 days after reference quarter for EA members		News release preliminary/database	94 days after reference quarter
		3 months after reference quarter for non-EA members		News release regular/database	120 days after reference quarter
	Data for EU administrative purposes				
	EDP	31 March	EDP verification	News release/database	115 days after reference quarter
October production rounds	**ESA 2010-based NAs**				
	T1 A	9 months after reference year		Database	
	T25	3 months after reference quarter	Aligned with EDP verification	News release/database	115 days after reference quarter
	T2	9 months after reference year	Aligned with EDP verification	Database	The same as for T25
	T801	85 days after reference quarter for EA members		News release preliminary/database	94 days after reference quarter
		3 months after reference quarter for non-EA members		News release regular/database	120 days after reference quarter
	T8	9 months after reference year		Database	Upon validation, between two releases of T801
	Data for EU administrative purposes				
	EDP	31 March	EDP verification	News release/database	115 days after reference quarter
	GNI OR		GNI verification	*Statistics explained*	End November, after agreement with the GNI Expert Group

* Dates of Eurostat publications vary depending on calendar days.

Source: Eurostat

Impact on quarterly vs annual data

A consistency challenge also arises where the quarterly and annual reporting of the same accounts takes place at different times. This is the case with the quarterly NA MAs (transmitted in August) and the respective annual aggregates (transmitted in September). Another example relates to annual non-financial accounts, which have to be transmitted only once a year, while the respective quarterly accounts are updated each quarter.

RELATIONSHIP BETWEEN ESA 2010 DATA TRANSMISSIONS AND ADMINISTRATIVE USES OF DATA AT EU LEVEL

Various policy indicators at EU level are derived from available ESA 2010-based data on national and European aggregates published by Eurostat.

When a transmission programme for NA is designed, it takes account of the timeliness needs of policy indicators at EU level and the ability of national compilers and Eurostat to supply the data. The latter depends on several factors, e.g. availability of data sources, complexity of compilation processes, the time needed to compile, transmit, validate and disseminate the data, quality assurance requirements, etc. Usually, data transmission deadlines represent a compromise between the ideal and what is practically achievable.

Over the decades of NA production in the EU, there have been major advancements in terms of making more and better data available in a timelier fashion. For instance, the ESA 2010 TP made it possible for RAs data to be available 12 months after the reference year, and quarterly NFSAs of euro area Member States 85 days after the reference period. Eurostat publications were brought forward accordingly.

In addition, the ESA 2010 TP is tailored to delivering data on time for the purposes of administrative uses at EU level, e.g. PEEIs, Commission economic forecasts, ECB macroeconomic projections, EDP, GNI OR, the macroeconomic imbalances procedure, etc. While most policy indicators are calculated directly from the ESA 2010 data sent by Member States and published by Eurostat, the legislation has provided for separate data transmissions for EDP and GNI OR purposes. EDP data are inseparable from ESA 2010 GFS and the key indicators on government debt and deficit use GDP as a denominator. GNI OR data are derived from GDP at current prices and the NA MAs. GNI is also reported in the ESA 2010 annual non-financial accounts.

This close link between ESA 2010 and EDP/GNI OR involves intertwining the data compilation processes nationally and synchronising deadlines for ESA 2010 transmissions and EDP/GNI OR reporting. Table 4.2 shows the deadlines that Member States should respect and the typical timing of Eurostat's publications in April and October-November. It shows that, while the deadlines are broadly aligned, some differences in the timing of incoming data make it difficult for countries to achieve numerical consistency of all datasets due for publication/transmission under time pressure. The same is true for Eurostat's publications. This requires cross-domain data analyses to ensure the consistency of published data.

In summary, while the ESA 2010 TP ensures data availability for EU purposes in good time, its design means that numerical inconsistencies are likely to appear between some datasets.

4.3. Numerical consistency as applied by Eurostat

National compilers aim to ensure the numerical consistency of the ESA 2010-based NAs that are released nationally and transmitted to and published by Eurostat. As noted above, there are objective reasons why this is not straightforward. This section explains how Eurostat assesses the data consistency of NAs and when it is achieved across Member States in practice.

WHICH DATA SHOULD BE CONSISTENT?

As a rule, data variables with identical definitions should be numerically consistent in all ESA 2010 tables (i.e. accounts). Figure 2.1 shows the links between the ESA 2010 tables. Table 4.3 shows the same information in relation to how data are treated by NA domains in Eurostat. The links indicate where related ESA 2010 tables share variables with identical definitions.

While Eurostat's data production processes are organised in domains, relevant data are shared before their release between the domains. This is done according to the principles of statistical confidentiality, in order to carry out cross-domain and intra-domain checks. This exchange of data is similar to exchanges at national level when the accounts are compiled and quality-assured.

Data variables with identical definitions can be identified on the basis of ESA 2010 TP data requirements. Since ESA 2010 is a consistent and integrated system of accounts, the list of variables with identical definitions reported in more than one ESA 2010 table is very long. In these guidelines, we present the common principles and issues, and focus in detail on ESA 2010 tables identified as priorities by Member States. Therefore, lists of data variables for which numerical consistency is expected are provided only for T8, T801, T1A, T1Q, T2 and T6 (see chapter 7). National compilers could prepare similar lists for the other ESA 2010 tables by comparing the relevant data requirements.

Table 4.3: Processing of ESA 2010 tables by NA domains in Eurostat

Table no	Subject	Related tables
	NA MAs	
1	MAs — annual	T1Q, T2, T3, T5, T8, T801, T9, T10, T11, T12, T13, T15, T16, T17, T20, T22, T26
1	MAs — quarterly	T1A, T2, T8, T801
3	Tables by industry — annual	T1A, T2, T8, T10, T12
5	HFCE by purpose — annual	T1A, T8, T13
20	Cross-classification of fixed assets by industry and by asset — annual	T1A, T22, T26
22	Cross-classification of GFCF by industry and by asset — annual	T1A, T3, T8, T20, T26
26	Balance sheets for non-financial assets — annual	T1A, T1Q, T2, T8, T801, T20, T22
	GFS	
2	MAs of general government — annual	T1A, T1Q, T3, T6, T7, T8, T801, T9, T11, T25, T26, T27, T28, T29
9	Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification — annual	T1A, T2, T29
11	General government expenditure by function — annual	T2, T6, T7, T28
27	FAs of general government — quarterly	T2, T8, T6, T7
28	Government debt (Maastricht debt) for general government — quarterly	T2, T27
	FAs	
6	FAs by sector (transactions) — annual	T2, T7, T8, T801, T27, T29
7	Balance sheets for financial assets and liabilities — annual	T2, T6, T7, T29
	NFSA	
8	Non-financial accounts by sector — annual	T1A, T1Q, T2, T3, T5, T6, T801, T9, T10, T11, T12, T13, T15, T16, T17, T22, T26, T27, T29
801	Non-financial accounts by sector — quarterly	T1A, T1Q, T2, T5, T8, T9, T10, T13, T22, T26, T29
	RAs	
10	Tables by industry and by region, NUTS level 2 — annual	T1A, T1Q, T3, T8, T12, T15
12	Tables by industry and by region, NUTS level 3 — annual	T1A, T3, T8, T10
13	Household accounts by region, NUTS level 2 — annual	T1A, T1Q, T5, T8, T801
	SUIOTs	
15	Supply table at basic prices, including transformation into purchasers' prices - annual	T1A, T1Q, T8, T10, T12, T16, T17, T22
16	Use table at purchasers' prices — annual	T1A, T3, T8, T15, T17, T20, T22
17	Symmetric IO table at basic prices — 5-yearly	T1A, T8, T15, T16
	PENSIONS IN NAs	
29	Accrued-to-date pension entitlements in social insurance — 3-yearly	T2, T6, T7, T8, T801

Comment: Links to T2 also imply links to the voluntary table T25 ('general government MAs – quarterly').

Source: Eurostat

CONVENTIONS FOR ASSESSING NUMERICAL CONSISTENCY

Eurostat monitors compliance with the ESA 2010 TP data requirements. As regards consistency, it takes account of the particularities of the ESA 2010 transmission deadlines presented in section 4.2. Consequently, the following conventions apply to national data when checked at EU level:

A. All data transmissions

- numerical consistency is assessed in relation to the publication/data transmission time to ensure that appropriate datasets are compared, instead of confronting data vintages released at different times;
- differences between identical variables in different datasets due to rounding are regarded as negligible and do not represent inconsistencies;
- numerical consistency within an ESA 2010 TP data table is obligatory;
- statistical discrepancies between the balancing item of the FA and the balancing item of the capital account are usually observed due to the data sources used19;
- government finance data should be consistent in all transmissions; and
- quarterly NFSAs should be consistent with quarterly GFS, quarterly NA MAs and annual NFSAs20;

B. Transmissions of national data at mandatory deadlines

- numerical consistency of quarterly data is required 85 days after the reference quarter;
- numerical consistency of annual data is required with the September data transmissions. The December data transmissions should be consistent with the annual data transmitted in September; and
- numerical consistency between the quarterly and annual frequencies is required with the September data transmissions. For the NA and general government MAs, it is also required with the February-March transmissions;

C. Transmissions of national data outside the mandatory deadlines

- numerical consistency of quarterly and annual data and between them is required at the time of data transmission.

CONSISTENCY CHECKS

Eurostat checks all incoming datasets for numerical consistency. It does so in the course of data validation, when examining the consistency of key variables in line with the *ESA 2010 handbook on data validation*[21]. The validation rules often apply thresholds that trigger a blocking or warning message to data compilers. In many cases, data are retransmitted to address concerns as to quality, including numerical consistency.

After publication, Eurostat conducts more in-depth consistency analyses, particularly on a cross-country basis. These serve to identify good practices and needs as regards the further harmonisation of compilation methods.

The consistency of national data is also assessed in the annual ESA 2010 quality reporting exercise. Eurostat compiles coherence indicators for internal, inter-frequency and cross-domain consistency and prefills them in the national quality reports. Member States comment on the results, particularly in cases of inconsistency.

19 See paragraphs 1.126 and 20.113 of Annex 1 to Regulation (EU) No 549/2013.

20 See Article 5(3) and (4) of Regulation (EC) No 1161/2005.

21

WHEN IS CONSISTENCY ENSURED?

Table 4.1 shows the periods when national data should be reported consistently. These correspond to the ESA 2010 TP deadlines and are in line with the HERP recommendations on data outside the scope of the HERP.

Users of data published by Eurostat should be aware that, at EU level:

- the highest consistency of annual data across all the accounts is ensured for publications from October to February (corresponding to data transmissions from September to December);
- consistency between quarterly data is ensured for releases in all calendar quarters; and
- consistency between quarterly and annual data is strongest with the October Eurostat publications (corresponding to data transmissions in September).

Differing schedules give rise to some variations in the calendar periods for national publication.

4.4. Measures to overcome consistency challenges

In the DMES task force on ESA 2010 cross-domain consistency, Eurostat and the Member States discussed measures to overcome the consistency challenges in a pragmatic way. It was agreed that:

- compilers of ESA 2010-based NAs should respect all quality criteria applied to European statistics and set out in the Statistical Law, i.e. relevance, accuracy, timeliness, punctuality, accessibility and clarity, comparability and coherence;
- consistency is a dimension of data quality and relates to data coherence. While it is the most distinctive characteristic of the NA framework, it can only be assured in combination with other quality dimensions;
- high-quality NAs depend on the adequacy of:
    - data compilation capacity;
    - the organisation of the data compilation process;
    - quality control of input, intermediate and output data; and
    - a transparent communication strategy;
- some specific compilation techniques (i.e. process mapping, balancing of accounts, consistency controls) promote the numerical consistency of the accounts; and
- the data transmission requirements for ESA 2010-based NAs must be met.

The task force identified measures in the form of recommendations and good practices; these are set out in chapters 5 to 8.

5 Management, coordination and cooperation

This chapter focuses on management, coordination and cooperation aspects of NA compilation that are conducive to consistency.

All NA compilers have their own organisational arrangements, reflecting the particularities of national economies and administrative systems. Under the principle of subsidiarity, NSIs' organisational arrangements are a matter for Member States to decide. However, all NSIs should strive to produce high-quality NAs and create an environment favouring data quality, including consistency. Therefore, some aspects are highlighted here for their impact on data consistency. While the management section focuses on the adequacy of staff, budget and internal procedures, coordination and cooperation aspects are explored in the following sections. The recommendations below concern the quality assurance of NAs in general; they do not comprehensively address other dimensions of quality.

5.1. Management of the statistical process

Experience shows that technical measures alone cannot ensure the consistency of national accounts. Above all, it is the overall management of the statistical process that creates the conditions for a national compilation system delivering high data quality, including consistency.

1: Adequate suitably trained staff with clear responsibilities

The NSI's management should ensure that the NA department has enough well-trained staff with clear responsibilities to deliver the full range of NAs under the ESA 2010 TP in line with ESS quality standards.

Staffing varies greatly among NA departments. This reflects the specific characteristics of national economies and the fact that the departments carry out different tasks. In some countries, the statistical compilation process is focused solely on producing the core accounts, while in others one or more satellite accounts are produced. Also, some departments are more actively involved than others in research or dissemination. There are also cases where NA departments undertake tasks related to other statistics. As a result, and in line with the principle of subsidiarity, it is neither feasible nor appropriate to make recommendations as to the staffing required for producing NAs. Only the NSIs are in position to estimate their needs and ensure the adequacy of staffing in the NA department.

It has been observed that, **where resources are limited**, NSIs prioritise the work and the sensitivity of statistical publications. Consequently, the production of different NA datasets is unevenly resourced. Also, numerical consistency may be 'deprioritised' in favour of data timeliness and completeness. This leads to systemic issues in Eurostat's validation of the transmitted data and a limited ability to make improvements. When NSIs opt not to disseminate nationally the entire accounts (as defined in the ESA 2010 TP and sent to Eurostat for publication), problems persist

because users refer to both national and Eurostat publications. Moreover, the responsibility for the quality of national data remains with the NSI even after Eurostat's validation.

Quality or efficiency gains could be achieved during data compilation by following the recommendations on the national compilation process in chapter 6. These would help reduce the burden on resources rather than staff numbers. The ESA 2010 TP has extensive data requirements and only exempts 'smaller economy' Member States (with GDP less than 1% of the corresponding EU total) from reporting certain compulsory data items for quarterly NFSAs (T801).

It is sometimes assumed that the automation of data production can alleviate staffing restrictions. While it is true that automation relieves the pressure on resources during routine data production, not all tasks can be automated, and establishing robust automated tools and putting them into operation themselves require staff (as well as time and budget). Where the availability of human resources is a reason for systemic consistency issues, the NA department should reassess its staffing requirements and aim to meet them by means of other appropriate measures.

In terms of **staff responsibilities**, it is not sufficient to allocate duties only for the compilation of items, datasets and accounts. It is important to have clear roles for horizontal aspects such as compilation schedules, the release calendar and revision policy. Tasks attributed to statisticians should include exchanging estimates and information, cross-domain checks, revision analysis and horizontal and vertical communication in the event of issues arising. The 'four eyes' principle should be used to reinforce quality control before data are published and transmitted to Eurostat. Post-publication and post-revision analysis tasks could also be assigned where consistency issues are observed. Specific tasks to be allocated to staff members could be based on the consistency measures described in chapters 5-9.

Various forms of training could be useful in creating a compilation culture that is conducive to the consistency of accounts. Besides the formal training courses provided by the European statistical training programme and in-house in the NSI, internal mobility and staff exchanges could be used to improve understanding of interdependencies between sets of accounts. Training sessions on specific subjects are also appropriate, particularly for horizontal aspects of data compilation and to follow up changes in the NA manuals and guidelines.

2: Adequate statistical procedures

The NA department should have well developed, documented and up-to-date procedures.

Statistical procedures should be established and periodically reviewed to ensure high-quality data. Data coherence and comparability are among the quality criteria referred to in the Statistical Law and Regulation (EU) No 549/2013, and there should be internal procedures to ensure the consistency of the accounts. It is important that the procedures include provisions covering all interdependencies of the accounts in the ESA 2010 TP, as shown in Figure 2.1 (corresponding to Figure 4.2 from the practical guidelines for revising ESA 2010 data). These provisions should also determine the action to be taken in the event of inconsistencies.

3: Adequate IT support and budget for IT infrastructure

The NSI management should ensure that the NA department has access to the support of the IT department and an adequate budget for creating and maintaining a modern and efficient data-production infrastructure.

While all NSIs use ICT for data production and exchanges, the degree to which modern ICT techniques and tools are embedded in NA compilation differs across countries. Chapters 6 and 7 suggest how the quality of data compilation could be improved through integration and automation. To implement the recommendations, the NA department should be actively and regularly supported by the NSI's IT department and be given the requisite financial resources.

The NA department should have prompt, permanent access to competent in-house or outsourced **IT support** for its short- and long-term data production and dissemination needs. The NSI management should establish administrative and operational arrangements for this purpose.

For major developments, NSIs could use the Commission's financial support in the form of grants from Eurostat and the structural reforms support programme[22]. This requires contributions from the **national budget**, which are planned in advance. Regular maintenance of ICT tools (though sometimes neglected) is considered essential for robust data production and should be covered in the national budget.

5.2. Coordination within NSIs

National accounts are an integrated and consistent accounting framework. Therefore, the compilation process should be well coordinated within the compiler organisation.

While coordination is an aspect of management, it is dealt with in a separate section because it was recognised as a major challenge for some NSIs. Even if the statistical methods and infrastructure are well established, inconsistencies in the accounts may still occur due to problems with coordination.

4: Communication and coordination within the NA department

Coordination within the NA department should be regular, conducted at each step of the compilation process and stepped up when needs arise. The management should seek feedback from statisticians to identify possible improvements.

NAs are produced on a quarterly or annual basis. The quarterly datasets usually undergo several releases in a short period of time. Moreover, a substantial number of data tables and data cells are produced in the NA framework. This requires compilers to move constantly from one production round to another and means in practice that there is a continuous need for coordination. Therefore, regular communication and coordination at all levels within the NA department is recommended. The management should promote joint meetings, projects and research. To achieve high-quality and consistent NAs, support is needed at the highest level of the organisation.

However, different data production rounds are not alike. As new challenges arise (e.g. relating to availability of sources, transmission requirements, compilation methods, changes in the release calendar), the coordination arrangements may need to be adjusted on the basis of feedback from statisticians who work daily with the data and experience the constraints.

While NA compilation is continuous, the production rounds could be viewed as project management stages:

- in the conception and initiation phase:
    - decisions are taken as to what data to produce;
    - the statistical infrastructure is established;
    - data production and dissemination tools are designed;
    - statistical procedures are developed;
    - the choice of data sources is made; and
    - production roles are assigned to staff.

[22] https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/structural-reform-support-programme-srsp_en

At this stage, it is important to consider the NAs as an integrated and consistent system and put in place common arrangements and tools for all NA domains;

- in the definition and planning phase, when the objectives of the data production round are decided and the timetable is established, it is appropriate to have a common plan and schedule for all NA domains;
- in the launch and execution phase, when the work on data takes place, it is necessary that all national accountants work in cooperation and that there is common monitoring of progress; and
- in the project close phase, when the results of the data production round are reported and analysed, it is important that conclusions are drawn for the NAs as a system.

All of the above is achieved through coordination and communication at each data compilation step.

5: Critical periods for coordination

Coordination workload varies from one data production round to another. The management of the NA department should ensure that coordination starts early:

- when benchmark revisions and planned or non-planned major revisions are implemented;
- each quarter, when quarterly data are compiled and released; and
- in the 1st, 3rd and 4th quarters, when annual data are typically compiled, revised and published.

Coordination action to produce high-quality NAs needs to be adapted to the particularities of different production rounds.

Publication dates at national and EU levels are not evenly spread over the year, since most data (and the more detailed data) tend to be released in the second half of the year. The coordination effort is also more intense in this period as regards data revisions. As recognised in the HERP, the alignment of data of different frequencies, across NA domains and between countries is best achieved with the transmissions in the 3rd quarter. More specifically, data compiled in the 3rd quarter are open for routine revisions of the entire time series. In line with the HERP, Member States tend also to choose the 3rd quarter to carry out their benchmark revisions, which are even more demanding in terms of preparation and result in substantial changes across the accounts. Thus, in the above cases, coordination between the national accountants should start in good time.

The work on **GNI OR/EDP** examines in detail the practical implementation of the ESA 2010 methodology. Therefore, the improvements requested in the action points or during the verification of notifications often have to be implemented not only in the datasets for administrative purposes, but comprehensively and consistently in the accounts in question. This implementation should be coordinated across the NAs. It is important to identify comprehensively the impact of the action points on the NA data in good time and to implement them in coordination.

The action points are known well enough in advance of the actual implementation of changes in the production rounds when revised data are published nationally and transmitted to Eurostat. This normally allows for early coordination across the accounts. The time constraints for coordination are more explicit in the verification periods, if the requested improvements are not thoroughly implemented. In this case, the coordination action should be taken promptly. It should be followed by an analysis of the implementation of the action points and possible identification of lessons learnt and adaptations to the coordination process.

Figure 2.1 in chapter 2 shows the interdependencies of the accounts in the ESA 2010 TP and can serve as a basis for examining which data changes should be coordinated. The practical guidelines for revising ESA 2010 data provide further advice for the above situations. The decision trees in Figures 5.1, 6.1 and 6.2 in the guidelines suggest how to handle benchmark and routine NA

revisions.

6: Essential aspects of data compilation that require coordination

The management of the NA department should take the lead in ensuring that staff develop and maintain, in coordination:

- a comprehensive, documented and published revision policy in line with the HERP;
- an integrated compilation system with coordinated cut-off and release dates; and
- an appropriate IT infrastructure operationalising the integrated system.

Detailed recommendations on the revision policy and practice, integrated system and IT infrastructure are made in chapters 6-7. This section aims to explain why the NA department's management should engage directly with these aspects.

The importance of the **revision policy and practice** for the consistency of the accounts is well recognised. As mentioned above, the HERP and the practical guidelines for revising ESA 2010 data make relevant recommendations. Chapter 9 of the guidelines also contains good practices concerning national revision policies. Alignment of national revision policies to the HERP is already recommended for overall data quality purposes. It should be actively pursued in the context of numerical consistency, as an essential measure to reduce the coordination effort in the event of vintage differences. Similarly, the monitoring and analysis of data revisions could help to avoid such differences as much as possible.

The monitoring and analysis of data revisions is a powerful tool for assessing NA data quality and improving compilation. The task is time-consuming unless an integrated compilation system and dedicated IT tools are in place. As a minimum, each compiler organisation should identify critical NA indicators for which data vintages should be kept and analysed. These indicators should include at least the variables in national quality reports. Since 2019, Eurostat has prefilled the national quality reports with revision indicators, which each Member State is invited to check. Thus, the analysis of revisions at national level should take place at least annually. The results should be followed up with preventive or corrective actions, *inter alia* to minimise inconsistencies in the accounts.

The most appropriate way to produce high-quality NAs is within an **integrated system**. It is understood that building up an integrated system is a lengthy process, partly because the requirements evolve. If such a system is not yet established, arrangements should be put in place to ensure flawless and sufficiently frequent data exchanges between the NA domains according to agreed deadlines. These arrangements should include the availability of a comprehensive compilation schedule for all domains in line with the NA release calendar and the deadlines for transmission to Eurostat. When these arrangements are made, it will be easier to start a project for integrating the compilation system.

As the NAs are a conceptually integrated and consistent system, it is natural to produce them in an integrated way; this should lead to consistent data results, unless external factors (e.g. user needs) create a challenge. While integrated data production is the ultimate objective, it takes many years and substantial resources to achieve it. Meanwhile, some arrangements are necessary to ensure the consistency of accounts.

A comprehensive compilation schedule in which the deadlines for all NA datasets are well coordinated is essential, in addition to the publicly available **release calendar**. The schedule should include:

- the dates on which data sources become available;
- cut-off dates for incorporation of data sources;
- dates for exchanging preliminary estimates;

- dates for the availability of final estimates;
- dates of data release at national level;
- dates of data transmissions to Eurostat; and
- the names of the statisticians responsible.

Statisticians should exchange preliminary estimates (more than one, if necessary) and final estimates. The compilation of independent estimates in the different accounts should be avoided, if only because it duplicates effort and resources are usually scarce. Each statistician engaged in data compilation should have access to common resources with relevant statistical procedures, source data, estimates, and metadata and common tools for data exchange and analysis.

A comprehensive NA compilation schedule should include **cut-off dates** for the incorporation of source data, as follows:

- the cut-off dates should be after the dates on which providers make source data available and sufficiently later to allow for minimum checks of quality of source data;
- the dates should be before the publication and transmission dates in the release calendar and sufficiently early to allow for proper implementation of the compilation procedures and minimum checks before NA dissemination;
- where variables are reported in several NA datasets, there should be a common cut-off date for the incorporation of data sources for these variables; and
- logically, cut-off dates should be well before the national releases and transmission of data to Eurostat.

A common compilation challenge arises when new, improved source data become available after the cut-off dates. These cases are discussed in section 5.4 (cooperation with data providers). As a rule, the preferred approach should be to resolve the quality of source data satisfactorily. As this may be difficult in the short term, some adjustments in the release and revision policies should be considered promptly for the next cycle of data compilation and release.

Given the time constraints for statistical production, appropriate **IT infrastructure** is indispensable to ensure efficiency and data quality, including the consistency of accounts. This should be built up and maintained in coordination to reflect the needs of compilers of all NA datasets.

IT resources and tools help to make statistical production time-efficient and cost-effective. Data structure definitions of different NA datasets are based on the statistical data and metadata eXchange standard (SDMX). Under Commission Implementing Regulation (EU) No 724/2014[23], data exchanges between Member States and Eurostat must be carried out in line with SDMX. Data and metadata production and dissemination tools are also developed according to SDMX. Thus, the use of SDMX provides the basis for the interoperability of NA information. An SDMX-based database should be at the heart of the integrated compilation system.

National data production systems are individual in architecture, hardware and software, but some tools are in common use across the ESS, e.g. for seasonal adjustment. Each compiler organisation takes decisions individually as to how to develop its data production system. If the compilation system is integrated, the IT infrastructure is advanced and integrated, and helps to ensure the consistency of accounts. If integration is not yet achieved, the compilation procedures, source data, estimates and metadata should be available on a shared drive and accessible to all statisticians engaged in data production.

[23] Commission Implementing Regulation (EU) No 724/2014 of 26 June 2014 on the interchange standard for the transmission of data required under Regulation (EU) No 549/2013 of the European Parliament and of the Council on the European system of national and regional accounts in the European Union (OJ L 192, 1.7.2014, p. 38).

7: Coordinated communication with users

- The management of the NA department should ensure that communication with users on data consistency, including responses to user queries, is prepared in coordination.

Coordination is important when the release of inconsistent data is unavoidable or when users submit questions on the consistency of the accounts.

From a user perspective, datasets for the same reference period (even when released on different days) should tell the same story. If there are differences, users look for plausible explanations. The coordination of replies between the NA domains will help to provide substantiated, professional answers. It will also improve awareness of user needs across domains.

The same considerations apply to communication on data transmissions to Eurostat and dealing with questions from Eurostat during data validation.

5.3. Coordination between NSI and Eurostat

NSIs and Eurostat cooperate in partnership within the ESS. National data are sent to Eurostat so that it can compile European aggregates and disseminate data on Member States for cross-country analysis. While the NSIs are primarily responsible for the quality of national data, Eurostat takes responsibility for the data it validates and disseminates.

8: Timely and effective coordination with Eurostat

- The NA department should ensure timely and effective coordination with Eurostat as regards data consistency for the purposes of validating national data, disseminating national metadata and compiling European aggregates.

The quality of Eurostat's dissemination depends on the quality of Member States' data. Therefore, given the tight production schedules, close coordination is needed on data transmission issues.

National data consistency is assessed during data validation against agreed thresholds set out in the *ESA 2010 validation handbook*. As suggested in chapter 8, NA compilers should explain the numerical inconsistencies of NAs in metadata transmitted with the datasets in question.

It is also important to communicate in advance on structural issues leading to inconsistency (e.g. various issues that could affect the quality of national data over a period). On the one hand, this allows Eurostat to identify issues affecting several Member States, for which the guidelines could be further developed. On the other, it gives time to work together on solutions in the interests of data users. In specific cases, Eurostat could also help the NSI to address the issues.

5.4. Cooperation with data providers

The efficient production of high-quality NAs depends significantly on the quality of source data (i.e. primary statistical surveys or administrative data) and smooth cooperation between the NA compiler and the provider of the source data. In some cases, the providers of survey data and the compiler are in the same organisation, so many practices are shared and fewer aspects need to be harmonised and coordinated.

9: Documented, comprehensive and up-to-date arrangements with data providers

The NSI should ensure that cooperation arrangements with source data providers are documented and subject to regular review and updates. The arrangements should include agreed timetables for sufficiently frequent data and metadata exchanges between providers and NA compilers in line with the national compilation schedule and NA release calendar, the ESA 2010 TP deadlines and the use of NA data for national and EU administrative purposes.

The arrangements should include minimum quality requirements for the source data.

Where the NSI is involved in a joint production process with another national administration, the cooperation arrangements should provide for a flawless exchange of confidential or embargo data for the needs of data production and quality control.

- In addition, the process of statistically adjusting source data must be coordinated so as to ensure consistency of compilation.

Internal or external cooperation arrangements should be **documented** and communicated clearly to the statisticians. This will ease communication and clarify deadlines and responsibilities. The arrangements should be reviewed periodically and whenever changes are made to the regulations on NAs and source data.

The cooperation arrangements should include clear provisions on the timeliness and periodicity of **data and metadata exchanges**. If needed, more than one exchange of data should take place to allow sufficient time for the compilation of accounts. In the event of exceptional delays in the source data or of errors, there should be a mechanism to inform the NA compiler promptly and a commitment to cooperate in seeking a solution. Major revisions of source data shortly after the agreed exchange dates or after the NA release dates could have a very negative impact on NA quality and the credibility of the statistics. Therefore, the arrangements should involve coordination before implementing major revisions in the source data.

To ensure efficient NA compilation under time constraints, statisticians should be able to rely on the **quality of source data**. On the one hand, the data should be accompanied by metadata. On the other, they should meet agreed quality requirements. When NA compilers observe quality issues with the source data, they should be able to contact the provider for prompt explanations. Any follow-up work to improve the quality of the source data should be the responsibility of the provider.

Some NA datasets may be produced by two national compiler organisations in a **joint production process**. The cooperation arrangements should involve the flawless exchange of confidential or embargo data for the needs of data production and quality control. They should describe such exchanges in detail and may go as far as to provide for the use of a common IT infrastructure and exchange of staff members.

6 National compilation process

The recommendations in this chapter should be applied and interpreted flexibly. The proposals are not a rigid framework within the national compilation process in which all steps must be followed in a strict order. They identify interdependencies in an integrated production system, possible steps in the production process and the compilation process links within an IT framework.

More specific recommendations are made for the data production process. These suggest controls and checks that can be performed at any stage of the process. They should be considered alongside the quality reporting and assessment under Commission Implementing Regulation (EU) 2016/2304[24]; the quality indicators must be satisfied in a balanced way.

6.1. Integrated production of NAs

10: Integration of all accounts

Implement production as an integrated system. An integrated system should take into account all interaction in the compilation process.

The compilation of accounts in NA domains involves overlapping steps and statistical collections that are used as data sources by multiple data producers. Introducing an integrated framework for compilation where all flows and links are clearly visible and known can alleviate inconsistencies. Task force members have noted repeatedly that ESA 2010 data should be viewed as a system, even though the ESA 2010 TP involves a series of separate tables.

A questionnaire on national compilation practices prepared by the task force asked *inter alia* for a detailed description of compilation processes from data sources to the final estimate. It was found that almost all countries have built up an integrated production process. Some integration processes were similar across countries. For many, the quarterly accounts are constrained by the annual accounts; in a few cases, annual accounts are derived as the sum of the quarters (for provisional years). General government accounts provide information for all other annual and quarterly accounts. Many countries said that the flow of information is driven by the ESA 2010 TP deadlines. Many also underlined the importance of maintaining a database and/or an IT system for the integration of all accounts.

Other processes are unique to the country in question. A few countries follow a compilation process that simultaneously integrates all accounts; internal deadlines are established in line with the compilation process and last-minute changes are incorporated automatically. Some countries specified that the integration of accounts stems from the integrated use of the same sources. Some

[24] Commission Implementing Regulation (EU) 2016/2304 of 19 December 2016 on the modalities, structure, periodicity and assessment indicators of the quality reports on data transmitted pursuant to Regulation (EU) No 549/2013 of the European Parliament and of the Council (OJ L 345, 20.12.2016, p. 27).

delegate the integration of the accounts to a specific team/person.

Below are two examples of integration.

Example: Integration of accounts – Italy

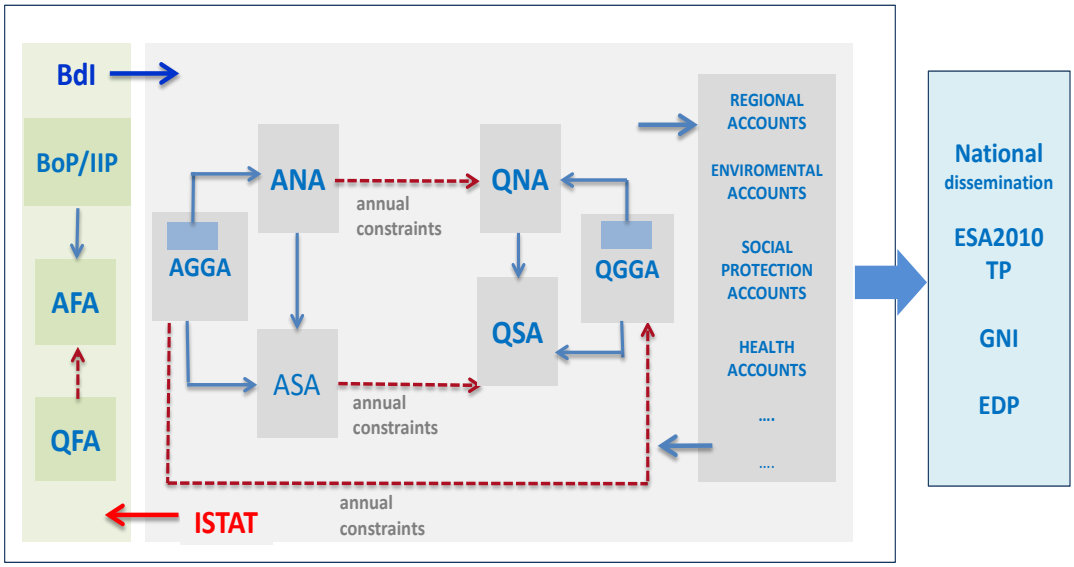
The red lines indicate consistency between annual and quarterly data. Consistency is achieved either by constraining quarterly data to annual data (temporal disaggregation and benchmarking techniques, A->Q) or by constructing annual data as the sum of the quarters (Q->A).

Blue lines starting from the blue area indicate that some items in the domain are used in other domains.

Blue lines starting from the bigger grey area indicate that all items in the domain flow into another domain.

NB: the accounts (items) that flow into (or are used in) other accounts are compiled in advance with respect to their own deadline, if necessary, i.e. if the deadline for the other accounts is earlier (e.g. taxes and subsidies of production compiled in annual general government account (AGGA) / quarterly general government account (GGAA) and used in ANA/QNA). When deadlines are close to each other, the available IT tools allow for simultaneous compilation, continuous updates and re-alignment between domains. Internal calendars and cut-off dates are agreed in advance for effective coordination.

Figure 6.1: NA integration – Italy



ANA: T1, T3, T5, T20, T22, T15, T16, T17
ASA: T8, T26
AGGA: T2, T9 and NTL, T11
AFA: T6, T7
REGIONAL: T10, T12, T13

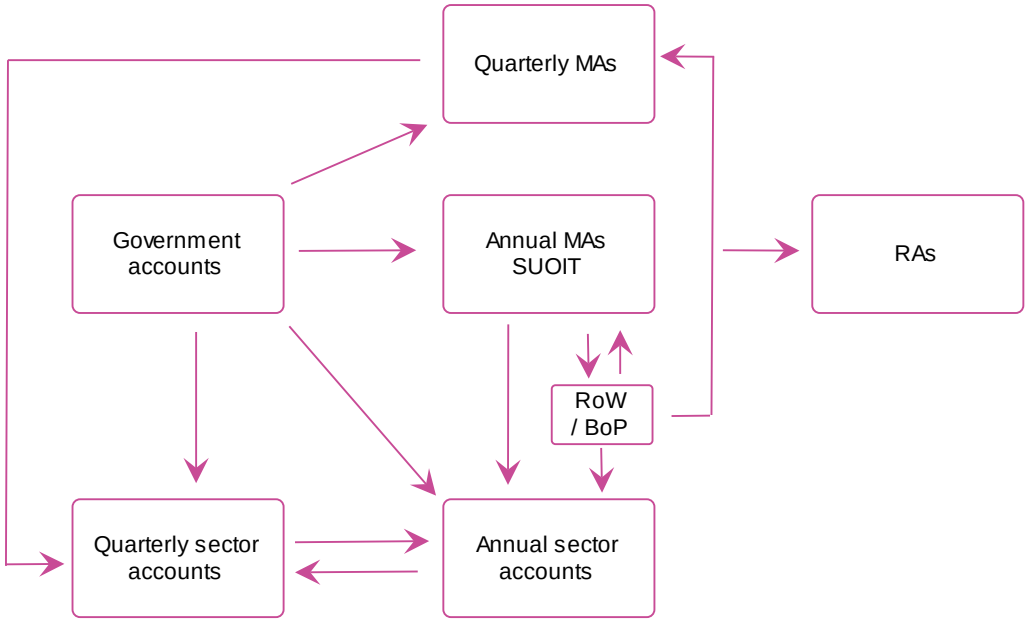
QNA: T1
QSA:T801
QGGA:T25 (ISTAT), T27 and T28 (BdI)

Source: ISTAT

Example: Integration of accounts – Austria

The integration process is based on data flows between domains (see Figure 6.3). The timing of the data flows follows the requirements of the ESA 2010 TP.

Figure 6.2: Integration of accounts – Austria



Source: Statistik Austria

Below are two examples of the planning of NA compilation.

Example: Integral planning – Statistics Netherlands

The annual compilation cycle starts with the integral planning of all activities, encompassing the core NA domains (SUTs, sector accounts and labour accounts, both annual and quarterly), including the government accounts and coordinated with the BoP by the Dutch Central Bank (DCB). The aim of the planning is to provide a clear overview of the milestones in all the domains and how they are linked.

As the integral planning has been extensively discussed and agreed by all parties involved, it also secures a strong commitment to stick to the dates and timing. This is very important, as the output of one domain is often the input for another.

Work on the integral planning normally starts during the summer holidays after Eurostat's release of the coordinated planning of the MAs. It is distributed to all parties involved in the course of September or October.

On the basis of the integral planning, most domains also have their own detailed planning, listing day-to-day activities and sometimes even hourly deadlines.

The work on the integral planning helps to identify bottlenecks and constraints. Deadlines for annual and quarterly data may coincide and put too much of a burden on some statisticians or groups. National holidays may affect tight quarterly processes. The planning highlights such problems, which are discussed and resolved as far as possible. Of course, this is not always possible, but bottlenecks at least become clear and can be taken into account.

Integral planning was introduced about 10 years ago. It works well for Statistics Netherlands and provides an important basis for ensuring cross-domain consistency. Such broad consistency is important for our national publication and transmissions to Eurostat and, of course, for all our data users.

Source: CBS

Example: Planning of NA compilation – Statistics Finland

The planning of NA compilation in Statistics Finland can be seen as a series of steps. The first step is common to all domains; the others are domain-specific. This example concerns ANAs.

Publishing timetable (according to NA revision policy)

- prepared each autumn for the next year;
- this gives the timing for all domains;
- it gives rise to different vintages and revisions between them;
- last possible dates are determined by ESA 2010 TP;

Coordination group meeting

- planning by compilation leader, balancing team and team leaders;
- timetable for compilation round;
- sequence of some data important (e.g. GFCF – CFC);
- timetable is established for transactions;
- tasks by named teams/persons (who are responsible for transactions and sectors);
-

Compilation

- teams plan their own part of the compilation according to the compilation round timetable;

Balancing

- planned and timed to happen in two stages: current price and volumes;
- balancing group analyses compilation results with all teams within the planned timetable;
- data should be ready by a given date;

Dissemination

- planning of national publishing with communication and information services department if there is a special need (media conference, etc.); otherwise the timetable is standard.

Source: Tilastokeskus

11: Process mapping

Each statistical process should have the following documentation:

- a written or graphical process description;
- an overview of the systems used;
- an overview of the links between systems;
- an overview of the data producers involved; and
- an overview of the data users.

All participants in the production process need a full overview. As a first step, the process should be mapped with regard to how it is organised within the NSI. Each level of the map should set out clearly the sequence of information needed and how it is used in the estimation process. As a second step, all inter-connections in the process should be highlighted.

Maintaining documentation with a full description of each statistical process provides insights not only into the structure of the process, but also that of constituent processes and how they are linked, and raises awareness of possible risks of inconsistency between them. Risks are then evaluated and compilers are informed and can take measures to minimise them. Revisions or changes to output can be swiftly communicated to all those affected, if everyone is aware who could be impacted. This is especially important for statistical offices with large numbers of staff involved in production.

Every change in the data that has an impact on other connected aggregates must be brought to the attention of all those involved. Process mapping can facilitate this. Data producers are encouraged to evaluate together any possible risks. It is important to share details on emerging datasets, highlight points of interest and share cross-cutting impacts. In this way, everyone is informed of potential risks and can take measures to minimise them.

Example: Process mapping of data – Czechia

The process of estimation is shown below (the data are available at any time, even after publication):

- data from business accounting of the statistical units are taken from statistical questionnaires and administrative sources to compile structural business statistics (SBS);
- the SBS data broken down by business accounting items, NACE code, institutional sector and sub-sector, and size category of the units are transformed according to NA items;
- missing data that are not surveyed or not available directly in administrative data sources are estimated on the basis of available data using extrapolation and models; these data are broken down by institutional sub-sector and NACE code;
- conceptual adjustments resolving inconsistencies between NA concepts and business accounting rules are broken down by institutional sub-sector and NACE code;
- non-observed economy adjustments are estimated and broken down by institutional sub-sector and NACE code; and
- balancing adjustments from the SUTs are broken down by NACE code and allocated to the institutional sectors and sub-sectors on the basis of time series analysis. The balancing adjustments concerning distributive transactions are allocated to the institutional sectors and sub-sectors.

Source: CZSO

Example: Documenting process descriptions from the GNI inventory – Netherlands

Each statistical process has a quality document; as of 2014, this consists of:

- a front page with an action plan to be signed by the process owner and department manager;
- a written and a graphical process description;
- an overview of the information systems used in the process;
- a documentation overview, with titles and links;
- agreements with data users and data suppliers; and
- a completed self-assessment questionnaire.

The quality document is updated regularly: annually for the 18 key statistics and every 3 years for all other statistics. The updates are centrally planned and monitored.

Quality assurance will guarantee the quality of statistical processes and, ultimately, data quality. A special unit in Statistics Netherlands is responsible for coordinating the introduction of all quality assurance systems, including the Regulation for the security of information of central government (VIR). The maintenance and updating of process documentation is the responsibility of the subject-matter departments.

Source: CBS

Documentation that clearly defines data producers' and users' responsibilities supports effective and fast communication between all involved in the production process. There is cooperation at every stage of production, including between compilers across teams, where the output of one becomes the input for another. Therefore, awareness of compilers' tasks and responsibilities facilitates efficient production and communication between compilers in an integrated production system.

6.2. Input data, intermediate and final results

12: Accessibility of input data

Input data that are common to more than one data producer should be accessible by all.

It should be possible to link to input data at each intermediate phase of the production process, so that data producers at the end of the process do not need to wait for the final data from intermediate producers before starting their own process.

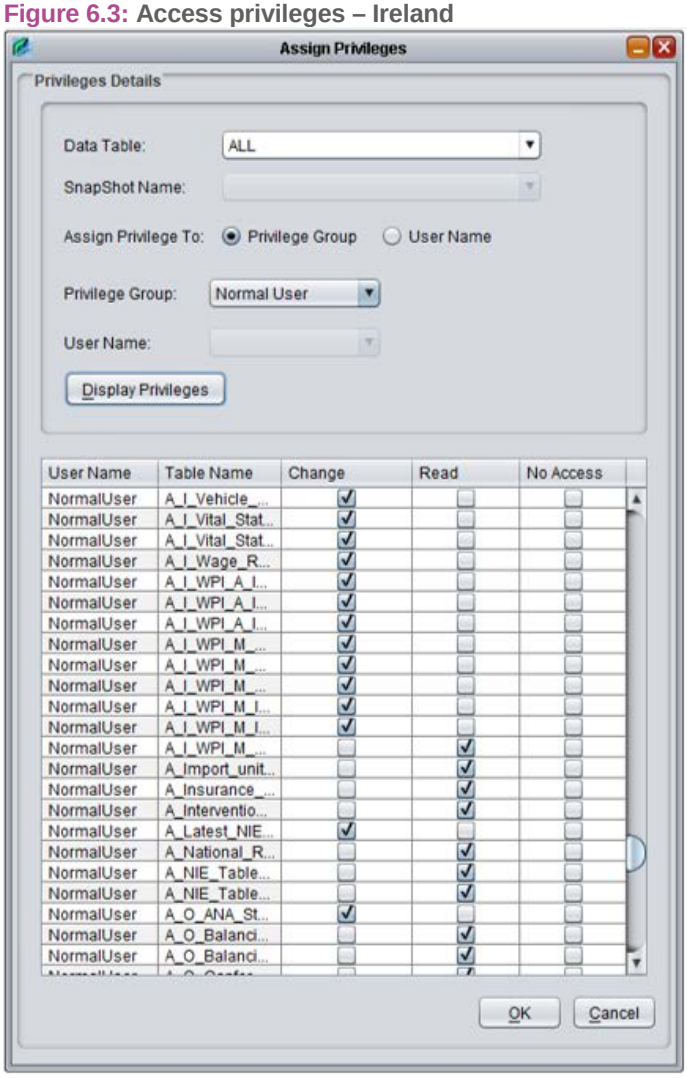
Example: Accessibility of input data – Ireland

The IT system has a functionality whereby it is possible to control access privileges to all data in the database. We define four privilege groups:

- read-only user – read access to all tables; this is the default for staff who do not need to run processes in the system;
- normal user – change access to input tables / read access to intermediate and final tables; this is required by data entry staff;
- super user – change access to all tables; for staff who run processes; and
- administrator – change access to all tables, plus ability to create and modify database tables; this is used by members of the IT development team.

The default access levels make all data visible for all NA staff. For certain sensitive data, more rigorous restrictions can be put in place (e.g. granting read-only access to named users), but in these cases the aggregated summary data are available to all staff.

Figure 6.3: Access privileges – Ireland



Source: CSO

Example: Accessibility of input data – Czechia

Input data from business surveys, household surveys or administrative records are processed centrally, with a few exceptions. A specialised unit outside the NA department collects and processes data, and passes them on to internal and external users. The unit is also responsible for grossing-up methods and preparing quality reports on input data. Each data source has its own schedule based on the main users' requirements. Consequently, input data used in different fields of statistics (e.g. SBS and NAs) may vary, as different versions are used.

NA compilers' feedback to data processors leads to improvements in the quality of input data. At different periods, each user may use different versions (preliminary, semi-final, final) of the same data source for the same indicators. Data sources that are not centrally processed are not usually subject to revision, e.g. household budget survey.

As a result, users can work independently and use input data that fit their needs. Data processors appreciate feedback from NA compilers, as it leads to better data and superior statistics. Nevertheless, it is demanding to ensure links and consistency between different data sources at any point in time.

Source: CZSO

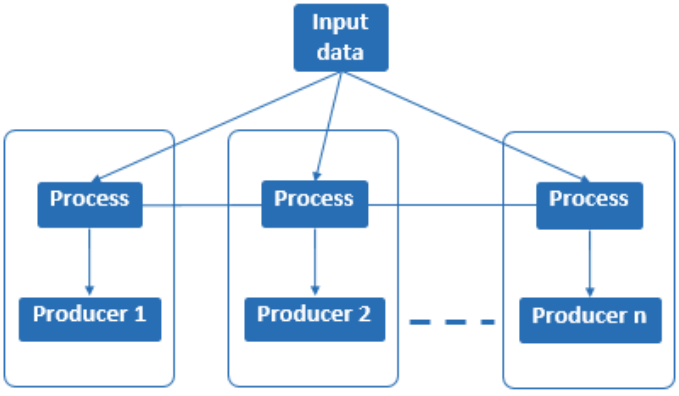
13: Processing of input data

Input data processing should be organised so that it is all done at the base. Processed input data should be accessible by and common to all producers, and should not have to be handled individually by each producer.

If input data require processing that is common to more than one data producer, it is more efficient to make the processed data accessible by all rather than each data producer processing the input data.

Example: Input data processed by each producer

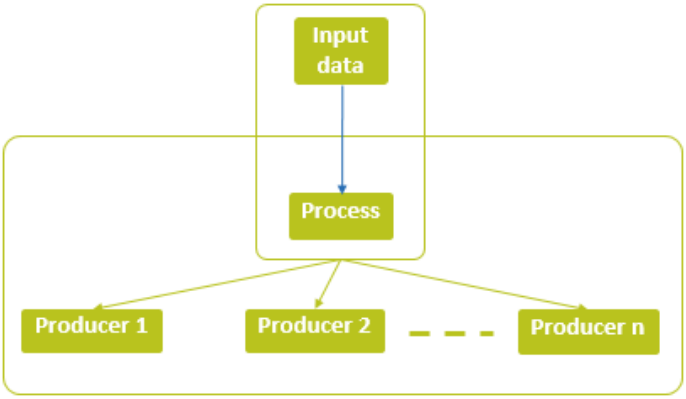
Figure 6.4: Input data processed by each producer



Source: Eurostat

Example: Input data processing at the base

Figure 6.5: Input data processing at the base



Source: Eurostat

14: Reconciliation of sources

Where possible, an integrated multiple-source approach is encouraged as the most appropriate method for reconciling various data sources.

NAs are based on a multi-source approach. Consequently, different combinations of sources, or choosing one source over another, will lead to inconsistent outputs. This is not necessarily an indication of poor data quality – neither output is incorrect or correct. Rather, different outputs provide different points of view and it is only by combining all sources that we can ensure a complete output that delivers higher-quality estimates. An integrated multiple-source approach makes it possible to reconcile different points of view without necessarily favouring one or more data source over another/others.

Examples, as they are specific to flows and tables, are provided in chapter 7.

15: Quality control on input data

Input data should be subject to quality controls.

The first quality control is on the input data. As a first step, plausibility checks should be performed on the input data to determine their quality, so that problems can be anticipated and resolved at an early stage of the production process.

Some quality controls can be suggested by national accountants and implemented by input data producers. Internal data providers (within the NSI) have to supply data that satisfies the minimum level of quality. It is important to cooperate with data providers (in other parts of the NSI, outside the NSI and within the NA department) and agree on basic checks that they can perform. Data inputs can thus be used directly when they arrive.

Example: Quality control on input data – Czechia

The Czech statistical office's producers of input data to be fed into the NA system carry out a number of quality controls:

- for each data source, total aggregated data (S1 level) broken down by NACE code are taken over to the source data table (full sequence of accounts) and totals, mainly of items that affect GDP, are compared with relevant items from the same data source from the previous year. The year-on-year indices are examined with the year-on-year changes of relevant data sources for the QNAs. Any significant differences are discussed with the data providers;
- once the totals are approved, the data sources are taken over to the system of source data tables. There is a source data table for each institutional sub-sector and, if relevant, also each size group of units (specified in advance). The source data are then filled in, with new year-on-year changes of group totals (institutional sub-sectors, size groups of units, etc.). In the event of significant changes, year-on-year changes by activity are analysed in order to find the main source of change. Where items are significant in comparison to gross value added (GVA), the year-on-year changes by activity are also analysed where the total year-on-year changes are under the specified threshold, which differs according to data source and the significance of the industry in relation to the total;
- vertical discrepancies between non-financial and financial accounts are analysed on the level of each data source by activity and institutional sub-sector. If the discrepancies are significant, the correctness of the data taken over is checked to establish whether all items from the data source are classified properly and captured in the relevant NA items. The aim is to minimise vertical discrepancy before the source data are taken over into the NA system; and
- after carrying out the above checks for each data source representing many statistical units, the development of some ratio indicators according to activity is analysed. The analysis focuses on:
    - year-on-year changes in GVA per worker;
    - year-on-year changes in average monthly wages by industry; and
    - stability or only slight changes in ratio between intermediate consumption and output (P.2/P.1) by activity.

Source: CZSO

16: Consistency checks

Consistency and plausibility checks should be made at each step of the process. Such checks should apply to all tables with logical and numerical interdependencies.

Compilers should perform numerical consistency and plausibility checks on flows between tables where interdependencies are identified. NAs form a consistent framework and series transmitted via different tables are in principle expected to be consistent, at least at specific points in time. Differences due to vintages should be limited and explicable.

Numerical consistency can be verified easily by the extent to which flows are reconcilable. Other forms of consistency should be verified through plausibility tests. Consistency checks should therefore include:

- plausibility checks on the economic meaning of final results, but also on interconnections between flows and on the impact of changes;

- plausibility checks on the impact of changes (changes in the input data or at any stage of the production process should lead to changes where expected and on the expected scale);
- numerical checks to verify identities; and
- accounting checks.

A clear hierarchy of sources/compilation should be established, so that changes can be made rapidly in the event of implausibility or numerical inconsistency.

Examples are provided in chapter 7 on specific flows (Table 8 in the ESA 2010 TP).

17: Checks on data changes in the production process

A warning system should apply to data changes, so that compilers can anticipate and verify *ex post* the expected qualitative and quantitative effects on the production process in the event of changes to input data for this specific process.

Compilers must be aware of:

- any data change;
- the size and direction of the change; and
- whether it comes from revisions, new information or corrections.

The earlier compilers are aware of a change, the more efficiently they can react and estimate the qualitative and quantitative effect it might have on their output. Therefore, it is recommended that a warning system be implemented, in addition to the minimum cooperation and communication expected between data compilers.

The following example from Sweden shows checks performed over the entire production process, from input data to final output.

Example: Interaction between input data, intermediate and final output and quality controls on IO data – Sweden

In the NA production process at Statistics Sweden, it is possible to link to input data at each intermediate phase. Quality controls are carried out at different stages, e.g. on input data, intermediate data, final output and finally before data dissemination and reporting.

Input data are received either from other units at Statistics Sweden or from other organisations and authorities. All data deliveries are agreed in advance and covered by a formal agreement.

Agreement

The NA economic statistics coordination unit is responsible each year for preparing and coordinating data deliveries. Agreements are concluded with all data producers and updated every year, if necessary. The data producers receive regular feedback, either under the agreements or through other formal channels. A data delivery may contain information for several products (e.g. non-financial and financial accounts) and may be accessed by several production teams in the course of the production process.

Production process

Different teams are responsible for processing the input data and for quality control and validation, depending on the process. At this stage, quality control includes detecting missing information and identifying outliers *vis-à-vis* the previous period. If necessary, the data producers are contacted for further explanations or a new data delivery.

Further quality controls are carried out when the balancing team has access to the intermediate output, e.g. at this stage, the IO table is used as a balancing tool.

The final output is used by the NA editing team, which is responsible for the preparation of the press release, the analytical texts and coordination with the communication department (responsible for actual dissemination). The reporting team completes the final output validation, i.e. checks through the shared validation services for structural validation (STRUVAL) and content validation (CONVAL).

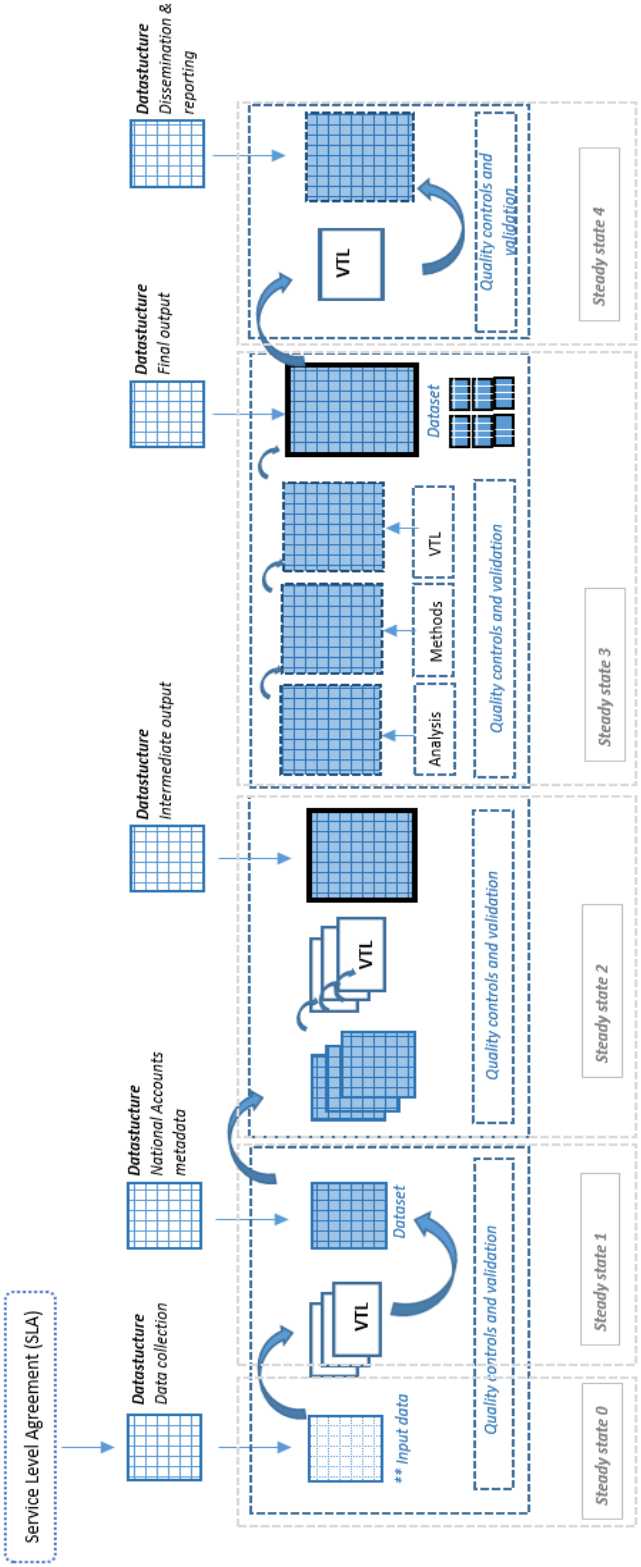
An employee may be part of several teams; this facilitates communication between teams and skills development.

Development of a new IT system

Statistics Sweden is developing a new IT system for the NA. The production process and the quality controls will be similar to those described above, but there will be changes to the actual IT tools. In the new system, the production system is divided into several ‘steady states’ and there is complete transparency from input to output. The input data are uploaded to the system and validated automatically. The production team’s focus shifts from uploading and validating the input data to more detailed analysis and further quality controls on the intermediate and final output data.

There will be no fixed delimitations between the different stages of the production process. Validation and quality controls may be easily accessed from all ‘steady states’ in order to get early warnings on the input, intermediate and final output data.

Figure 6.6: NA flow in new IT system – Sweden



Source: SCB

18: Balancing of final results

Where possible, balancing is encouraged for reconciling different estimation methods.

Balancing makes it possible to reconcile different points of view, without necessarily favouring one estimate over another/others. Balancing in a complex system can cause different outputs from its internal structure with different values per product, which may not be proportional to each other. If there are high discrepancies between different estimates it is recommended to investigate on the nature of the discrepancy rather than to change an estimate in the attempt to remove the imbalance. If the result from balancing causes a different structure with respect to the starting structure, the results must also be reported on the detailed data, maintaining consistency with all the tables that include the aggregates.

Following are examples of balancing in supply and demand (across tables) as well as balancing intra-domain.

Example: Balancing – Czechia

GDP balancing procedure

GDP is compiled on the basis of production, expenditure and income. It is compiled using the production and expenditure methods separately. The difference is then resolved by balancing the SUTs. GDP is compiled by income after the SUTs have been balanced or after the inclusion of balancing adjustments in GVA.

The compilation of SUTs is a very complex process that has to take account of many linkages and factors. The main goal is to ensure a balance of resources and uses of commodity flows in the economy and in relation to non-residents (imports and exports). The balancing of the SUTs is the final phase in the estimation of GDP. SUTs have been compiled since 2004 as an integral part of the process of estimating GDP. Currently, they are available in time series since 1990. They are compiled in a preliminary version at the level of 88 product groups (CPA 2); other versions are compiled on a larger scale (about 200 product groups). Many products are subdivided for deflation purposes (e.g. service processing, merchanting, agricultural self-supply, imputed rental, etc.). The preliminary version is compiled in MS Excel and consists of a series of linked files. Other versions are prepared using the SNA-NT software developed by the Norwegian Statistical Office. This is a database solution that (unlike the MS Excel system) allows for work with the larger dimension tables. However, the principles are the same for both approaches.

The preliminary version of the NAs is compiled on the basis of incomplete data from annual statistical surveys. For the semi-final and subsequent versions, data from annual statistical surveys are used. The preliminary and semi-final SUTs are balanced independently while the differences between versions are analysed. Balancing adjustments are taken over from previous versions in the revision of NAs due to changes in the classification of units to institutional sectors. In this version of the NAs, there are no changes in data sources, only minor changes resulting from different coverage of market and non-market producers' output.

Input data for balancing are taken over from sector accounts (figures without balancing adjustment). They are estimated as the sum of the data from statistical/administrative data sources, extrapolation models, conceptual adjustments and adjustments to exhaustiveness. Balancing adjustments are subsequently included in the sector accounts, thus ensuring consistency between the final estimates of macro aggregates in sector accounts and in the SUTs.

The balancing process consists of several phases and lasts approximately 3 months. First, the framework figures are established in relation to the institutional sector accounts. The overall

balancing difference between resources and the use side is usually up to 2% of GDP. The balancing difference is then removed by balancing each product group. Balancing adjustments are based on analysis. The development of indicators in time series is analysed; comparisons are carried out with other available statistics (quarterly estimates of GDP, indices of industrial production and construction output, sales indices in individual industries, employment data, etc.). Data are then verified after conversion into constant prices by industry and commodity, and any discrepancies are corrected (see below). Attention is focused mainly on the development of GVA at constant prices, which is a key indicator of real economic development in each industry.

Any unusual developments in the volume indices give rise to consultations with colleagues from business statistics. In most cases, the results are explained by irregular events, such as scheduled or unexpected shutdowns of major factories, or the introduction or abolition of taxes or subsidies. Exceptionally, they are caused by an error in collected or grossed-up data.

Compilation of SUTs and balancing phases

The process of compiling and balancing SUTs consists of six phases:

1. preparation of data for macro aggregates;
2. balancing of SUTs at purchasers' prices;
3. compilation of valuation sets (layers) and calculation of use tables at basic prices;
4. analysis of time series and ratios;
5. transformation of SUTs into previous year's prices; and
6. adjustment of data at current prices based on analysis of developments of volume and other indicators.

Input data for each macro aggregate in the product/industry breakdown are prepared in the first phase, i.e. for:

- output;
- imports;
- net taxes on products (taxes minus subsidies);
- trade margins;
- transport margins;
- intermediate consumption;
- HFCE;
- final consumption expenditure of government;
- final consumption expenditure of non-profit institutions serving households (NPISHs);
- GFCF and net acquisition of valuables;
- changes in inventories; and
- exports.

The overall balancing difference and balancing differences in individual commodities are identified after SUTs have been compiled and then the balancing process starts. During this process, the values of macro aggregates are adjusted in order to remove balancing differences in individual commodities. Balancing differences within a given commodity are allocated to one or more macro aggregates. Intermediate consumption or changes in inventories are usually considered to be less reliable indicators. In some cases, adjustments are allocated to output (typically in service industries, where data are less reliable due to a larger proportion of sample surveys) or transfers are made between products within exports or imports. Balancing adjustments are based on analysis of time series and comparison with other available statistics or information. There is further analysis of

indicators such as the ratio of intermediate consumption to output and value added per worker (including developments in constant prices). Significant differences from the average values in the respective time series aggregates or ratios are analysed in order to identify potential errors in the source data. If there are no errors in the source data and there is no explanation for the deviation, the data are adjusted. There is no general procedure for such corrections; usually the data are adjusted to match the trend of related indicators (e.g. if the trend for output differs from that for intermediate consumption, the latter is usually adjusted to the former, which may be confronted with an alternative indicator).

During SUT balancing, items balanced by definition (e.g. other non-market output, financial intermediation services indirectly measured (FISIMs), imputed rent, agricultural self-supply, capitalised R&D, etc.) are not changed.

SUT balancing is carried out by a team of selected individuals from the IO tables unit, each of whom is responsible for certain product groups and industries. The team is led by the head of unit, who supervises the balancing process and resolves any disputes. Balancing adjustments and the reasoning for larger balancing adjustments are recorded in balancing protocols. Such protocols are available for standard versions of the ANAs, but are not used in the event of major revisions. There are no predetermined limits for balancing SUTs, but the adjustments are independently analysed by the staff compiling sector accounts.

Manual and automatic balancing methods are used. Intermediate consumption is also adjusted by the RAS method, whereby the intermediate consumption matrix can be changed in an iterative procedure to reflect new row and column sums. Adjustments to other macro aggregates are all performed manually.

SUTs are compiled simultaneously in all valuation sets (layers), i.e. value added tax (VAT), trading margins, transport margins, taxes on products (excluding VAT), subsidies on products, and basic prices. Primarily tables are compiled at purchasers' prices and converted to basic prices by subtracting all valuation sets.

Changes in inventories are regarded as the least reliable indicators. Balancing adjustments can be found in almost all categories of products that can be stored. However, it is only a change of commodity structure, since the commodity structure of material is not surveyed annually.

In the balancing process, total import and export amounts are not changed. Analysis of output/exports and domestic use/imports may lead to a reclassification of goods re-exports and imports/exports. There are minor changes in the commodity structure, since details about products are not available in the transition from a cross-border approach to foreign trade to a national approach.

In the longer term, balancing adjustments are made to GVA in industries where there is a higher proportion of grossed-up data, such as construction, trade and real estate. However, such adjustments do not consistently increase or decrease GVA in particular industries. In the case of HFCE, there are systematic increases in expenditure on personal care (CPA 96) and educational services (CPA 85), which are caused by an underestimation of input data from the household budget survey. As regards GFCF, there is an increase of investment in transport equipment. Changes in inventories do not lead to a consistent pattern of balancing adjustments in any product groups.

Balancing of distributional transactions

Distributional transactions are balanced mostly after the balancing of GDP in the supply and use framework. The items of distributional transactions are balanced on the level of sub-items according to the relevant ESA 2010 classification.

Each distributional transaction item is balanced using 'who to whom' tables, which are very useful in that they show subjects' roles *vis-à-vis* each item. This way of balancing distributional transactions can help to detect obvious errors in the data, because each item has typical payers and typical recipients among the institutional sectors.

In the case of the Czech NAs, D.43 and D.443 have to be the very last distributional items to be

balanced, because they are influenced by many other items.

Once all the productive items are finalised and all distributional transaction items are balanced, the sum of non-financial B.9 for S.1 and S.2 is equal to zero. It is then possible to start balancing financial assets.

Balancing of FAs

CZSO uses 'who to whom' tables to compile and balance the annual FAs. A set of separate balancing 'who to whom' tables is created for each item. Financial transactions are calculated using the following formula:

	closing stock
minus	opening stock (closing stock of the previous year)
minus	revaluation
minus	other changes in volume (K.61, K.62 and K.5 are distinguished)

A separate balancing table is compiled for each item using the above formula. 'Who to whom' tables are compiled using the top-down method. As a first step, the totals from the data sources are taken from sectoral tables for all sub-sectors. The 'who to whom' tables are then filled with additional information on counterparts for each sector, where available. This additional information is taken from the Czech National Bank (financial institutions surveyed by the CNB), the Ministry of Finance (the government sector), the IIP/BoP (non-residents) and the annual statistical survey (non-financial institutions and other financial institutions). For S.13, CZSO's totals from the government statistics are kept unchanged, as are the S.12 figures from the banking statistics (quarterly FAs).

Data on counterparts from the statistical survey of non-financial corporations are not grossed up, so they do not cover the whole population. This means that the non-financial corporations sector serves as a residual sector in many cases.

Transactions under 'trade credits and advances' (F.81) and 'other accounts receivable/payable excluding trade credits and advances' (F.89) are used to balance net lending/borrowing between non-financial and FAs.

Source: CZSO

Example: GDP balancing procedure – Germany

GDP is calculated in Germany according to the production approach and the expenditure approach. The calculations are performed largely independently and then combined in a macroeconomic balancing process. The results from the income approach are used to validate GDP, e.g. by calculating specific macroeconomic indicators.

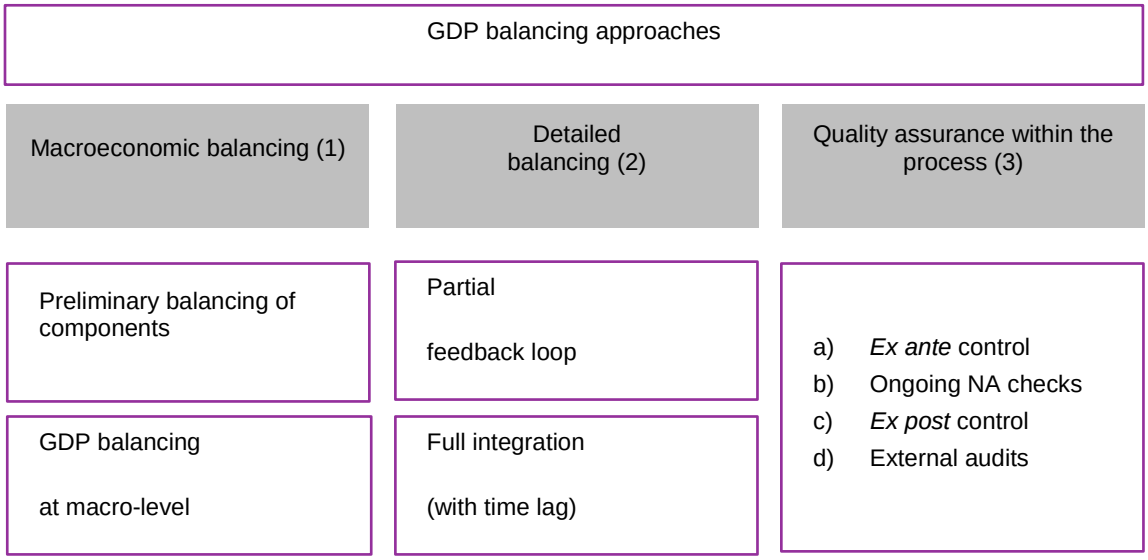
The balancing and validation of GDP calculations can be subdivided into three major blocks:

1. macroeconomic balancing;
2. detailed balancing; and
3. quality assurance during the process.

The **macroeconomic balancing** procedure serves to verify the results of the largely independent production and expenditure approaches to calculate GDP and to combine them in a macroeconomic system. This procedure is performed separately in each calculation of GDP, from the first provisional quarterly GDP calculations to the regular, more in-depth annual calculations. In these calculation cycles, the statistical data become ever denser and the quality of the NA figures progressively improves.

The calculation process includes partial reconciliation of components before the actual macroeconomic balancing. Aggregates that are particularly closely related in statistical terms are checked for coherence prior to GDP balancing, e.g. GFCF on buildings and structures is reconciled with the output of the construction industry; source data for retail trade used to calculate HFCE are compared with those for retail trade used to calculate the output of the retail trade industry in the production approach.

Figure 6.7: GDP balancing approaches – Germany



Macroeconomic GDP balancing is a systematic, multi-stage, iterative procedure, where a number of NA experts interact to establish an optimised result with respect to a whole range of indicators. Thus, it is not an automatic process or a predetermined sequence of mathematical steps. The balancing process can be broken down into the following steps:

1. starting point: the results of the calculations in the production and expenditure approach (annual and quarterly results, at current prices and with adjusted prices);
2. identification and checking of deviations;
3. analysis of results over several years (time series);
4. comparison of 'new' and 'old' results (from the previous computation);
5. comparison of provisional and final results (from previous years);
6. first feedback loop / verification of 'weak' and less reliable aggregates;
7. plausibility check on changes in inventories (after the first balancing round);
8. plausibility check on implicit deflators (after the first balancing round, for GDP, aggregates of expenditure and from the production approach);
9. feedback loop with (provisional) seasonally and calendar-adjusted results;
10. feedback loop with results of income approach (e.g. operating surplus, labour share in national income, saving ratio);
11. analysis of other macroeconomic indicators (productivity, unit labour costs);
12. feedback loop with results of sector accounts (in particular coherence);
13. analysis of balancing differences in the time series;
14. breakdown of balancing differences (published values), primarily by arithmetical methods

(with subsequent plausibility checks, particularly of the time series);

15. comparison with results from other external institutions; and
16. discussion and feedback from external NA experts (or, particularly in the case of seasonally and calendar-adjusted results, experts from the *Deutsche Bundesbank*).

Detailed balancing is a further approach, which involves integrating GDP and the IO calculation. Based on the SUTs, reconciliation is carried out at a detailed level of product supplies (domestic production and imports) and product use (final demand and intermediate consumption). If the detailed balancing reveals that the requisite corrections in specific groups of products or industries cannot be made within the sums of data by columns and rows (the results of the previous macro-balancing), the latter may be changed in another round of the macro-balancing procedure. Currently, there is a time lag for this integration of around 3 to 4 years. Full integration without a time lag is not possible, because of the data situation and the complex calculations involved in IO compilations.

In addition to these two balancing approaches to GDP, there is a whole range of further measures designed to provide accompanying quality assurance for the calculations; these are outlined in detail in *Domestic product and national income in accordance with ESA 2010 - methods and sources - Fachserie 18 Series S. 30 - Edition 2016*[25].

Source: DESTATIS

19: Automated quality controls

The production process should remain systematic, with well-defined steps. Where possible, automate procedures within all the steps, from input data to intermediate and final results.

The automation of the estimation procedures is important, as is the prompt availability of aligned and up-to-date intermediate and final outputs. Without continuous automatic alignment of estimates, the process would be too time-consuming and subject to error.

In many instances, controls are implemented when a new output is created or when the process is revised as a result of an evaluation. The aim should be to make the output process (and the checks made at every step) an ongoing routine activity, so that inconsistencies can be corrected as they arise and not necessarily in relation to the final output, in which case the process may have to be restarted from the beginning. If possible, automate such consistency checks, so that the entire process can produce the final output instantly given any last-minute changes at whatever stage of the production process. A procedure for automatic balancing at the final stage of the process can be put in place in order to allocate minor discrepancies.

Controls on final outputs should also be automated as much as possible.

Example: Eurostat validation

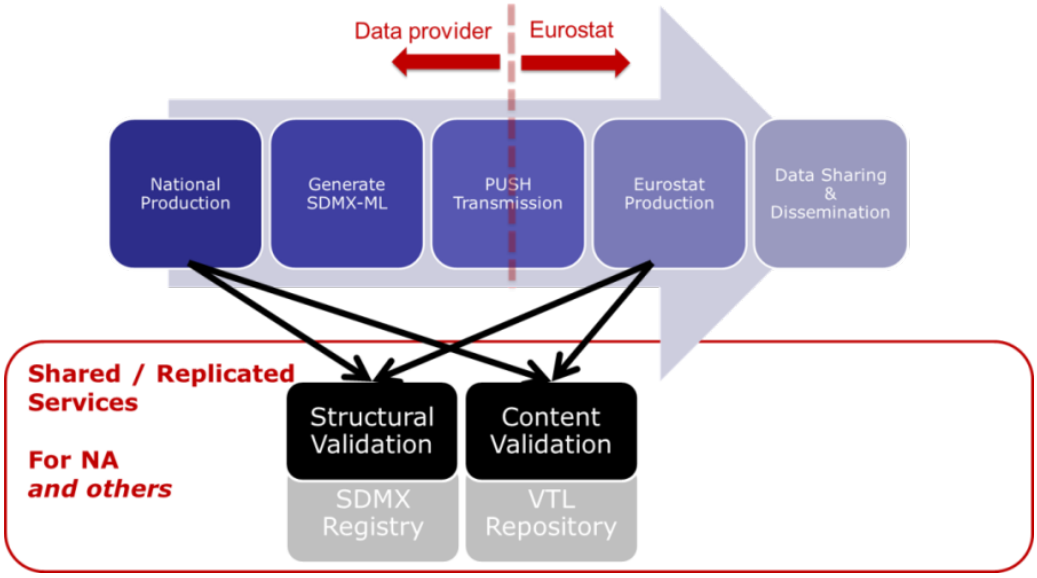
Eurostat has implemented automatic validation processes gradually for ESA 2010 data transmissions. It has deployed shared validation services for structural validation (STRUVAL) and content validation (CONVAL), which are offered through a flexible architecture to allow connection from Eurostat and from national production systems (see Figure 6.9).

25 https://www.destatis.de/EN/Themes/Economy/National-Accounts-Domestic-Product/Publications/Downloads-National-Accounts-Domestic-Product/gross-domestic-product-6489030169004.pdf?__blob=publicationFile

The pre-validation workflow is designed on the basis of rule-sets by type and level of complexity. Each rule-set (and separate rules within the rule-sets) can have different severity level (*Error, Warning, Info*). The pre-validation services runs for each rule-set, which corresponds to the boxes shown in Figure 6.10. A validation report is generated for each rule-set and it can contain different outcome, ranging from information messages about potential issues (*Info*) to blocking issues (*Error*), which stops the processing of entire dataset. The entire dataset often has to be rejected to preserve the consistency of the overall set of data, which is an essential property of NAs.

Figure 6.8 represents production flows. Eurostat has also set up special EDAMIS pre-validation flows (V-flows) [26] where NSIs can check their datasets before sending them to Eurostat, to simulate production. Files sent via V-flows for testing purposes are not transmitted to the production domain, nor counted as an official data transmission. This is a helpful tool for countries to check their data for inconsistencies before sending to production.

Figure 6.8: Validation services architecture



STRUVAL assists the Member States and Eurostat in the structural validation of transmitted datasets. The structures and dictionaries are defined in a dataset definition (DSD) matrix stored in the Euro SDMX registry. STRUVAL performs structural validation on the basis of structural information following the SDMX information model for a given data flow. It ensures that a data file respects the structure and coding in the DSD and the constraints for the data flow in question.

The structural validations under STRUVAL include:

- verifying that the SDMX-ML message (the dataset) is a well-formed XML document;
- verifying that the structural elements in the SDMX-ML message (header, dataset, groups, series, observations, etc.) are correctly ordered and nested;
- detecting misplaced, undefined and missing dimensions and attributes at the dataset, group, series and observation levels;
- detecting invalid data format and invalid values for time-period concepts;
- detecting invalid codes based on the pre-defined code lists and the dataflow constraints;
- detecting duplicated observations.

CONVAL assists the Member States and Eurostat in the process content validation of a file

26 V-flows is the special dataflow set in EDAMIS, where countries can transmit their data for testing purposes. More information on EDAMIS V-flows is provide in the *ESA 2010 validation handbook* chapter 3.2.3 connect to process

containing a statistical dataset. The content validations under CONVAL include:

- basic logical checks;
- basic content checks;
- general plausibility and consistency within the file;
- advanced plausibility and consistency across files;
- cross-domain or source checks.

Content validation rule-sets for pre-validation workflow are deployed in a phased approach and in order of complexity.

STRUVAL, as well as first ruleset of CONVAL - basic logical checks - are already available in production for all NA sub-domains. The focus is now on deploying basic content validation checks and general plausibility and consistency checks for all the sub-domains. The preparation and implementation of the rule-set for advanced plausibility and consistency checks of the same series across tables, for assuring consistency, is planned for 2020-2021 and depends on ongoing implementation of a real-time revision database.

Full description and status on the implementation of the automatic pre-validation services can be found in the *ESA 2010 validation handbook.*

Figure 6.9: Groups of validation checks by type and level of complexity

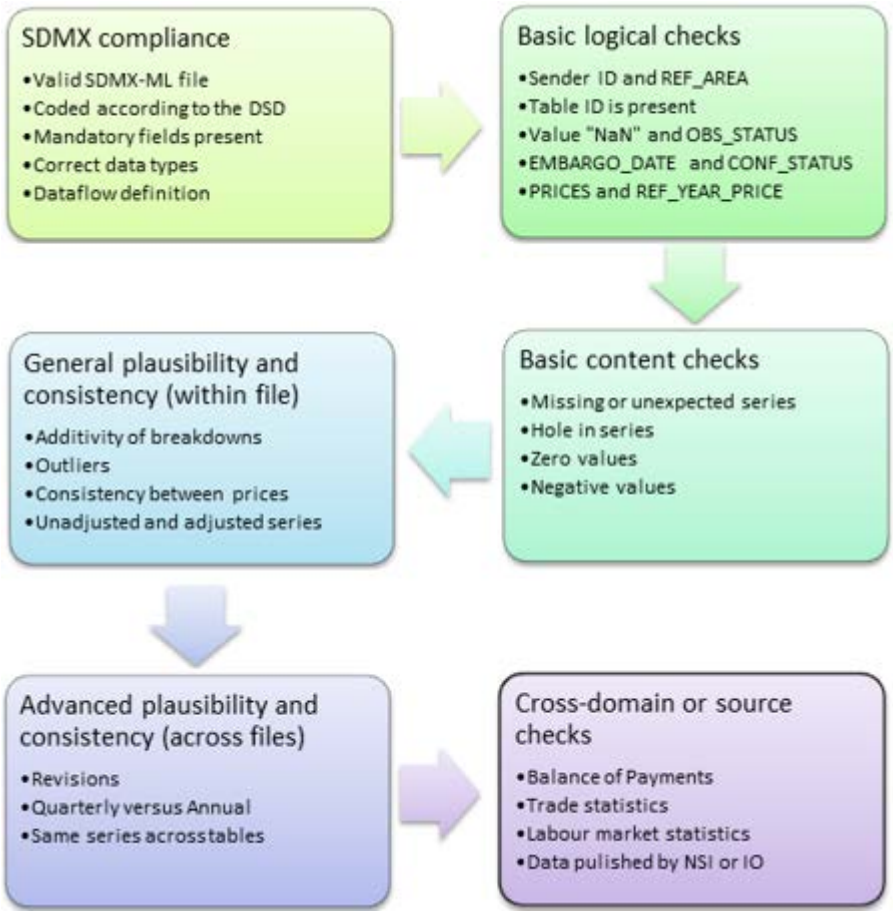
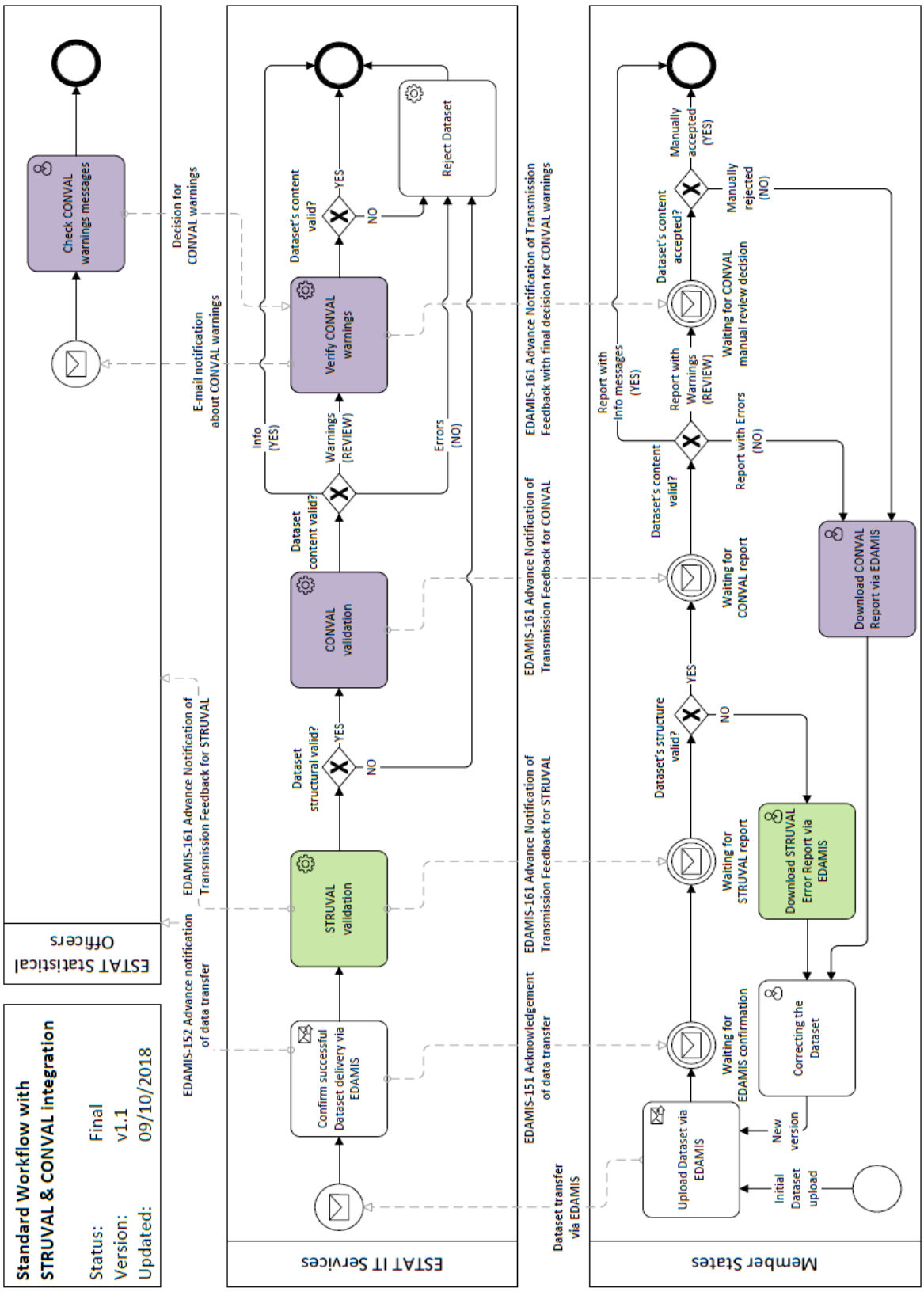


Figure 6.10: Pre-validation workflow – Eurostat



Source: Eurostat

6.3. IT system

20: IT framework

The IT framework should facilitate interconnection between domains and prompt updates (automation) of any revisions.

Standardising dimensions (file structures), file names and file paths can facilitate the interconnection of processes during data production and so improve the efficiency of the process.

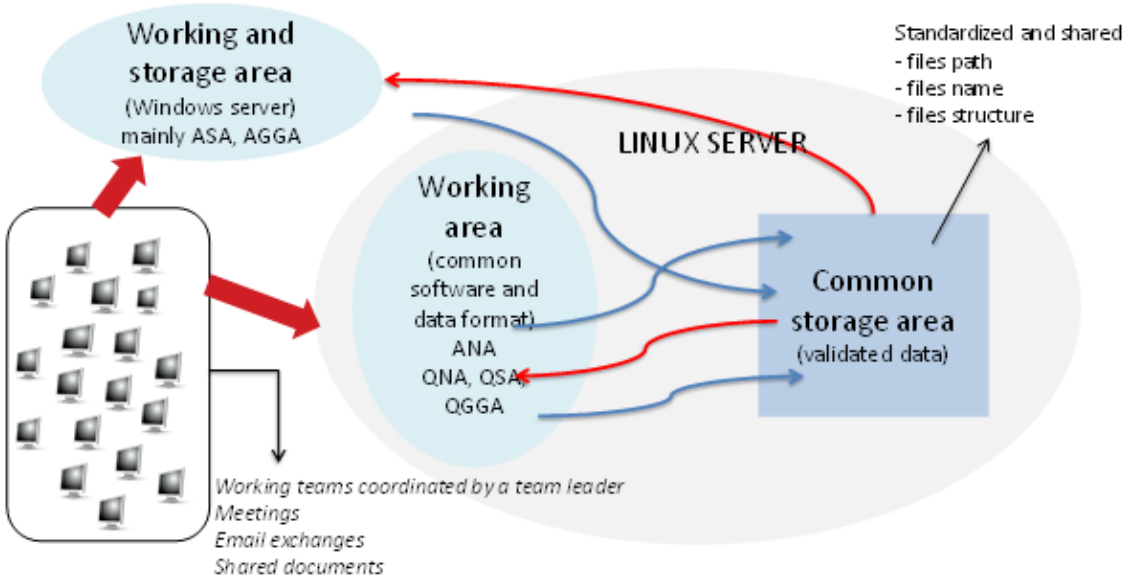
Determine how IT solutions are linked with inconsistencies.

The IT framework is part of the overall organisational context. Data have to be organised so that they can be elaborated efficiently and quickly. The exchange of information is crucial and must be instant. The IT system must be organised so as to enhance interconnection. Countries that presented the organisation of their compilation procedure and are successful in achieving cross-domain consistency have outlined how the interconnection of their IT system facilitates data-sharing and supports consistency.

Example: IT framework of data production and dissemination – Italy

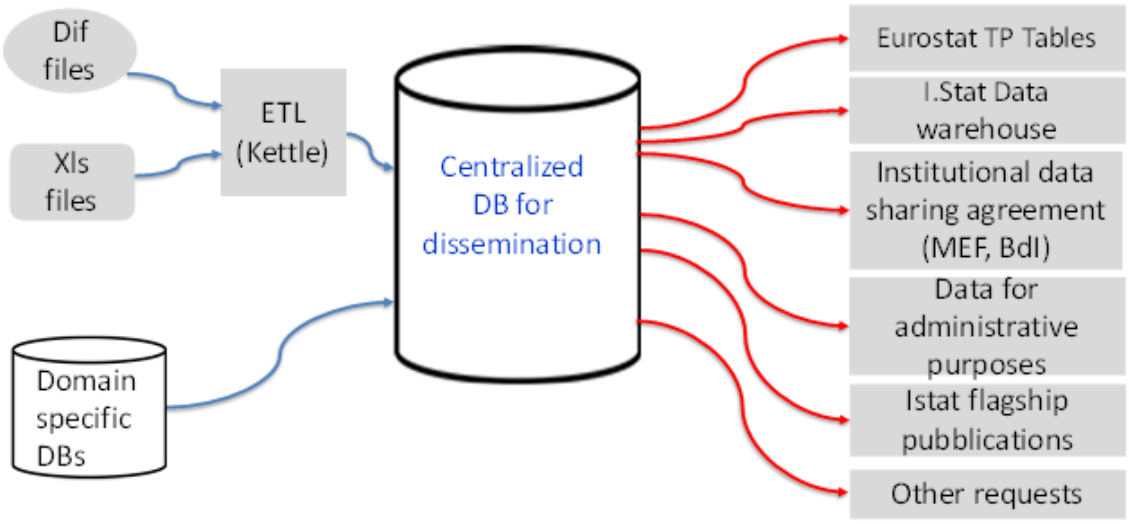
Production is decentralised, but IT solutions for data storage and data-sharing are centralised

Figure 6.11: IT framework of data production – Italy



Decentralised production, but centralised IT solution for dissemination.

Figure 6.12: IT framework of data dissemination – Italy



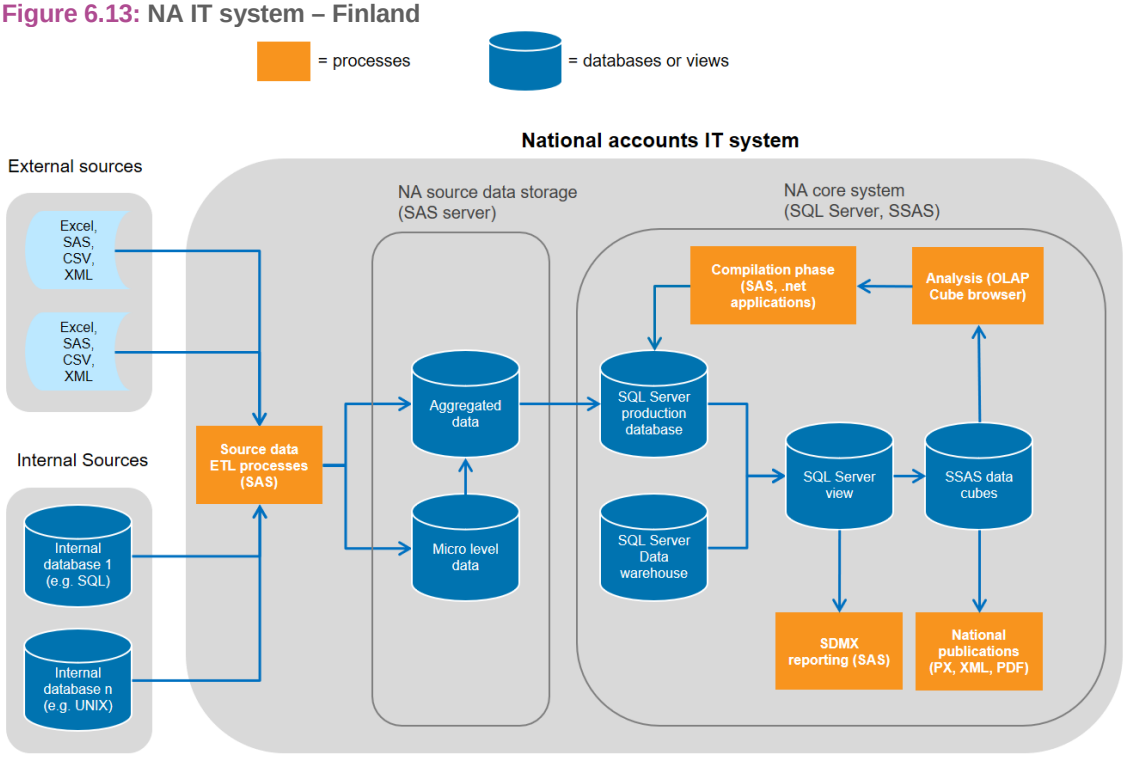
Source: ISTAT

Example: NA IT system components and data flow – Finland

Main features of the NA IT system:

- an integrated system;
- common
  - to all parts of NA and BoP compilation;
  - hardware and software;
  - principles;
  - classifications;
  - platform for metadata for processes as well as for data;
  - procedures and maintenance; and
  - centralised IT support;
- making heterogeneous source data homogeneous;
- versioning and archiving of programs as well as data -> traceability, repeatability, quality and revision control; and
- bringing data processing to NA experts (for quality and speed).

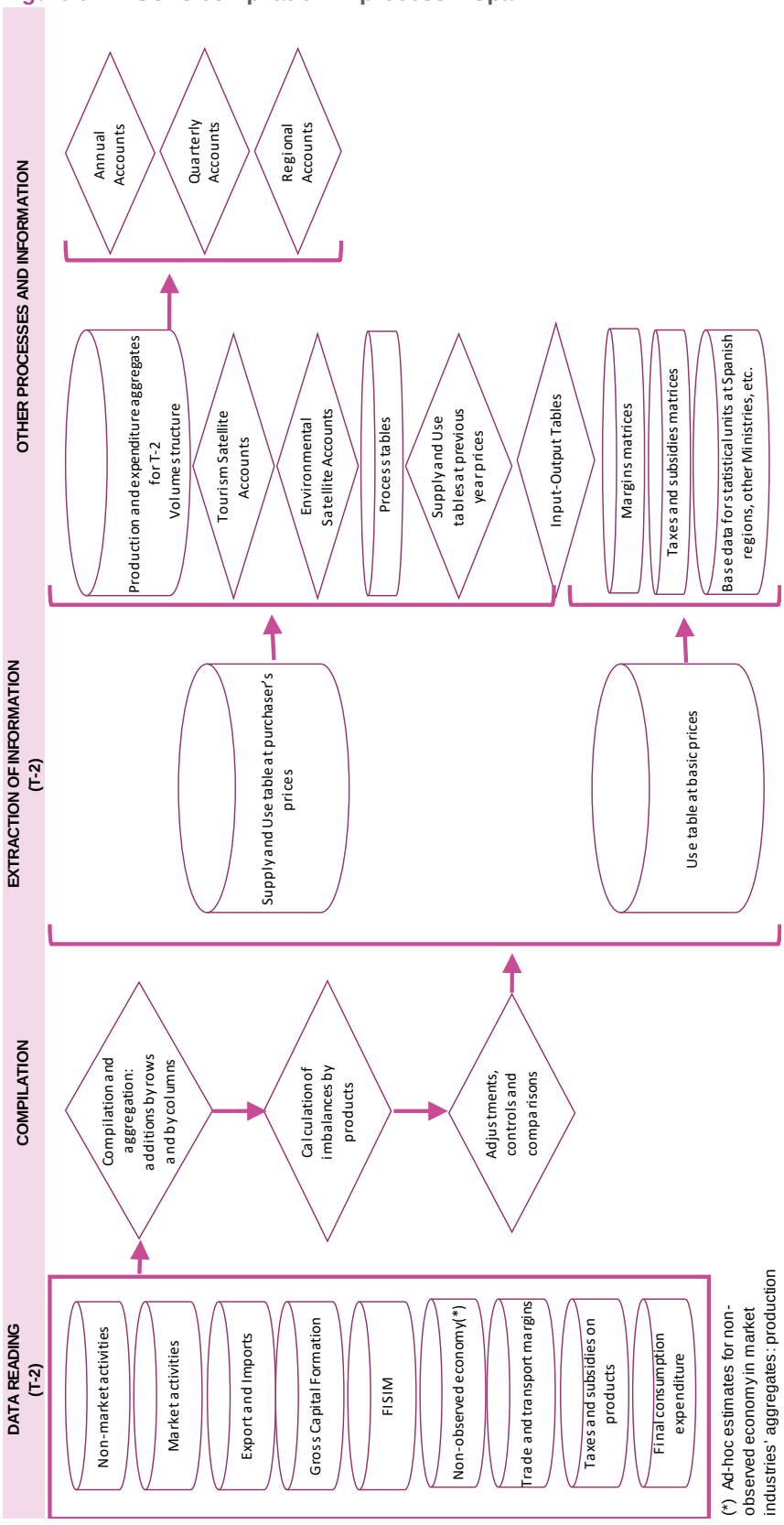
Figure 6.13: NA IT system – Finland



Source: Tilastokeskus

Example: SUTs compilation IT process – Spain

Figure 6.14: SUTs compilation IT process – Spain



Source: INE

The IT framework may include controls on input data, consistency checks and checks on data changes (see recommendations 12-19).

Example: IT framework – Ireland

Interconnection between domains and prompt update of revisions

Although only the MA domain is currently fully implemented in the IT system, the process of maintaining the interconnections in that domain will be extended to cross-domain cases when they are delivered.

The IT system covers the income and expenditure approaches, which are integrated to give the final figures for GDP, GNI, etc.

The modules of the IT system for annual MAs are categorised in seven distinct processes:

- capital formation;
- personal consumption;
- corporate profits & GNI at current prices;
- compensation of employees at current prices;
- BoP/trade imports & exports;
- conversion of GVA to constant prices; and
- integration of annual processes.

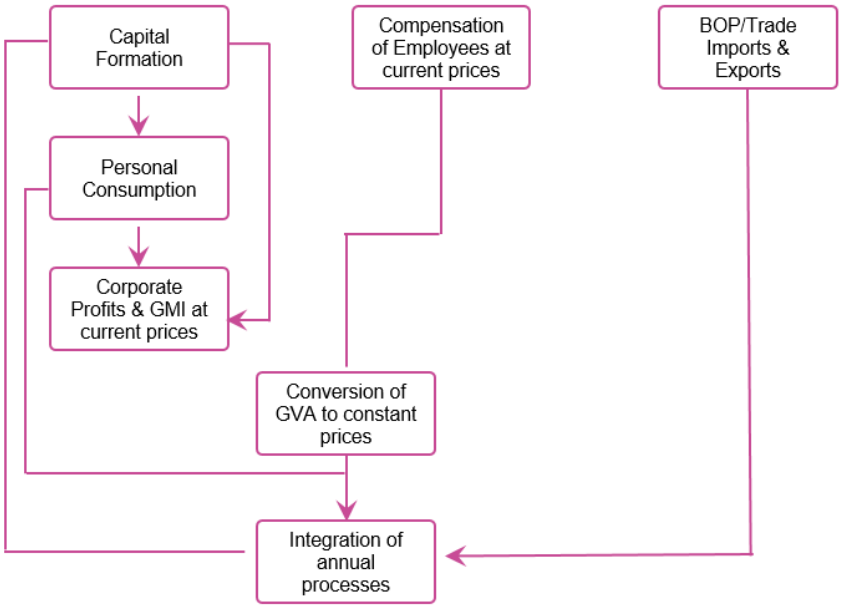
Although each process contains many individual modules, using these broad groupings allows us to manage the data dependencies when running a production cycle, while also allowing individuals to focus their expertise on their own processes.

Some of these processes (e.g. capital formation and compensation of employees) do not rely on the others – they use only input data to produce their results. Others use the outputs of earlier processes as their inputs (e.g. corporate profits use the results of capital formation and personal consumption in the calculation of results).

Figure 6.14 shows the broad interconnections between the processes in the system. If the processes are run in the order required by the red arrows, the system will avoid inconsistencies caused by timing of data.

As each process completes, the system generates an automatic e-mail informing the staff members responsible for the downstream processes that their input data have been refreshed, so that they can re-run their processes to maintain consistency. (In practice, the e-mails are also sent to the statisticians involved in compiling the results, so that everyone is kept up to date).

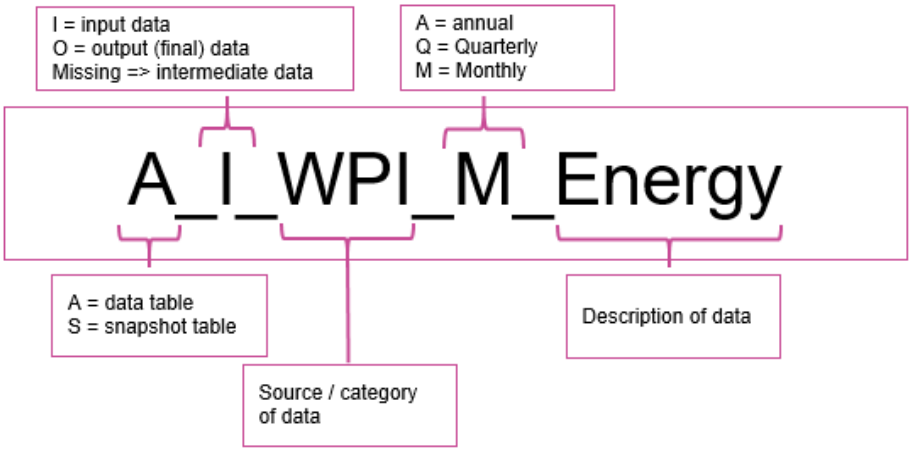
Figure 6.15: Intermediate data dependencies for NA IT system



Standardising dimensions, file names and file paths

The IT system uses a single database to hold all input, intermediate and final data. In the database, naming conventions are used to identify the different types of data table. All data table names begin with 'A' (signifying a normal data table) or 'S' (signifying a snapshot table, where vintages of that table's data are held). The table names may then contain an 'I' (for input) or 'O' (for output (final)). Tables without 'I' or 'O' contain intermediate data. Next follows the source of the data, then a periodicity indicator and a description of the data. For example, 'A_I_WPI_M_Energy' is the input dataset, monthly wholesale price index for energy and 'A_O_Capform_Q_Results' is the output dataset for the quarterly capital formation results.

Figure 6.16: IT system – Ireland



Similar naming conventions exist for data snapshots (records of data table contents at a point in time). All the snapshots of data tables associated with a particular release/transmission (e.g. quarterly MA transmission) are given the same snapshot name. This makes it easy to identify any vintage of a given data table and to compare results between vintages. Also, because standard programs are used to read from the database, simple parameters can be used to specify a particular

vintage of data to read. Hence, we can re-produce the results for a past transmission, or specify the correct annual vintage when benchmarking quarterly figures. (In addition, the SAS programs in the processing system are managed using version control software. Hence, we maintain vintages not only of the data, but also the production processing system).

Where possible, common tasks have been standardised in SAS macros (re-usable blocks of code). For example, two SAS macros (one for annual, the other for quarterly) are used for chain-linking across all processes in the IT system. A similar macro is used to benchmark quarterly figures to the relevant annual totals. This ensures that the methods and calculations are the same across all parts of the IT system.

These conventions provide a recognisable 'vocabulary' for data and programs, so that a user who is familiar with one part of the system can quickly become familiar with other processes.

Source: CSO

Example: IT achievements (2015-2019) – Spain

Centralisation and development of SAS processes for estimates related to basic data:

- market industries (from SBS data, fiscal data, economic accounts of agriculture, economic accounts of forestry, economic surveys of aquaculture and fisheries) for ANAs;
- production price indices for market industries and intermediate consumption price indices for market and non-market industries for ANAs;
- changes in inventories by market industries and products for ANAs;
- GFCF by assets and products for ANAs;
- employment, compensation of employees and hours worked by industries for ANAs;
- trade and transport margins for SUTs;
- non-observed economy aggregates for SUTs;
- balances of non-financial assets by assets, industries and institutional sectors for ANAs;
- annual estimates of production and intermediate consumption for year T in ANAs; and
- basic short-term statistics in ASAs, QSAs and QNAs.

Seasonal adjustment tools (based on Tramo-Seats and JDemetra+) are used for QSA compilation and SAS tools are developed for mass execution of seasonal adjustment processes in QSAs and QNAs:

- SAS processes for compilation of statistical operations and dissemination:
- compilation, backcasting and semi-automatic balancing of the annual series corresponding to the reference periods 1995 to T;
- standardisation, centralisation and compilation of the SUIOTs;
- development of automatic balancing procedures in QNAs in SAS (using standard methods programmed in MATLAB);
- feeding INE dissemination databases and tables into QSAs, QNAs and ANAs; and
- development of PensINE software to estimate the stock of accrued-to-date pension entitlements in social security systems.

Other:

- analysis and consistency checks of the QSA, ASA, ANA and QNA results;
- several improvements in the compilation of institutional sector accounts and estimates of MAs related to the institutional sector accounts in SAS and Excel.

Source: INE

Automated quality controls in the IT framework are more suitable for countries that compile their NAs using a database system or similar. For countries compiling NAs primarily using MS Excel, automated quality controls are limited. MS Excel automated quality controls mostly identify inconsistencies.

Example: Software

While MS Excel allows interconnection and data-sharing, Excel files with long chains of interconnected tables are not always stable. Countries relying only on Excel files find it harder to achieve consistency. A system that allows for explicit links between data inputs, variables, etc. is preferable to one that risks infinite references and loops. A system based on different databases can be more stable and allow coding procedures that can be automated and updated quickly and efficiently. In-house developed IT-framework and database systems provide more support in achieving consistency. A custom-developed IT tools can help in keeping semi-automated controls updated.

Source: Eurostat

6.4. Release schedule and revision policy and practice

21: Achieving consistency according to the national release schedule

While achieving consistency at any time is challenging, it is feasible to publish consistent data in line with the release schedule, at least, for a specific set of data tables in specific periods. The dates in the national release calendar should precede the Eurostat publication dates, while the national revision policy should be aligned to the HERP.

It is not necessary to revise every table at every revision. Given the high degree of interdependency between the ESA 2010 TP tables, it is normal that not all variables in different tables will be perfectly aligned in every given period. Revisions should not be confused with errors, which should be corrected in all affected tables as soon as possible. It is possible to achieve consistency in specific periods and among a specific set of tables, and compilers are encouraged to use the release schedule and appropriate revision policies to support this.

If this is not possible, the national release and revision policy should not contradict the HERP in terms of expected consistency between specific tables in specific periods.

Example: National revision policy – Netherlands

From the second half of 2016 to the first half of 2018, Statistics Netherlands executed a benchmark revision for the year 2015, exactly 5 years after the previous benchmark and conceptual revision adopting ESA 2010. The aim of the revision was to incorporate the latest statistical insights and new data sources into the NAs as much as possible and to make some methodological improvements, notably with respect to the sectorisation of some holdings and head offices, and the registration of merchanting and goods for processing some multinational corporations. Methodological improvements were also made to address all the action points recently identified in the Eurostat GNI verification mission and the EDP dialogue visit. A longstanding cooperation project between Statistics Netherlands and the DCB reached an important milestone in this revision, as it resulted in full consistency between the NAs and the BoP with respect to MAs such as current account surplus and net wealth *vis-à-vis* the RoW.

The revision encompasses all NA domains and covers all the ESA 2010 TP tables, including time series from 1995 onwards. Full consistency has been achieved within and between the domains. The RAs are set to be published by the end of 2018, in line with EU requirements. The instant publication of the time series is considered a major achievement and an important improvement compared to earlier revisions, where time series sometimes lagged for several years. Detailed SUTs and IO tables were constructed for 2015 and subsequent years. These were not revised for the previous years, as this was considered too laborious in relation to the demand for the data and it would also have delayed the overall construction of the time series.

Although Statistics Netherland follows the HERP in terms of benchmark years chosen (those ending in ‘0’ or ‘5’), the publication is actually a year earlier than recommended because the Dutch SBS, the most important data source, have recently become available with a time-lag of just 1 year, whereas 1.5 years is most common in the Member States. It was therefore also possible to bring forward the publication of the final ANA estimates by 1 year. Also, where the HERP recommends publication by the end of September (the transmission deadline for most of the annual tables), the Dutch NAs are traditionally already published by the end of June, in preparation for the third Tuesday in September (*Prinsjesdag*), when the budgetary plans for the year ahead are presented in parliament and the political debate takes place. To prepare for this day, the government needs new economic forecasts from the Dutch Bureau of Economic Policy Analysis, which are based on the June figures. Publication by the end of September would be too late.

The revision led to new results for the key indicators, although the adjustments are generally small; GDP was revised upwards by 1.0% to €690.0 billion for 2015, GNI by 1.6% to €690.5 billion, government debt (EMU debt as a percentage of GDP) by 0.2 percentage points to 64.8% and EMU surplus by 0.1 pp to -2.0%.

The revision was closely monitored by a special project organisation and was characterised by a tight planning schedule. A steering committee was set up with the directors of the two departments involved (‘national accounts’ and ‘government finance and consumer prices’), supported by the head of the research and publication section of the NA department, strictly monitoring overall progress, evaluating the main (often multi-domain) projects and keeping a close eye on the impact on key indicators. The impact of each project on key indicators (e.g. GDP and government surplus) was traced from the start. The steering committee was supported by a coordination group consisting of the project leaders of the main domains (SUT/IO, sector accounts, government accounts and labour accounts) and a project leader for the time series. This group monitored progress closely and evaluated the results and quality of all the projects. Other senior experts were involved in quality assurance for each project.

The revision planning covered a period of almost 2 years. Over 150 revision projects were executed from the second half of 2016 to mid-2017, some rather small but others with substantial impact on key indicators. In the second half of 2017, the results were incorporated into the various systems and the balancing and finalisation of the figures was completed in January 2018, a major milestone,

yielding consistent and coherent level estimates for 2015 for all the main domains, including a SUT, sector accounts, government accounts and labour accounts. Subsequently, the revised quarterly data were aligned to the new 2015 totals by means of manual and mathematical balancing, and work on the regular annual compilation cycle started. This resulted in final estimates for 2016, preliminary estimates for 2017 and a realignment of the quarterly data to the new annual totals. At the same time, work began on the time series, starting with the annual data back to 1995, followed by the quarterly data. The time series were more aggregated than the regular cycle, but detailed enough to fulfil the requirements of the ESA 2010 TP. Backward estimates of the revision project were added as separate 'layers' to the pre-revision data; bigger discrepancies were balanced manually and smaller ones mathematically. Extensive use was made of graphics to analyse the results. The new level estimates for 2015 were published on 24 May 2018. The press release contained the results for the key indicators, some background and the most important adjustments, the planning schedule for the remaining activities and a reference to the more detailed report with descriptions and figures. Some key users were informed (under embargo) a day before the publication. Finally, the complete revised estimates, from 1995 to the first quarter of 2018, were published on 22 June 2018. An updated GNI inventory was scheduled for the beginning of 2019.

Source: CBS

Example: Revision practice – Spain

Table 6.1: Revision practice – Spain

Release calendar for non-financial accounts (INE)			Quarterly accounts	Annual accounts	Regional accounts	Observations
Year N	Q1	January	Around 30 January Preliminary t+30 QNA MAs (table 1Q) for 4th quarter of N-1 Preliminary estimates of annual MAs (table 1A) for year N-1 as sum of quarters			
		February				
		March	Around 31 March QNA MAs (table 1Q) and QSA (table 801) for 4th quarter of N-1. Quarters 1 to 3 of year N-1 are revised and the preliminary 4th quarter of N-1 for QNA is also revised Second available estimate of annual MAs (table 1A) for N-1 as sum of quarters			
	Q2	April	Around 30 April Preliminary t+30 QNA MAs (table 1Q) for 1st quarter of year N		Around 30 April Regional NUTS II GDP, GVA and employment for N-1	*At this time, RAs are totally aligned with annual aggregates published at end of March*
		May				
		June	Around 30 June QNA MAs (table 1Q) and QSA (table 801) for 1st quarter of year N. Only the preliminary estimate of 1st quarter of year N in QNA is revised			

Release calendar for non-financial accounts (INE)			Quarterly accounts	Annual accounts	Regional accounts	Observations
Year N	Q3	**July**	Around 30 July Preliminary t+30 QNA MAs (table 1Q) for 2nd quarter of year N			
		August				
		September	Around 30 September QNA MAs (table 1Q) and QSA (table 801) for 2nd quarter of year N Quarters from 1st quarter of year N-2 to 1st quarter of year N are revised (incorporating revised NA series). Preliminary estimate for 2nd quarter of year N is also revised	1st fortnight of September Annual MAs (table 1A) for year N Annual estimates for N-1 and N-2 are revised. Around 30 September ASA (table 8) and annual results by industry (table 3) and HFCE by COICOP (table 5) for year N Annual estimates for N-1 and N-2 are revised.		*At this time (30 Sept.), all QNA and ANA MAs and sector accounts are aligned*
	Q4	**October**	Around 30 October Preliminary t+30 QNA MAs (table 1Q) for 3rd quarter of year N.			
		November		During November SUT year N-2 (tables 15 and 16)		*SUIOT data are consistent with the annual aggregates published in September*
		December	Around 30 June QNA MAs (table 1Q) and QSA (table 801) for 1st quarter of year N. Only preliminary estimate of 1st quarter of year N in QNA is revised	By end December IO tables for N-2 (every 5 years or benchmark revision) – table 17 Stocks of non-financial fixed assets by industry and by sector and GFCF by industry and asset (tables 20, 22 and 26). N-2 Year N-1 is revised	Around 23 December RAs (tables 10,12 and 13) Regional estimates for N-1 and N-2 are revised	*1. IO data are consistent with SUIOT data* *2. At this time, RAs are aligned to NA data published at end September*

Source: INE

7 Application of recommendations for priority tables

This chapter looks into the challenges of compiling the priority tables so as to ensure consistency across the ESA 2010 TP. This requires not only the consistent use of source data to compile specific datasets, but also a balancing process that harmonises the data in different NA tables and maximises their accuracy. Eurostat set out and illustrated concrete steps in that process in the *Handbook on quarterly national accounts*[27], which also contains examples of how to apply generic recommendations on national compilation and data production to priority tables.

This chapter also stresses consistency checks as the main quality treatment applied to ESA 2010 TP tables, including the priority tables identified in the prioritisation exercise, i.e. tables on:

- NFSAs;
- NA MAs;
- general government MAs; and
- FAs by sector.

An analysis of each priority table's consistency with other priority tables, as reflected in Eurostat's validation rules, is given at the end of each sub-section.

Recommendations on the consistency of ESA 2010-based NAs should take account of the complexity of compiling ESA 2010 tables. Achieving consistency between the tables is difficult and resource-intensive, given the inert complexity of the system. In general, for the compilation of every ESA 2010 table:

- national accountants use many different input sources that need to be organised and processed in a consistent way;
- input data that are fed into different processes can be revised at any time;
- NAs are constrained by different deadlines and cut-off dates by group of ESA 2010 tables;
- deadlines cannot be changed; and
- compilation times between different groups of tables are constrained by deadlines, but require different resources and time given the individual complexity of compiling the table.

Given conflicting source and table deadlines, input data revisions and the linkages of flows between ESA 2010 tables, maintaining consistency and keeping domains aligned involves recalculating everything every time. This may be more technically difficult for compilers with resource constraints.

27 *Handbook on quarterly national accounts*, 2013 edition; see chapter 8 ('The balancing of QNA'), pp. 232-273; https://ec.europa.eu/eurostat/documents/3859598/5936013/KS-GQ-13-004-EN.PDF/3544793c-0bde-4381-a7ad-a5cfe5d8c8d0

7.1. Non-financial accounts by sector

NFSAs (T8 and T801) are among the most challenging priority tables, predominantly due to the numbers of links with other ESA 2010 TP tables and of interdependent flows. Therefore, the challenges arising from compiling this priority are analysed first.

LINKS BETWEEN T8 AND OTHER ESA 2010 TP TABLES

Recommendation 11 on process mapping suggests establishing all links between NFSA tables and other ESA 2010 TP tables.

Figure 2.1 shows how many links there are between 'non-financial accounts by sector – annual' (T8) and other tables; the direct and indirect links are summarised in Table 7.1.

Table 7.1: Direct and indirect links of 'non-financial accounts by sector – annual' (T8)

Table no	Subject
	Direct links – numerical consistency
1	MAs – annual
2	MAs of general government – annual
6	FAs by sector – annual
801	NFSAs – quarterly
13	Household accounts by region, NUTS level 2 – annual
	Indirect links - numerical consistency/plausibility
3	Tables by industry – annual
5	HFCE
9	Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification – annual
10	Tables by industry and by region, NUTS level 2 – annual
11	General government expenditure by function – annual
12	Tables by industry and by region, NUTS level 3 – annual
15	Supply table at basic prices, including transformation into purchasers' prices – annual
16	Use table at purchasers' prices – annual
17	Symmetric IO table at basic prices – 5-yearly
22	Cross-classification of GFCF by industry and by asset (transactions)
26	Balance sheets for non-financial assets – annual
27	FAs of general government - quarterly
29	Accrued-to-date pension entitlements in social insurance – 3-yearly

Source: ESA 2010

Direct and indirect links exist where data describing flows labelled under the same TP code are found in different tables. Indirect links can also arise for other reasons and sometimes involve comparable concepts across tables or variables.

There are indirect links with other tables, such as T3, which breaks down by industry variables from T1 that are common with T8; T3 derives its indirect link to T8 from T1. Indirect links based on direct links with other tables require numerical consistency, as do direct links, since the variables are identical.

In other cases, the links are indirect because the variables do not overlap exactly. This is an example of the need for plausibility checks. For example, T26 (balance sheet for non-financial assets) has breakdowns of non-financial assets by institutional sector. T8 shows only flows, but the structure of stocks and corresponding flows should be comparable.

Table 7.2 shows the indirect links according to whether numerical consistency or plausibility apply.

Table 7.2: Indirect links of 'non-financial accounts by sector – annual' (T8)

Table no	Subject	Link from Table
	Indirect links – numerical consistency	
3	Tables by industry – annual	**T1**
5	HFCE	**T1**
9	Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification – annual	**T2**
10	Tables by industry and by region, NUTS level 2 – annual	**T1**
11	General government expenditure by function – annual	**T2**
12	Tables by industry and by region, NUTS level 3 – annual	**T1**
15	Supply table at basic prices, including transformation into purchasers' prices – annual	**T1**
17	Use table at purchasers' prices – annual	**T1**
17	Symmetric IO table at basic prices – 5-yearly	**T1**
22	Cross-classification of GFCF by industry and by asset (transactions)	**T1**
	Indirect links – plausibility	
26	Balance sheets for non-financial assets – annual	
29	Accrued-to-date pension entitlements in social insurance – 3-yearly	

Source: ESA 2010

LINKS BETWEEN DATA DESCRIBING SAME FLOWS IN T8 AND OTHER ESA 2010 TP TABLES

Recommendation 11 on process mapping also suggests establishing links between flows in T8 and other ESA 2010 TP tables. It is very important to indicate clearly which flows are common to each table and that each compiler is aware of the interconnection of flows between tables.

Some flows overlap and are common to more than one table. 'Total economy' (S.1) and 'general government' (S.13) are the sectors in which there are the most overlaps in variables between T8 and other tables, both directly and indirectly. Table 7.3 lists variables in these sectors that are common to T8 and other tables, where numerical consistency is expected.

Table 7.3: Common variables between T8 and other ESA 2010 TP tables

Code	Transactions and balancing items	Sectors	
		S1	S13
	I Production account / external account of goods and services Resources	Total economy	General government
P.1	Output	T3, T15, T16, T17	T2
(P.11+P.12 +P.131)	Market output, output for final use and payments for other non-market output		T2
P.11	— Market output	T15	T2
P.12	— Output for own final use	T15	
P.13	— Non-market output	T15	T2
P.7	Imports of goods and services	T1, (T15, T17)	
P.71	— Imports of goods	T1,	
P.72	— Imports of services	T1,	
P.72F	— Imports of FISIMs		
(D.21 — D.31)	Taxes less subsidies on products	(T15, T17)	

Uses			
P.2	Intermediate consumption	T3, T17	T2, T11
P.6	— Exports of goods and services	T1, T17	
P.61	— Exports of goods	T1	
P.62	— Exports of services	T1	
P.62F	— Exports of FISIMs		
B.1g	GVA/GDP	T1, T3	T2
B.11	External balance of goods and services	T1	
P.51c	Consumption of fixed capital	T3, T16, T17	T2
B.1n	Value added, net / net domestic product		T2
	II.1.1 Generation of income account		
	Resources		
B.1g	GVA/GDP		
D.3	Subsidies	T1	
D.31	— Subsidies on products	T1	
D.39	— Other subsidies on production		T2
Uses			
D.1	Compensation of employees	T1, T3, T10, T16, T17	T2, T11
D.11	— Wages and salaries	T1, T3	
D.12	— Employers' social contributions	T1	
D.2	Taxes on production and imports	T1	
D.21	— Taxes on products	T1	
D.29	— Other taxes on production		T2
(B.2g+B.3g)	Operating surplus, gross, plus mixed income, gross	T1, T3, T16, T17	
B.2g	— Operating surplus, gross	T16, T17	T2 (net)
B.3g	— Mixed income, gross	T16, T17	
	II.1.2 Allocation of primary income account		
	Resources		
(B.2g+B.3g)	Operating surplus, gross, plus mixed income, gross		
B.2g	— Operating surplus, gross		
B.3g	— Mixed income, gross		
D.1	Compensation of employees		
D.11	— Wages and salaries		
D.12	— Employers' social contributions		
D.2	Taxes on production and imports		T2, T9
D.21	— Taxes on products		T2, T9
D.211	— — Value added-type taxes (VAT)		T2, T9
D.212	— — Taxes and duties on imports, excluding VAT		T9
D.214	— — Taxes on products, except VAT and import taxes		T9
D.29	— Other taxes on production		T2, T9

D.4	Property income			T2
D.41	—	Interest		T2
D.42	—	Distributed income of corporations		
D.421	— —	Dividends		
D.422	— —	Withdrawals from income of quasi-corporations		
D.43	—	Reinvested earnings on foreign direct investment (FDI)		
D.43S2I	— —	Reinvested earnings on intra-EA FDI		
D.43S2X	— —	Reinvested earnings on extra-EA FDI		
D.43S21	— —	Reinvested earnings on intra-EU FDI		
D.43S22	— —	Reinvested earnings on extra-EU FDI		
D.44	—	Other investment income		
D.441	— —	Investment income attributable to insurance policy holders		
D.442	— —	Investment income payable on pension entitlements		
D.443	— —	Investment income attributable to collective investment fund shareholders		
D.45	—	Rent		
B.4g	Entrepreneurial income, gross			
D.41g	Total interest before FISIM allocation			
Uses				
D.3	Subsidies			T2, T11
D.31	—	Subsidies on products		T2
D.39	—	Other subsidies on production		T2
D.4	Property income			T2, T11
D.41	—	Interest		T2
D.42	—	Distributed income of corporations		
D.421	— —	Dividends		
D.422	— —	Withdrawals from income of quasi-corporations		
D.43	—	Reinvested earnings on FDI		
D.43S2I	— —	Reinvested earnings on intra-EA FDI		
D.43S2X	— —	Reinvested earnings on extra-EA FDI		
D.43S21	— —	Reinvested earnings on intra-EU FDI		
D.43S22	— —	Reinvested earnings on extra-EU FDI		
D.44	—	Other investment income		
D.441	— —	Investment income attributable to insurance policy holders		
D.442	— —	Investment income payable on pension entitlements		
D.443	— —	Investment income attributable to collective investment fund shareholders		
D.45	—	Rent		

B.5g	Balance of primary incomes, gross / national income, gross			T2 (net)
D.41g	Total interest before FISIM allocation			
	II.2	**Secondary distribution of income account**		
	Resources			
B.5g	Balance of primary incomes, gross / national income, gross			T2 (net)
D.5	Current taxes on income, wealth, etc.			T2, T9
D.51	—	Taxes on income		T9
D.59	—	Other current taxes		T9
D.6	Social contributions and benefits			
D.61	—	Net social contributions		T2, T9
D.611	— —	Employers' actual social contributions		T2, T9
D.612	— —	Employers' imputed social contributions		T9
D.613	— —	Households' actual social contributions		T2, T9
D.614	— —	Households' social contribution supplements		T9
D.61SC	— —	Social insurance scheme service charges		T9
D.62	—	Social benefits other than social transfers in kind		
D.63	—	Social transfers in kind		T2[28]
D.631	—	Social transfers in kind — non-market production		
D.632	—	Social transfers in kind — purchased market production		
D.7	Other current transfers			T2
D.71	—	Net non-life insurance premiums		
D.72	—	Non-life insurance claims		
D.74	—	Current international cooperation		
D. 74A	— —	of which: payable to / receivable by European institutions (e.g. EDF)		
D.75	—	Miscellaneous current transfers		
D.76	—	VAT- and GNI-based EU own resources		
Uses				
D.5	Current taxes on income, wealth, etc.			T2
D.51	—	Taxes on income		
D.59	—	Other current taxes		
D.6	Social contributions and benefits			
D.61	—	Net social contributions		
D.611	— —	Employers' actual social contributions		
D.612	— —	Employers' imputed social contributions		
D.613	— —	Households' actual social contributions		

[28] D.63 for S13 should be equal to P31.

D.614	— —	Households' social contribution supplements		
D.61SC	— —	Social insurance scheme service charges		
D.62	—	Social benefits other than social transfers in kind		T2, T11
D.63	—	Social transfers in kind		
D.631	—	Social transfers in kind — non-market production		
D.632	—	Social transfers in kind — purchased market production		T2, T11
D.7	Other current transfers			T2, T11
D.71	—	Net non-life insurance premiums		
D.72	—	Non-life insurance claims		
D.74	—	Current international cooperation		
D.74A	— —	of which: payable to / receivable by European institutions (e.g. EDF)		
D.75	—	Miscellaneous current transfers		
D.76	—	VAT- and GNI-based EU own resources		
B.7g	Adjusted disposable income, gross			
B.6g	Disposable income, gross			T2 (net)
	II.4.1 Use of disposable income account			
	Resources			
B.6g	Disposable income, gross			T2 (net)
D.8	Adjustment for change in pension entitlements			T2
Uses				
P.3	Final consumption expenditure		T1, T5, T16, T17	T2, T11, T16, T17
P.31	—	Individual consumption expenditure	T1	T2, T11
P.32	—	Collective consumption expenditure	T1	T2, T11
D.8	Adjustment for change in pension entitlements		T6 (F.63)	
B.8g	Saving, gross			T2
B.12	Current external balance			
	III.1.1 Change in net worth due to saving and capital transfers account			
	Changes in liabilities and net worth			
B.8g	Saving, gross			T2
B.12	Current external balance			
D.9r	Capital transfers, receivable			T2
D.91r	—	Capital taxes, receivable		T2, T9
D.92r	—	Investment grants, receivable		T2
D.99r	—	Other capital transfers, receivable		
Changes in assets				
D.9p	Capital transfers, payable			T2, T11
D.91p	—	Capital taxes, payable		

D.92p	— Investment grants, payable		T2, T11
D.99p	— Other capital transfers, payable		
P.51c	Consumption of fixed capital	T3, T16, T17	T2
B.10.1	Change in net worth due to saving and capital transfers		
	III.1.2 Acquisitions of non-financial assets account		
B.10.1	Change in net worth due to saving and capital transfers		
Changes in assets			
P.5g	Gross capital formation	T1, T3, T16, T17	T2, T11
P.51g	— GFCF	T1, T3, T10, T16, T17, T22	T2, T11
P.51c	Consumption of fixed capital	T3, T16, T17	T2
P.52	— Changes in inventories	T1, T3, T16, T17	T2
P.53	— Acquisitions less disposals of valuables	T1, T3, T16, T17	
NP	Acquisitions less disposals of non-produced assets		T2, T11
B.9	Net lending (+) / net borrowing (—)	T6 (B.9F)	T2 T6 (B.9F)
DB.9	Discrepancy with net lending / net borrowing of FAs		T2
	Additional information		
EMP	Employment (in number of persons and number of hours worked)	T1, T3, T10, T12	
OTE	Total general government expenditure		T2, T11
OTR	Total general government revenue		T2

Source: ESA2010

Information on sectors of non-financial corporations (S.11), financial corporations (S.12), households (S.14) and NPISHs (S.15) can only be found in 'non-financial accounts by sector' and 'financial accounts by sector'. Clearly, there are direct links in the information for all sectors of non-financial accounts between annual (T8) and quarterly frequencies (T801). All variables in T801 are included in T8. It goes without saying that annual and quarterly NFSA tables should be consistent when they are transmitted in the same quarter.

'Household accounts by region, NUTS level 2 – annual' (T13) contains information on households (S.14). The flows are:

- property income (D.4) paid and received;
- compensation of employees (D.1) received;
- current taxes on income and wealth paid (D.5);
- net social contribution paid (D.61);
- social benefits other than social benefits in kind (D.62) received;
- other current transfers (D.7) paid and received; and
- HFCE (P.3).
- For these flows, the sum of the region must equal the value in sector S.14 in T8. Moreover, T13 contains regional values of the following balancing items:
- operating surplus/mixed income (B2B3);

- primary income (B.5); and
- disposable income (B.6) net of capital consumption.

These net balancing items can also be derived from T8, which contains gross value and the corresponding capital consumption (P.51c).

Also, T5 and T1 include data on final consumption expenditure (P.3) for households (S.14), and T1 includes data on exports of goods and services (P.6) and imports of goods and services (P.7) for RoW (S.2).

COMMON INPUT DATA IN T8 AND OTHER ESA 2010 TP TABLES

Staff have to be fully aware of the interconnections of flows between tables, starting from the input data. Recommendation 15 on quality controls on input data is the first step, regardless of the flow or table that is being compiled. Compilation for the sectors covered by non-financial accounts is based not only on new data sources, but also on other data sources that are an input for other NA tables. Recommendation 13 on the processing of input data is therefore particularly relevant for achieving consistency efficiently. It is imperative that every data source used in compiling T8, also common to prior compilation processes, includes at the very start all relevant information necessary for the estimation of its sectors.

RECONCILING INPUT DATA IN T8

Recommendation 14 suggests reconciling different sources in order to derive consistent estimates for the NA framework. For NFSAs, it can be applied in various ways. Every method is specific to the flow and/or sector, and necessary for achieving consistency. The most frequent means of reconciling data sources are 'who to whom' matrices, counterpart information and treating one sector as a residual.

NFSAs are the only dataset that portrays non-financial transactions in the whole economic system and their linkages. The final balancing of uses and resources by sector and for the total economy remains particularly challenging in terms of consistency. Therefore, balancing is necessary to achieve consistency between T8 and other ESA 2010 tables. No balancing is not recommended.

Example: Reconciliation of total interest before FISIM allocation (D.41g) in T8 – Netherlands

Balancing adjustments across all sectors

In the balancing process, only interest payable and receivable by S.11, S.14 and S.15 will be adjusted. Data sources addressing S.12, S.13 and S.2 are considered of high quality. The direction of adjustments, uses vs resources, etc. is directly related to cross-checks based on balance-sheet positions (F.2-F.4), market interest rates published by the DNB and nominal interest rates for bonds. This cross-check is done for each (sub-)sector, but with special attention given to sectors S.11, S.14 and S.15, as the source data for those sectors may have flaws such as non-response or missing items. Total uses and resources of S.11, S.14 and S.15 are adjusted to ensure transaction identity (total uses D.41 equals total resources D.41).

For some sectors, information on the inner cells of the 'who to whom' matrices is not available. Therefore, these cells are filled on the basis of a calculation of balance-sheet positions (F.2-F.4), market interest rates and nominal interest rates for bonds. Remaining differences between totals and the sum of the inner cells are distributed over the inner cells in proportion of the calculation.

Source: Statistics Netherlands annual sector accounts inventory (September 2015)

Example: Reconciliation of miscellaneous current transfers (D.75) in T8 – Finland

This item is compiled in a full 'sector by counterpart sector' matrix, using the same item on the uses side for the paying sector and on the resources side for the receiving sector. The figures are thus balanced by default and no balancing adjustments are carried out. In the table below, the expression 'counterpart sector data used' means that the data are automatically transferred from the counterpart sector's account.

Usually, around 70% of the D.75 total is transfers to S.15 and includes various items.

Table 7.4: Reconciliation of miscellaneous current transfers (D.75) in T8 – Finland

	Resources		Uses	
	Sources	**Methods**	**Sources**	**Methods**
S.11	(see counterpart sector)	Counterpart sector data used directly (includes transfers from S.13149 and S.2)	(see counterpart sector)	Counterpart sector data used directly (includes transfers to S.1311 and S.15)
S.121	N/A	N/A	See S.121/P.11/	P.11/R of S.121 is also recorded here as D.75 from S.121 to S.122 (Reference ESA 2010: 14.16)
S.122	(see counterpart sector)	Counterpart sector data used directly (S.121\D.75\U)	N/A	N/A
S.123	N/A	N/A	N/A	N/A
S.124	N/A	N/A	N/A	N/A
S.125	N/A	N/A	N/A	N/A
S.126	N/A	N/A	N/A	N/A
S.127	N/A	N/A	N/A	N/A
S.128	N/A	N/A	(see counterpart sector)	Counterpart sector data used directly (transfers to S.1311 from DS 10: "other indemnities")
S.129	N/A	N/A	N/A	N/A
S.1311	DS 10, DS 11	Direct data sources. Item consists mainly of: donations received by universities, participation of the church (S.15) to tax collection costs and fines paid by households.	DS 10	Direct data sources. Item consists of transfers to households S.14 (e.g. "Expenses to households") and to NPISH S.15 (e.g. share of corporate income tax revenue to the church, state grants to schools).
S.1313	DS 12	Source data used directly for transfers from S.14 ("parking fines")	DS 12, DS 19, DS 10	Transfers to S.15: direct data source (includes several items).
S.13141	N/A	N/A	N/A	N/A
S.13149	N/A	N/A	DS19	Includes transfers to S.11 (around 95 % of the total) and to S.15, source data is used directly. Transfers to S.11 are compensations related to occupational health care. Transfers to S.15 include transfers to Finnish Student Health Service.

	Resources		Uses	
	Sources	**Methods**	**Sources**	**Methods**
S.14	(see counterpart sector)	Transfers from S.13 and S.15 automatically transferred from counterpart sector's account.	(see counterpart sector)	Transfers from S.13 and S.15 automatically transferred from counterpart sector's account.
S.15	Counter-part sector data, various small sources	Counterpart sector data used for transfers from S.13 and S.2. Calculations based on tax data and various publicly available sources are used for transfers from S.14 (these include, for example, parish tax and various membership fees) and from S.2. Transfers from S.11 (sponsorships) are estimated based on publicly available data on the annual change of sponsorship activities.	DS 24, counterpart sector data, various small sources	Counterpart sector data used for transfers to sector S.13 and S.2 (part). Calculations based on tax data are used for transfers to S.14 (these include e.g. scholarships) and S.2 (part).
S.2	Various small sources	Based on publicly available sources. Includes charity, donation and aid from S14 and S15.	Various small sources	Based on publicly available sources. Usually includes only charity, donation and aid to S14 and S15. In 2011 and 2012 there was a larger temporary royalties related recording from S.2 to S.11.

Source: Statistics Finland annual sector accounts inventory (October 2015)

RELEASE SCHEDULE OF T8 AND T801

The order of compilation according to the ESA 2010 TP must be clearly established and known. Recommendation 21 on national release schedule and revision policy suggests achieving consistency according to the release schedule.

Consistency checks on data are challenging due to revisions and vintage effects, whereby inconsistencies could arise due to national compilers' differing release calendars and revision practices. Transmission calendars differ between T8 and other ESA 2010 TP tables with which it has interdependencies. Transmission calendars differ between priority tables, but due to their similar transmission patterns, T8 should be highly (if not fully) comparable to the other tables in a given production year.

Table 7.5: ESA 2010 TP deadlines

	MAs	General government MAs	FAs by sector	Non-financial accounts by sector
Quarterly	t+2 months	t+85 days (*)		t+85 days (*)
		t+3 months		t+3 months
Annual	t+2 months	t+3 months		
	t+9 months	t+9 months	t+9 months	t+9 months

(*) Applicable to Member States whose currency is the euro. For non-euro Member States, the transmission deadline is 3 months.

Source: ESA2010

From Table 7.5, it can be deduced that transmission of fully consistent annual tables is expected at least at t+9 months. This period is also the alignment objective in the HERP, as endorsed by the Committee on Monetary, Financial and Balance of Payments Statistics. Recommendation 21 on the national revision policy suggests aligning the national release and revision policy with the HERP.

The order of compilation necessarily follows the TP deadlines and the linkages between flows.

Example: T8 aggregate in different tables with different transmission deadlines

Table 7.6: P.5 interdependence and transmission deadline

P.5 Gross capital formation	
Deadline t + months	**ESA 2010 tables**
February	T1
March	T2
September	T1, T2, T3, T8
December	T11, T16*, T17*, T22**

* data in T16 and T17 refer to T-3 years

** data in T22 refer to T-3 years

Source: ESA 2010 TP

In September, P.5 should be totally aligned between T1, T2, T3 and T8. In order to achieve consistency and given the transmission deadlines for the aggregate in other tables, P.5 in T1 and T2 can be compiled first and be a constraint for T8 (and T3). Alternatively, T1 can be compiled as a sum of sectors; in this case, S.13 and all other sectors must be compiled first and T1 derived from them as a sum.

CONSISTENCY CHECKS BETWEEN T8 AND T801, AND ESA 2010 TABLES

For the tables where interdependencies are identified, perform consistency checks as per recommendation 16 on consistency checks.

Compilers should perform numerical consistency and plausibility checks between T8 and the tables listed in Table 7.1. Numerical consistency should be verified with arithmetical tests. Plausibility should be verified for comparable concepts and flows indirectly linked.

Example: Numerical consistency

T8 vs T1, T801 vs T1q

Numerical consistency between NFSAs and MAs should be checked for all overlapping flows at every release. The series to be checked are as follows:

Table 7.7: Overlapping flows in NFSAs and MAs, annual and quarterly frequencies

Annual	Quarterly
S1.P3.D	S1.P3.D
S1.P5.D	S1.P5.D
S1.P51G.D	S1.P51G.D
S1.P52.D	S1.P5M.D
S1.P53.D	
S1.D1.D	S1.D1.D
S1.D11.D	
S1.D12.D	
S1.D2.D	S1.D2.D
S1.D21.D	S1.D21.D
S1.D3.C	S1.D3.C
S1.D31.C	S1.D31.C
S1.D21X31.C	S1.D21X31.C
S1.B1GQ.B	S1.B1GQ.B
S1.B2A3G.B	S1.B2A3G.B
S13.P3.D	S13.P3.D
S13.P31.D	S13.P31.D
S13.P32.D	S13.P32.D
S1M.P31.D	S1M.P31.D
S14.P31.D	
S15.P31.D	
S2.P6.D	S2.P6.D
S2.P61.D	S2.P61.D
S2.P62.D	S2.P62.D
S2.P7.C	S2.P7.C
S2.P71.C	S2.P71.C
S2.P72.C	S2.P72.C
S2.B11.B	S2.B11.B
S1.EMP.PS	S1.EMP.PS

Source: ESA 2010 TP

T8 vs T2

Numerical consistency between NFSAs and general government MAs should be checked for all overlapping flows at every release. The series to be checked are as follows:

Table 7.8: Overlapping flows in NFSAs and general government MAs

Annual		
S13.P2.D	S13.P1.C	S13.B1G.B
S13.P3.D	S13.P1O.C	S13.B1N.B
S13.P31.D	S13.P13.C	S13.B8G.B
S13.P32.D	S13.D2.C	S13.B9.B
S13.P5.D	S13.D21.C	
S13.P51G.D	S13.D211.C	
S13.D1.D	S13.D29.C	
S13.D29.D	S13.D39.C	
S13.D3.D	S13.D4.C	
S13.D31.D	S13.D41.C	
S13.D39.D	S13.D5.C	
S13.D4.D	S13.D61.C	
S13.D41.D	S13.D611.C	
S13.D5.D	S13.D613.C	
S13.D62.D	S13.D7.C	
S13.D632.D	S13.D9.C	
S13.D7.D	S13.D91.C	
S13.D8.D	S13.OTR.C	
S13.D9.D		
S13.D92.D		
S13.P51C.D		
S13.NP.D		
S13.OTE.D		

Source: ESA 2010 TP

Example: Plausibility checks

T29 vs T8

Plausibility checks should be performed between comparable concepts in NFSAs and 'accrued-to-date pension entitlements in social insurance'; examples are as follows:

Table 7.9: Overlapping concepts in NFSAs and 'accrued-to-date pension entitlements in social insurance'

T8	T29	Validation check
S11+S12+S1M	Columns C+E	T29 ≤ T8
S.13	Columns D+F	T29 ≤ T8
S.13	Columns D+F+G+H	T29 < T8

Source: ESA 2010 TP

T26 vs T8

Plausibility checks should be performed between comparable concepts in NFSAs and balance sheets for non-financial assets. The sector share of fixed assets (AN.11) and gross fixed capital consumption (P.51c) should be similar.

Table 7.10: Overlapping concepts in NFSAs and balance sheets for non-financial assets

T8	T26	Validation check
For each sector, P51G-P51C	N11N	T8 ≤ T26
For each sector , $P51G_t$-$P51C_t$	$AN11_t$- $AN11_{t-1}$	$AN11_t$- $AN11_{t-1}$should be 'similar' to $P51G_t$-$P51C_t$
For each sector , $P52_t$	$AN12_t$- $AN12_{t-1}$	$AN12_t$- $AN12_{t-1}$should be 'similar' to $P52_t$
For each sector , $P53_t$	$AN12_t$- $AN12_{t-1}$	$AN12_t$- $AN12_{t-1}$should be 'similar' to $P53_t$

Source: ESA 2010 TP

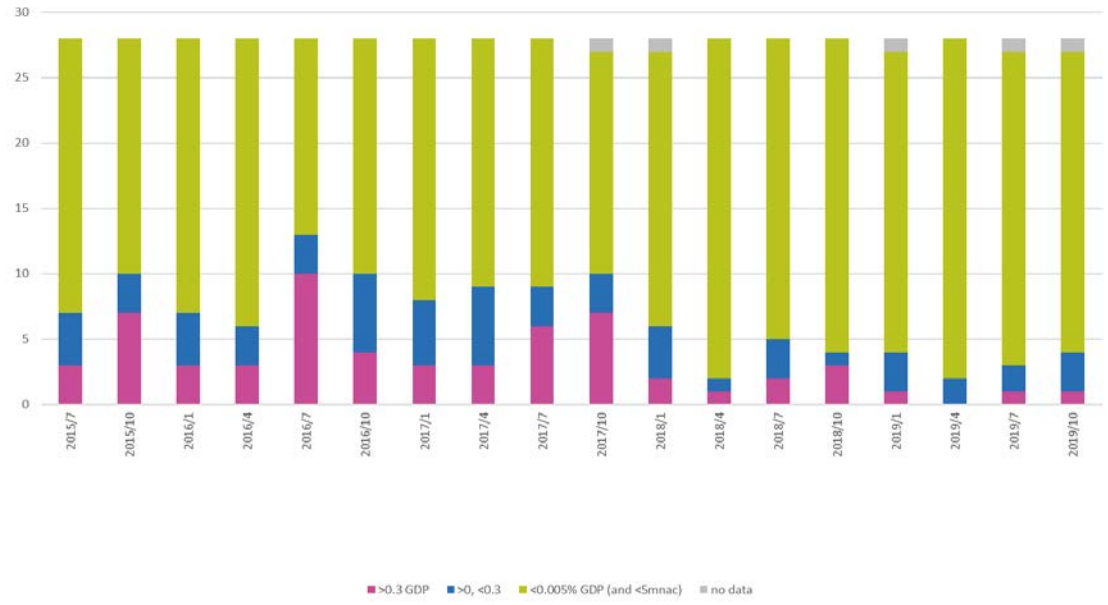
DATA ANALYSIS RESULTS OF CONSISTENCY OF T8 AND T801

The trend of inconsistencies can be analysed when inconsistencies are measured at the end of each production round. 45 variables are cross-checked in NFSA quarterly and annual data with GFS, 23 variables with quarterly MAs and 26 with annual MAs.

The first analysis of consistency between quarterly NFSA and QNA / quarterly GFS spans the last 18 production rounds from July 2015. Countries are grouped according to GDP/B9 (net lending/net borrowing) discrepancies:

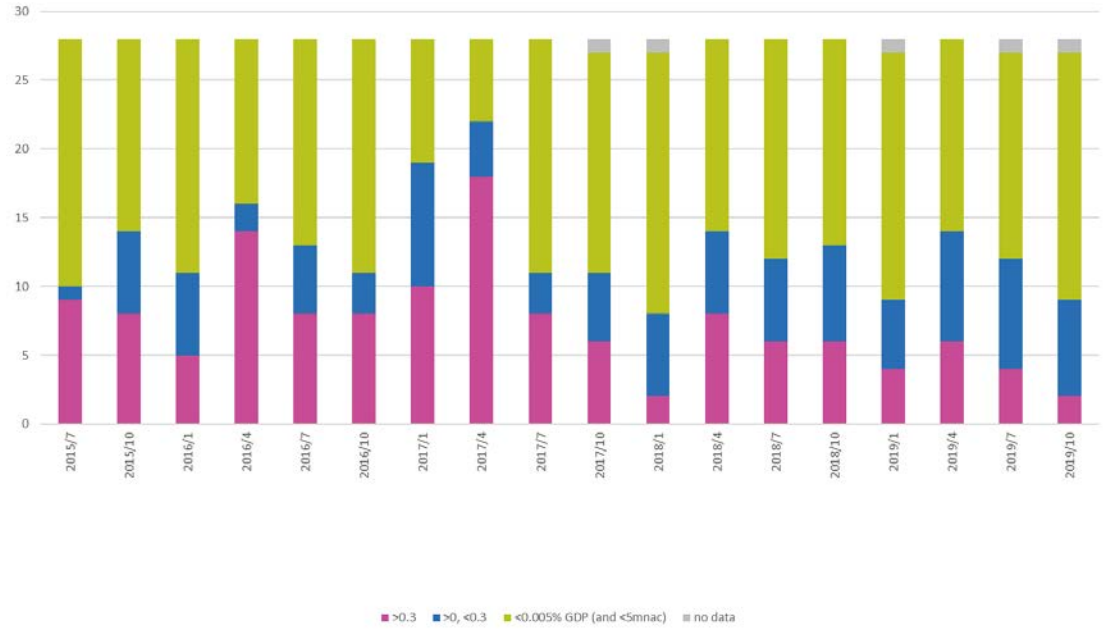
- above 0 in at least one quarter;
- over 0.3% of GDP in at least one quarter;
- less than 0.005% of GDP.

Figure 7.1: Number of countries with inconsistency in S1.GDP over time



Source: Eurostat

Figure 7.2: Number of countries with inconsistency in S13.B9 over time 20



Source: Eurostat

Figures 7.1 and 7.2 show that:

- the number of countries with zero discrepancies (less than 0.005% of GDP and less than 5 million in national currency) fell in the first part of the period, but rose again after the introduction of consistency requirements in validation rules in July 2017;
- the opposite applies as regards the number of countries with discrepancies >0;
- among countries for which discrepancies are observed, the incidence of severe discrepancies (>0.3% of GDP in any quarter) is decreasing;
- for the B9 variable, it can be observed that April is the most challenging production round in terms of consistency between NFSA and GFS; and
- for the GDP variable, no regular maximum or minimum is observed, but April seems to be the most, and January the least critical production round, in terms of consistency between NFSA and MA.

Where inconsistencies are observed with S1.GDP or S13.B9, other variables are also inconsistent. However, the reverse is not necessarily true, i.e. there may be inconsistencies in other variables that are not reflected in these balancing items (S1.GDP and S13.B9). This happens when there are classification or consolidation issues (e.g. P31 vs P32 with same P3, or D7.C vs D7.D).

7.2. Main aggregates of national accounts

In the ESA 2010 TP, Table T1 shows a set of ANA and QNA indicators that play a prominent role for economic policy analysis and are regularly reported in the news. These include GDP (the most commonly used indicator of economic performance) and its main output, expenditure and income aggregates. The dataset also includes population and employment figures that are consistent with NA concepts and can be used to derive *per capita* figures and for productivity analysis.

The following sections explore specific types of challenge in compiling ANAs and QNAs, with a view to identifying good practices in ensuring the overall consistency of NAs. The analysis focuses on

consistency requirements for ANAs and QNAs that are agreed validation checks for MAs and reviewed in the regular ESA 2010 quality reports. It also outlines issues of consistency with other datasets (in particular, between the two main sets of ESA 2010 tables: the sector accounts and the supply-use framework) and possible solutions from an ANA or QNA perspective, but these are explained in more detail in subsequent sections to avoid overlap. While the analysis is based on the requirements of the current ESA 2010 TP[29], some improvements are proposed for the future.

EFFICIENT INTEGRATED PRODUCTION OF KEY POLICY INDICATORS

Due to the importance of MAs as key policy indicators, with relatively frequent updates and overlaps with other datasets, an efficient and integrated approach to their production is crucial.

Data transmitted in ESA T1 have direct and indirect links to many other datasets (see Table 7.11) and series transmitted in T1 are also transmitted in other data collections (see Table 7.12).

Table 7.11: Direct and indirect links of MAs T1

Table no	Subject
	Direct links – numerical consistency
2	MAs of general government
3	Tables by industry
5	HFCE
8/801	NFSAs
9	Detailed tax and social contribution receipts by type of tax or social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification
10	Tables by industry and by region
11	General government expenditure by function
12	Tables by industry and by region
13	Household accounts by region
15	Supply table at basic prices
16	Use table at purchasers' prices
17	Symmetric IO table at basic prices
22	Cross-classification of GFCF by industry and by asset
	Indirect link – numerical consistency / plausibility
20	Cross-classification of fixed assets by industry and by asset
26	Balance sheets for non-financial assets

Source: ESA 2010 TP

29 https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-01-13-429-3A-C

Table 7.12: T1 and other ESA 2010 TP tables – common variables

Code	Variables transmitted in T1 at annual and quarterly frequency	Current prices	Previous year´s prices and/or chained-linked volumes
B.1g	GVA at basic prices	T3, T8, T10, T12, T16, T17	T3
D.21	Taxes on products	T8, T9, T15, T17	T15
D.31	Subsidies on products	T8, T15, T17	T15
B.1*g	GDP at market prices	T8	
P.3	Total final consumption expenditure	T8, T16, T17	T16
P.3	HFCE (domestic concept)	T5, T8, T16, T17	T5, T16
P.3	HFCE (national concept)	T5, T8, T13	T5
P.3	Final consumption expenditure of NPISHs	T8, T16, T17	T16
P.3	Government final consumption expenditure	T2, T8, T10, T11, T16, T17	T16
P.31	Individual consumption expenditure	T2, T8, T10, T11	
P.32	Collective consumption expenditure	T2, T8, T10, T11	
P.4	Actual final consumption	T8, T16, T17	T16
P.41	Actual individual consumption	T8	
P.5	Gross capital formation	T3, T8, T16, T17	
P.51g	GFCF	T3, T8, T10, T16, T17, T20, T22, T26	T16, T20, T22
P.52	Changes in inventories	T3, T8, T16, T17, T26	T16
P.53	Acquisitions less disposals of valuables	T3, T8, T10, T16, T17, T26	T16
P.6	Exports of goods (fob) and services	T8, T16	T16
P.61	Goods	T8	
P.62	Services	T8	
P.7	Imports of goods (fob) and services	T8, T15, T17	T15
P.71	Goods	T8	
P.72	Services	T8	
B.11	External balance of goods and services	T8	
B.2g + B.3g	Gross operating surplus and gross mixed income	T3, T8	
D.2	Taxes on production and imports	T8, T9	
D.3	Subsidies	T8, T10	
POP	(a) Total population (thousands)	T10, T12	
EMP	Employment in resident production units and employment of residents	T3, T8, T10, T12	
ESE	Self employed	T3	
EEM	Employees	T3, T10, T12	
D.1 (D11/D12)	Compensation of employees working in resident production units and compensation of resident employees (split into wages and salaries and social contributions)	T3, T8, T10, T16, T17	

Source: ESA 2010 TP

A relatively low level of detail is required in T1[30] and NAs are usually compiled at a much more detailed level. To ensure the consistency required in the overall set of NAs, it is therefore highly recommended that countries compile their annual accounts in an integrated process and publish their estimates together or according to a pre-announced, well-coordinated release schedule.

30 Industry breakdowns for GVA, income and employment aggregates by industry according to NACE A*10, some additional information on the structure of household expenditure and geographical breakdowns of exports and imports.

Most countries publish updated annual estimates close to the ESA transmission deadlines (T+9 and 12 months), but some update their ANA estimates earlier, e.g. in May, June or July. In addition, the ESA 2010 TP requires a first transmission of T1A data 2 months after the beginning of each year, where countries are normally not expected to revise past estimates, but add estimates for the previous year based on the sum of quarterly data.

The main purpose of T1 is to provide key policy indicators at quarterly frequency. Although the ESA 2010 TP requires only one transmission of QNA per quarter, after 2 months, most countries transmit QNA estimates more frequently.

Responding to user needs for timely estimates, most EU and EFTA countries already compile GDP and/or flash estimates after 30 and/or 45 days, and several publish full sets or sub-sets of T1Q indicators at the same time. On the other hand, a number of EU countries retransmit updated QNA after T+85 days/T+3 months or T+120 days to incorporate additional information and ensure consistency with the sector accounts (T801) that have to be transmitted 85 days or 3 months after the end of each quarter. In this respect, efficient production of T1Q estimates (in terms of IT infrastructure and human resources) is crucial for the regular production process.

In 2020, changes in transmission pattern are expected for countries that requested a derogation to submit QNA data after 70 or 85 days. Since derogations expire formally on 1 January 2020, all countries should bring their QNA transmissions forward to (at the latest) T+2 months from end February 2020 onwards. Some other countries are reportedly considering changes to their overall QNA and ANA release pattern to improve the timeliness and/or consistency of their data releases.

ENSURING INTERNAL CONSISTENCY BY BALANCING APPROACHES

In practical terms, a key challenge for the compilation and transmission of T1 is to make best use of all available source data while ensuring full internal consistency in a dataset currently split across several sub-tables.

To obtain reliable estimates, it is generally recommended that countries estimate GDP separately on the basis of output and expenditure, and ensure consistency through subsequent balancing. Income components are also estimated, but only in current prices and gross operating surplus, and mixed income is often estimated as a residual. While countries are expected to implement an interactive estimation and balancing process, including expert judgements (especially for ANA estimates), the balancing of QNA estimates is usually more automated, often using an indicator-based econometric approach benchmarked to the latest ANA estimates. It is recommended that country-specific sources and methods be well documented, which is usually the case[31].

A basic requirement for T1 is that GDP data transmitted in the different sub-tables containing MAs from the output (T0101), expenditure (T0102) and income (T0103) approaches are fully consistent and that geographical breakdowns of exports and imports in sub-tables T0120/1 are consistent with the totals in T0102. Also, accounting identities should be fulfilled and transmitted price series should be coherent with each other. In principle, this applies to both annual and quarterly estimates, although the method of seasonal adjustment or chain-linking has to be taken into account when verifying consistency checks. While Eurostat occasionally detects inconsistencies in the course of its validation, they are quite rare and addressed by retransmissions if needed. The ESA 2010 quality reports produced since 2016 show that, in general, ANAs and QNAs have been internally consistent.

In practice, the pre-requisites for ensuring the internal coherence of T1 estimates are the effective sharing of data and the pre-validation of results with agreed validation checks, possibly with gradual refinement of estimates through comparison and balancing. This is greatly facilitated by a highly integrated and partly automated IT system, but expert judgement should also be used to ensure that the estimates are plausible and robust.

31 EU and EFTA countries have to provide detailed inventories to verify GNI estimates determining their contributions to the EU budget. Many countries also provide QNA inventories on a voluntary basis; these are published on Eurostat's website; https://ec.europa.eu/eurostat/web/national-accounts/methodology/member-states-accounts/qna-inventories

Some countries transmit statistical discrepancies to ensure that the GDP aggregates from the output, expenditure and income side add up (see Table 7.13). If countries consider one compilation approach to be the most accurate (i.e. the output approach in most countries), the statistical discrepancy is set to zero for that approach, but specified for other approaches. A generally accepted approach is also to use a specific aggregate (typically changes in inventories for the expenditure and gross operation surplus and mixed income for the income approach) to include any statistical discrepancy[32]. Statistical discrepancies can be an efficient and transparent way of dealing with inconsistencies in preliminary estimates and re-aligning earlier QNA estimates with subsequently updated general government or sector account estimates. Statistical discrepancies are not transmitted for sector accounts, so a balanced approach would seem preferable for MAs also.

LIMITING VINTAGE-RELATED DISCREPANCIES BETWEEN TABLES

For the overall consistency of NAs, vintage-related discrepancies between T1 and other tables should be kept to a minimum using well-planned revision processes.

A key issue for the overall consistency of NAs is that earlier T1 estimates show vintage differences from subsequently revised or new data from general government and/or sector accounts releases. Since the ESA 2010 TP requires that QNA data be transmitted after t+2 months (and a number of countries release them even earlier), sector accounts and GFS estimates transmitted after t+85 days and t+3 months respectively are generally based on improved source data. Eurostat does not systematically check QNA estimates submitted by t+2 months against other NA transmissions, since they constitute the most up-to-date vintage[33]. It does usually check subsequent transmissions of GFS and sector accounts against MAs (see following sections for details).

Table 7.13 Use of statistical discrepancies in MA transmissions

Price	Annual data (2017)					Quarterly data (unadjusted) for 2018Q4					Quarterly data (adjusted) for 2018Q4				
	current			previous year		current			previous year		current			previous year	
Country	T0102	T0101	T0103	T0102	T0101	T0102	T0101	T0103	T0102	T0101	T0102	T0101	T0103	T0102	T0101
DK											269				
EE	-146			-2		-15			-89						
IE	1 052	-1 052	-1 052	-1 275	1 275	1 297	-1 297	-1 297	-695	695	695	-695	-695	-467	467
ES									-1	-1				1	1
NL											542	45	134		
AT	825			525		-116			565		-116				
PT		-104			-139		2			71		201			
RO											-888	-187	-1 606		
SK						161			171		161	42	-19		
FI	-468			-317		1 135			719		1 333				
GB	-1 883		7 191	-1 834		-8 004		9 538	-485		-508		2 451	1 945	
NO							-63	-63							
AL	-18 760			965		2 206			11 109		-4 298				
BA	-1 134	-791	-791	-1 241	-807	-122	-206	-206	-118	-219					

Source: Eurostat

Where sector accounts estimates are updated significantly, countries should therefore consider whether they could also transmit updated QNA estimates. This is already established practice in a number of countries, which retransmit updated QNA estimates consistent with sector accounts data after about T+3 months to ensure that the NAs are consistent overall and that the MAs reflect the most up-to-date information. However, many countries find this approach too resource-intensive and/or are reluctant to revise their QNA data too frequently, especially as the growth rate of MAs is significantly affected and there is a risk of users perceiving QNA estimates to be unreliable.

32 One way to improve transparency on the balancing process could be to introduce a sub-item 'of which due to balancing the GDP approaches' in a future revision of the ESA TP.

33 The validation periods for T1 agreed with main users are usually limited to 1-3 working days (i.e. much less than for other datasets), to ensure timely data availability;
https://ec.europa.eu/eurostat/documents/24987/6624264/OECD-Eurostat-cooperation.pdf

A particular challenge arises where Eurostat's GNI or EDP verification processes require substantial revisions that may have significant impacts on the entire set of NAs. In particular, this is the case if substantial revisions affect entire time series, so that they should in principle be incorporated in the context of a benchmark revision. Eurostat recently published recommended approaches for the coordinated implementation of revisions[34]. While full consistency between all transmitted data series is expected in the third quarter (especially in benchmark years), the practical approach to dealing with specific cases should be clarified bilaterally with Eurostat if necessary.

In practice, it will help if countries implement an integrated IT system that ensures that series transmitted in different tables are consistent and that subsequent balancing is at least partly supported by automated processes. Information on the revision policy and possible data inconsistencies should be provided as metadata.

A specific case is the consistency of ANAs and QNAs in relation to different ESA 2010 TP deadlines, since T1A is due after t+9 months and the deadline to transmit T1Q is t+2 months after the end of the quarter, i.e. t+8 months after the beginning of the year. While it should be emphasised that the ESA 2010 TP deadlines specify the last possible transmission date, only a few countries transmit updated annual data already at t+8 or earlier to ensure the consistency of QNAs with updated ANA levels. Several countries solve the problem by retransmitting QNAs with updated ANAs close to the t+9 months deadline. However, some do not transmit updated QNAs until the next QNA deadline, i.e. t+11 months after the end of the year. This creates a long period of inconsistency between QNAs and ANAs, which usually raises questions from users and is negatively perceived in terms of data quality. Therefore, Eurostat encourages additional transmissions that are not scheduled in the TP.

CONSISTENCY CHECKS FOR MAIN AGGREGATE TABLES

Since MAs transmitted in T1A and T1Q are generally received and validated before the other priority tables, consistency checks for the validation process focus mostly on T1 internal consistency (in particular, the consistency of series transmitted in different sub-tables), additivity, price consistency and the consistency of annual and quarterly T1 data[35].

T1 data transmitted at a particular point in time are generally fully consistent in terms of identical variables transmitted via different sub-tables (GDP, exports and imports). On the other hand, there are cases where series should not be identical, e.g. household consumption and employment series that are transmitted in different sub-tables according to the national and domestic concepts.

Accounting identities are generally respected. If Eurostat validation checks on the additivity of breakdowns and consistency of prices detect deviations, these can usually be explained by country-specific methodological practices, such as direct seasonal adjustment or chain-linking techniques of which countries have informed Eurostat[36].

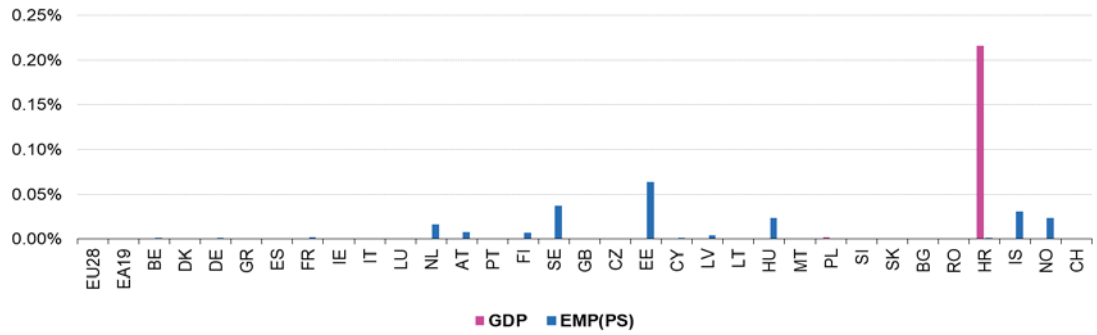
Temporary vintage-related differences occur mainly between annual and quarterly data, but they are generally small (see Figure 7.3).

34 https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-18-012

35 ESA 2010 handbook on data validation, chapter 5; https://webgate.ec.europa.eu/fpfis/wikis/pages/viewpage.action?spaceKey=ESRNA&title=ESA+2010+-+Handbook+on+Data+Validation; online access with EU login account

36 https://ec.europa.eu/eurostat/web/national-accounts/methodology/member-states-accounts

Figure 7.3: Consistency of annual and quarterly GDP and persons employed



Note: Maximum difference between A and sum of Q in percentage terms (1995-2018), based on data extracted on 7 November 2019

Source: Eurostat

Finally, cross-domain checks against T1 data are generally carried out during the validation of other tables. For detailed MAs such as T3, T5 and T22, identical series are checked and compared to relevant T1 series, and plausibility checks are applied as regards the relation to T20 and T26. In particular, consistency checks against same series transmitted in T1 are regularly applied for sector accounts and GFS. Any differences are shared with the MA team and followed up with counterparts if necessary.

7.3. Main aggregates of general government

General government MAs include breakdowns of general government expenditure (both current and capital) and revenue according to sub-sectors. The difference between total revenue and expenditure is net lending / net borrowing, one of the two main indicators published for the general government sector (together with general government debt).

LINKS BETWEEN T2 AND OTHER ESA 2010 TP TABLES

There are relatively many links between general government MAs (T2) and other ESA 2010 TP tables. The direct and indirect links are summarised in Table 7.14.

Table 7.14: Direct and indirect links between general government MAs (annual T2) and other ESA 2010 TP tables

Table no	Subject
	Direct links – numerical consistency
	GFS tables
9	Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector, including the list of taxes and social contributions according to national classification – annual
11	Expenditure by government function (COFOG) – annual
25	Quarterly non-financial accounts of general government
	Other tables
1	MAs – annual
8	NFSAs – annual
	Indirect links – numerical consistency / plausibility
	GFS tables
27	Quarterly FAs of general government
28	Quarterly government debt
	Other tables
3	Tables by industry – annual
6	FAs by sector
7	Balance sheets for financial assets and liabilities
26	Balance sheets for non-financial assets – annual
801	NFSAs - quarterly
26	Balance sheets for non-financial assets – annual
29	Accrued-to-date pension entitlements in social insurance – 3-yearly

Source: ESA 2010 TP

In addition to ESA 2010 TP tables, there are direct and indirect interdependencies and links to EDP notification tables based on Council Regulation (EC) No 479/2009[37], as amended. The Regulation requires consistency with the underlying government accounts and the provision of updated data at notification times.

For example, indirect links involve comparable concepts across two tables or variables, e.g. P.3 of S.13 in individual COFOG groups is conceptually equal to P.31 of S.13 in all other tables under ESA 3.104-106. There are indirect links with other tables, such as T3, which has industry breakdowns of variables from T1 that are also common with T2. However, such consistency verifications should be based on direct consistency verifications between ESA T1 and T3.

In other cases, the links are indirect because variables do not overlap exactly. This is an example of logical consistency, e.g. corresponding flows in T27 (quarterly FAs of general government) should be comparable with T2. (In practice, this is verified against ESA T25).

Cross-table consistency and other consistency checks are described in Eurostat's *ESA 2010 validation handbook*.

The T2 compilation process is designed to coincide with that for other GFS tables and the compilation and transmission of EDP notification tables. The following links are verified (full consistency):

- T2 vs T25 – all common transactions should match, e.g. annualised T25 should equal T2 at common transmission periods;
- T2 vs T9 – all common transactions (tax and social contribution aggregates) should match at common transmission periods;

37 Council Regulation (EC) No 479/2009 of 25 May 2009 on the application of the Protocol on the excessive deficit procedure annexed to the Treaty establishing the European Community (OJ L 145, 10.6.2009, p. 1).

- T2 vs T11 – all common (expenditure) transactions must match. The transmission deadline for T11 is t+12 months, so it is not compulsory to retransmit T2. Consistency is verified with T2 or T25, as appropriate. Vintage differences may occur in comparison to T2;
- ESA T2 vs EDP notification tables – B.9, D.41p, P.51g should be equal in coinciding transmissions. In addition, cross-checks are performed with EDP questionnaire tables; and
- coherence of non-financial and FAs (ESA T27) is monitored via ESA T25.

In addition, the following interdependencies are monitored (inconsistencies frequently occur for reasons of data vintage, revision policy and transmission deadlines):

- T2 vs T1; and
- T2 vs T8.

T2 RELEASE SCHEDULE

Consistency checks on data are challenging due to revisions and vintage effects, which can give rise to inconsistencies as a result of national compilers' differing release calendars and revision practices. Transmission calendars are mainly aligned for GFS and EDP tables, with the exception of ESA T11. Therefore, vintage differences are not expected to occur at the common transmission deadlines. However, transmission deadlines differ between T2 and other ESA 2010 TP tables with which it has interdependencies. Vintage differences with these tables can therefore occur due to different transmission deadlines, but also due to the differing time and resources needed to update other tables. The legal transmission deadline for T2 is the end of March and September, reflecting the need for full consistency between GFS tables and EDP notification tables. However, T2 can also be transmitted every time the annual data for S.13 are revised.

7.4. Financial accounts by sector

LINKS BETWEEN T6 AND OTHER ESA 2010 TP TABLES

Apart from the close links with T7, T6 (FAs by sector, flows, annual) has few links with other ESA tables. Tables 6 and 7 can be considered as integrated. Indeed, the term 'FAs' is generally used to cover not just financial transactions and other financial flows, but also financial balance sheets, by institutional sector. Data consistency between Tables 6 and 7 is of paramount importance, because of the NA identity whereby, for any variable, the sum of flows must be equal to the change in stock between one period and the next. Therefore, in data validation at both national and international level, Tables 6 and 7 are treated together and their validation is dependent on full stock/flow consistency across all variables.

Conceptually, T6 has a direct link with T8, through the variable B.9 (net lending / net borrowing). It is the same balance in the sequence of accounts, observed from the capital account and FA of each sector and the total economy. ESA 2010 paragraph 5.18 states that '[t]he balancing item of the FA is conceptually identical to the balancing item of the capital account. In practice, a discrepancy is usually found between them because they are calculated on the basis of different statistical data'. In other words, ESA 2010 acknowledges that non-financial and FAs require different source data, so vertical discrepancies are likely.

The discrepancies are recognised in the ESA 2010 TP, where T8 includes the variable DB.9 ('discrepancy with net lending / net borrowing of FAs') for each sector. Moreover, T6 refers to 'net financial transactions' (B.9f) rather than to 'net lending / net borrowing' (B.9).

Table 7.15: Direct and indirect links of FAs by sector – annual T6

Table no	Subject	Due date	Link
Direct links – numerical consistency			
7	NFSAs – annual	t+9 months	B.9 + discrepancy (DB.9) = B.9f
27	FAs of general government – quarterly	t+3 months (t+85 days for euro area)	For most variables = sum of four quarters
29	Accrued-to-date pension entitlements in social insurance – 3-yearly	t+24 months	F.63, K.5, K.7
Indirect links – numerical consistency			
7	Balance sheets for financial assets and liabilities – annual	t+9 months	Opening stock + flows = closing stock
28	Government debt (Maastricht debt) for general government – quarterly	t+3 months	Liabilities in AF.2 and AF.4

Source: ESA 2010 TP

T6 can be compared to T27 as far as the general government sector (S.13) is concerned. As it contains annual data for delivery at the end of September each year (t+9 months), it should be coherent with the annualised quarterly data of T27 at t+3 months. However, because of possible retransmissions of T27 during the GFS validation process, full consistency between T6 and T27 (if it existed at end of September) might not be maintained.

T6 can be compared to T29 with regard to flow data on households' pension entitlements. As T29 relates to annual data due at t+24 months, pension entitlement flows should normally be equal to the FAs reported at t+21 months for the reference year concerned.

In accordance with recommendation 16, cross-table consistency checks should be set up in national production systems for T6 in line with the above links to other tables.

DATA FLOWS CONTROLS IN T6

As Tables 6 and 7 may be considered as a set of interlinked matrices, any data inconsistencies can be easily resolved using IT solutions, as mentioned in recommendation 20.

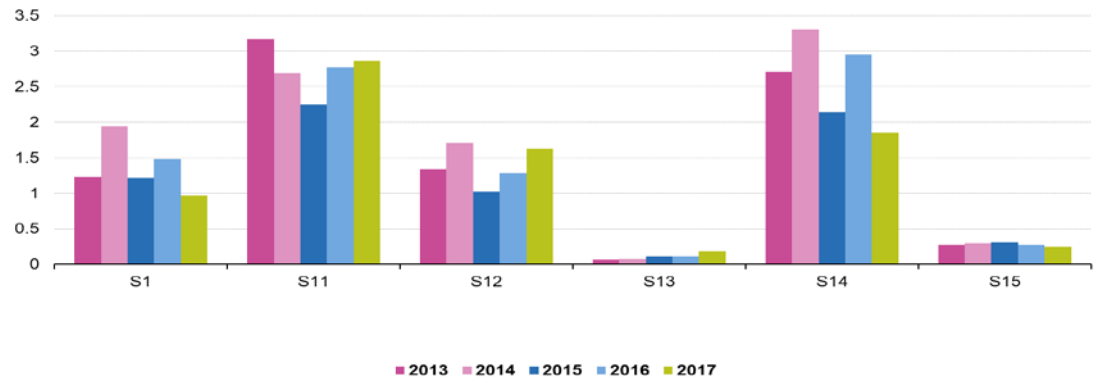
In the IT system, the quality checks prior to data release may mirror Eurostat's. Additional controls could include cross-table checks and plausibility checks focusing, for example, on corporations' external financing or households' debt-to-income ratios.

BALANCING: REDUCING VERTICAL DISCREPANCIES

Inconsistencies between net lending / net borrowing (B.9) by sector of T8 and the conceptually equal balancing item (known as B.9f) in T6 are known as vertical discrepancies.

How should one handle inconsistencies between B.9 and B.9f? It might be assumed that, generally, the larger the inconsistency, the more questionable the data quality of the non-financial and/or FA. However, interpretation of this inconsistency should be more nuanced. Figure 7.4 shows absolute differences between B.9 and B.9f for 27 EU countries (26 for 2017) as a percentage of GDP. Data extraction was in February 2019.

Figure 7.4: Absolute differences in B.9/B.9f as a percentage of GDP (average of EU countries)

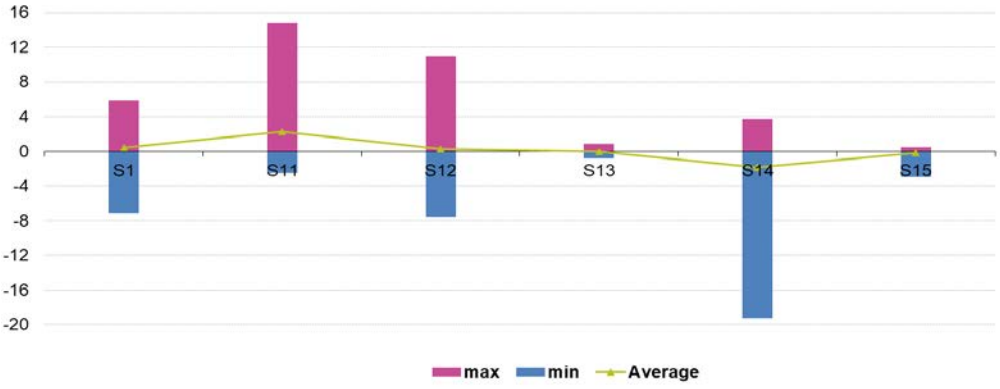


Source: Eurostat

Compared to other inconsistencies which may arise in NA data reporting, the inconsistencies in Figure 7.4 are clearly significant in size, particularly in the household and non-financial corporation sectors, where data sources tend to be less complete or reliable. Moreover, there is no indication (except as regards S.13) that the differences reduce over time, as data for earlier years become finalised. Indeed, examination of a much longer time series indicates that similarly large inconsistencies persist in many countries over the whole period.

What about variations between countries in the size of vertical discrepancies? The bars in Figure 7.5 show the range of inconsistencies among 27 EU countries (26 in 2017) for each sector, taking an average of countries' data for reference years 2013-2017 (thus reducing the impact of extreme values for any one year).

Figure 7.5: Inconsistencies in B.9/B.9f, range and average, as a percentage of GDP (EU countries, average of reference years 2013-2017)



Source: Eurostat

One feature is the wide range of inconsistencies for S.14 in particular, followed by S.11 and S.12, and the size of the differences (almost 20% of GDP in the case of S.14). Another feature is the fact that the discrepancy tends to be negative in the case of S.14, meaning that net lending is higher (or net borrowing lower) for the FA than the non-financial account; the discrepancy tends to be positive in the case of S.11 and, to a lesser extent, S.12. This suggests a sectoral bias in the results of at least some countries.

The line in Figure 7.5 shows the countries' average difference in 2013-2017, ranging from -2% to +2% of GDP depending on the sector. This result may seem highly skewed, especially for S.14 and, to a lesser extent, S.11 and S.12, which indicate higher average differences. The reason for the tendency towards zero is the fact that several countries eliminate the vertical discrepancy each year for some or all sectors. This involves adjusting one or more financial and/or non-financial transactions to ensure that B.9 matches B.9f. The differences are allocated to data considered to be of lesser quality, typically accounts receivable/payable, or unlisted shares, but possibly also to other transactions.

However, such adjustments may have little statistical justification and may risk reducing the quality of the affected data. Moreover, they make it more difficult to reconcile the accounts with data sources. It should be noted that ESA 2010 paragraph 5.244 rules out the use of accounts receivable/payable for recording statistical discrepancies.

Nevertheless, it is good practice to reduce vertical discrepancies as much as possible, without resorting to arbitrary decisions or techniques. Eurostat and the ECB have set up a joint project to produce guidelines on reducing vertical discrepancies. This will be discussed in the relevant expert groups.

VERTICAL DISCREPANCIES AND INSTITUTIONAL ARRANGEMENTS

Recommendations 4 -9 on the need for inter-departmental and inter-institutional dialogue are highly relevant when considering best practice on reducing vertical discrepancies. National compilers of data for non-financial and FAs by sector often work in two different institutions. A group comprising data compilers and NA methodologists should be set up, tasked *inter alia* with:

- ensuring a uniform sectoral classification of units;
- cooperation on data sources;
- regular review of balancing procedures;
- analysis of transactions affecting both the non-financial and financial accounts;
- the removal of any sectoral bias observed in the vertical discrepancies; and
- the convergence of revision policies towards the HERP.

The group should meet at least once a year and, in the case of annual FAs based on quarterly production, up to four times a year.

8 Communication and metadata

ESA 2010-based national accounts should be consistent, by law. Inconsistencies can be accepted only temporarily, exceptionally and if justified. This chapter gives advice on how to manage communication with users as regards inconsistencies. Transparency on consistency issues is strongly recommended, the purpose being to inform users, not to justify the inconsistencies.

8.1. Communication

An effective communication policy is crucial for dissemination at national and EU levels, including for explaining logical and numerical inconsistencies in published data.

22: Communication adapted to users

National policy on communication on the consistency of accounts should consider the audience, the media to be used, how significant the inconsistencies are and what types of explanation are suitable.

Communication policy should be suited to the needs of Eurostat as well as professional and non-professional users. Statistical compilers may choose from various media:

- information on inconsistencies could be transmitted to Eurostat through data flags, table footnotes, reference metadata, quality reports and inventories on sources and methods;
- in general, press releases, metadata and webpages are appropriate means of addressing users; but
- more professional users will also investigate metadata, inventories and relevant articles.

The need for communication depends on the significance of each individual inconsistency; in particular:

- is the inconsistency logical or numerical?
- does it concern a key NA variable?
- for numerical inconsistency, what is the size?
- what is the reason for the numerical inconsistency?
- does the inconsistency affect several datasets or is it restricted to a single dataset?
- is the inconsistency exceptional and temporary? and
- why is immediate alignment not feasible?

The communication channel depends on the nature of the inconsistency:

- *exceptional inconsistencies* should be communicated to users when inconsistent data are released, using press releases, data flagging, etc.;
- *recurrent logical or numerical inconsistencies* should be avoided, but where present they can be treated as a sub-optimal by-product of a transition to a consistent NA system. Possible communication channels could be reference metadata, methodological notes, a web page, an article, etc.

Explanations of inconsistencies can vary in terms of detail, technicality and presentation. While detailed and technical explanations are suitable for communicating with Eurostat, explanations to users should be easily accessible and non-technical.

Example: Possible communication channels for some types of inconsistency

Table 8.1: Communication channels for different types of inconsistency

Type of inconsistency	Example	Possible communication channels
Differences between conceptually similar NA variables	Incoherence of net lending / net borrowing in NFSAs and FAs due to different data sources.	Inventories on sources and methods Reference metadata Quality reports
Differences in series that are conceptually different, but similar for the non-specialist	Incoherence between NA and labour force survey employment data, due to different methodological basis.	Website or article Inventories on sources and methods Reference metadata
Differences between frequencies of NAs	Temporary inconsistency between annual data and quarterly data due to publication/transmission deadlines.	Inventories on sources and methods Reference metadata Quality reports
Cross-domain differences in NAs	Differences between the same variable in different accounts.	Inventories on sources and methods Reference metadata Quality reports
Breaks in a time series	For an NA time series, a country introduced a new methodology bringing the data for the latest years into line with ESA 2010. Data for earlier years will not be adjusted until the benchmark revision.	Reference metadata or footnotes

Source: Eurostat

8.2. Metadata

Differences in figures published for the same NA concept in the same production round are confusing for users, can be interpreted as a sign of low quality and pose difficulties when it comes to interpreting the conflicting data results. Therefore, every effort should be made to avoid such cases. If this is not possible, communication with users requires the regular publication of easily accessible, up-to-date metadata providing clear explanations of observed inconsistencies.

However, the time allocated to producing metadata to explain inconsistencies should not exceed the time spent achieving numerical consistency. The NAs should be a consistent framework and inconsistencies (and related metadata) should be the exception.

23: Metadata on inconsistencies

For each set of accounts published nationally or transmitted to Eurostat, metadata should be used to explain what kind of consistency is expected and, if it has not been achieved, why.

We can illustrate the use of metadata for communicating on inconsistencies by reference to NFSAs (Tables 8 and 801). The tables bring together transaction data from different NA domains (MAs, GFS, BoP) to provide a comprehensive view of economic processes by institutional sectors in a given period. Consistent inputs are essential to produce an internally coherent, balanced set of accounts. For this reason, when validating sector accounts, Eurostat assesses:

- the internal consistency of the dataset;
- the consistency between quarterly and annual data for selected variables of transmitted national data; and
- the cross-domain consistency of the dataset with the NA and general government MAs.

Where revisions are not synchronised or release calendars differ across the accounts, inputs of different vintages hinder the production of an internally coherent, balanced set of accounts. In such cases, the simultaneous consistency of sector accounts with all related NA domains is not possible and this is where inconsistencies become most visible to data users.

Eurostat collects metadata reports from data providers to assist in sector accounts data validation. Such reports (in Excel format) have to be transmitted at the same time as (or shortly after) each data transmission. They provide information on major events, revisions, flags and data adjustment policies, but also on cross-domain consistency. If inconsistencies are observed (beyond the rounding level), data providers should fill in the relevant section of the report.

24: Metadata for dissemination

Reference metadata files in Euro SDMX metadata structure (ESMS) published together with the data should provide brief information on consistency (under ‘coherence and comparability’).

ESMS files provide information on all metadata and quality concepts, as described in the single integrated metadata structure (SIMS V.2), which the European Statistical System Committee endorsed as an ESS standard for reporting metadata and quality in November 2015. This covers all data quality criteria in the Statistical Law in a standardised format and includes a section 15 on ‘coherence and comparability’, including ‘cross-domain coherence’ (15.3) and ‘internal coherence’ (15.4). The former describes how the statistical outputs in question differ from other related statistical outputs and may gauge the effects of the differences. ESMS files can be compiled for the whole dataset, and separately for each country. For national and regional accounts, general high-level metadata have been developed for the whole ESA 2010.

Example: Eurostat's reference metadata file on ESA 2010

Eurostat's reference metadata accompany the published data:

Figure 8.1: Reference metadata print screen from Eurobase

The reference metadata file on ESA 2010 contains the following detailed description (https://ec.europa.eu/eurostat/cache/metadata/en/na10_esms.htm):

'Within the system of national accounts there is full consistency between the domains: annual and quarterly national accounts, government accounts, sector accounts, financial accounts, regional accounts, supply and use tables. However, in practice full consistency may not always be possible and temporary discrepancies might occur. They are usually the result of vintage differences.

Primary statistics like structural business statistics (SBS), short-term statistics (STS) and labour force statistics (LFS) are widely used as input for national accounts. However, there is no full consistency between these statistical domains and national accounts. Main reasons are differences in concepts/definitions and in coverage.

Balance of payments is also used as an important source for national accounts. The definitions and coverage of BoPs, as defined in the BPM6 manual, are fully harmonised with those in ESA 2010. Therefore, BoPs variables are in principle fully coherent with the corresponding national accounts variables.

Although in theory the NA data should be harmonised between all NA domains, in practice there will be discrepancies in the data of several countries as well as in the euro area and EU aggregates. The reasons are the following:

- Quarterly data of most countries are usually aligned to annual data once a year; inconsistencies between quarters and the corresponding year might appear for some time before the alignment.
- National data for different national accounts domain are compiled at different points in time, which is usually related to availability of sources.
- Timeliness requirements differ between tables of the ESA 2010 transmission programme. For example, quarterly national accounts main aggregates have to be delivered to Eurostat 2 months after the end of the reference quarter, whereas the quarterly sector accounts table and government quarterly financial accounts table have to be transmitted at 85 days or 3 months after the quarter-end.
- The length of the validation and compilation processes differs between the responsible Eurostat units. For example, a correction done by a national accounts domain that publishes at 90 days after the reference quarter cannot be taken on board by the domain that already disseminated its data at 65 days after the reference quarter.

Usually the discrepancies between the national accounts domains only concern the most recent reference period; previous reference periods tend to be coherent between domains.'

Source: Eurostat

As the ESA 2010 concepts and definitions are consistent, there should be no logical inconsistencies in the NA framework. However, if in exceptional, justified cases logical inconsistencies are present, they must be well documented in the descriptions of sources and methods (inventories). Advice should be given to users on how to interpret the data when differences lead to numerical inconsistency.

Member States are developing inventories of sources and methods on a voluntary basis (e.g. on QNAs, quarterly and annual NFSAs, etc.). The completed inventories are published on Eurostat's website. The analysis showed that not all inventories take a systematic approach to coherence and consistency. Information is generally available, but scattered and not developed in sufficient detail. It is therefore appropriate to review the templates of the voluntary inventories and include sections on consistency checks and the national approach to consistency. In 2019, Eurostat updated the guidance to compilers on inventories to include appropriate information in a standardised way. This effort will continue on a regular basis as needs arise.

25: Metadata in inventories

The reasons for any inconsistencies should be explored in detail in public inventories of sources and methods.

Example: Inventories – Netherlands

The Netherlands addresses consistency systematically in its inventories. Below are two examples from the QNA and ASA inventories. The inconsistencies were resolved in the 2018 benchmark revision and the inventories are being updated.

The text from the first versions of the inventories serves as good practice for several reasons:

First, the descriptions reassure users that consistency of accounts is an objective and is well monitored during the compilation process.

Secondly, inconsistencies between the same variables in different datasets were clearly identified and explained. Examples were the differences between taxes on products (D.21) and other taxes on production (D.29) in ESA 2010 Tables 2 and 8, and the differences in BoP statistics.

Finally, where there were differences, actions to improve the overall numerical consistency of the accounts were identified. The examples below are taken from the inventories as they stand in 2019.

QNA inventory:

'The regular estimates of the QNA are consistent with the quarterly sector accounts and the short-term public finance statistics (STPFS). The QNA and the labour accounts are consistent as well and released on the same day.'

ASA inventory:

'**3. ASA datasets consistency**

3.1 Integration of financial and non-financial ASA accounts

In the Netherlands the non-financial and the financial accounts are compiled by one organisation, CBS (in close cooperation with DNB). The non-financial and the financial accounts are compiled simultaneously within the same iSR automation environment.

This combined approach should guarantee consistency and allow checking of errors between both types of account. One of the indicators used for error detection relates to vertical discrepancies, i.e. the difference between net lending/borrowing per sector (B.9 and B.9F). One of the final steps in the integration process is evaluating the statistical discrepancies caused by inconsistencies between net lending/borrowing per sector. For the financial corporations sector (S.12), the statistical

discrepancy is completely eliminated. For the other (sub-)sectors, statistical discrepancies are not completely eliminated, but their size is kept to a minimum.

3.2 Consistency with non-financial QSA data

Consistency between the annual accounts (ASA) and quarterly accounts (QSA) is ensured, as the QSA is benchmarked on ASA as soon as (updates of) the annual accounts become available. The annual sector accounts are not simply the sum of the quarterly sector accounts estimates. Provisional annual estimates are based on quarterly data sources. However, over time new annual data sources become available and these replace the quarterly data sources. The quarterly data are subsequently benchmarked to the annual totals by using quarterly data sources as much as possible. Note that, for some sectors, data sources are essentially based on quarterly reporting, so in such cases the new annual totals are simply updates of the quarterly data, making subsequent benchmarking rather easy.

3.3 Consistency with other datasets

3.3.1 Consistency with main aggregates (table 1 of ESA 2010 TP)

In the Dutch national accounts, consistency is ensured between the annual sector accounts and main aggregates of table 1 of the ESA 2010 TP. Relevant transactions from the SUTs are transferred to the sector accounts production environment (after being reclassified to institutional sectors) without making further adjustments at macro level in the sector accounts integration process.

3.3.2 Consistency with general government main aggregates (table 2 of ESA 2010 TP)

In the Dutch national accounts, consistency is ensured between the annual sector accounts and main aggregates for the general government in table 2 of the ESA 2010 TP. The sector accounts for the general government are compiled as an integral part of annual (and quarterly) sector accounts. In general, transactions of the general government remain unadjusted when applying the balancing machine.

Nevertheless a difference does exist between table 2 and table 8 of the transmission programme regarding taxes on products (D.21) and other taxes on production (D.29). In the Dutch SUTs, the estimate for VAT is determined through calculation and this estimate is also used in table 8. This estimate will diverge from the registered VAT in the government data in table 2. To ensure consistency with total tax receipts (D.2) of the government sector, a compensating adjustment in table 8 is made to other taxes on production (D.29). In section D [of the inventory] more information is provided on this particular difference.

3.3.3 Consistency with BoP data

The Dutch sector accounts may deviate from the BoP data. The BoP is an important data source, but during the balancing process the figures from this source can be adjusted due to inconsistencies with other data sources. In addition, differences can arise over time due to different attitudes to breaks in the time series and different revision policies. The national accounts follow a continuity strategy for the non-financial account, focusing on reflecting the correct growth paths, whereas the central bank publishes figures reflecting the most recent actual levels.

When performing a benchmark revision, CBS will benchmark its data as much as possible to the levels found in the most recent BoP. CBS has investigated (tentatively) the possibilities of deviating from the typical multiyear schedule of benchmark revisions. The outcome is to follow level shifts in data sources for balance sheet items on an annual benchmark basis, but every 5 years for the income transactions, such as interest and dividends. This is done in recognition of user needs and the size of revisions in the FAs. Nevertheless the possibility is open for ad hoc annual adjustments to the current account items if differences become large, and overall consistency in the accounts is a factor when deciding to adjust the financial data.

Furthermore, as the BPM6 and ESA 2010 leave no conceptual differences, a project has led to additional analyses and rules to minimise differences, especially in the context of the primary income balance. In the recent past, for transactions such as dividends (D.421) and reinvested earnings

(D.43), differences appeared to be substantial. At the moment, the net balance of these transactions with the RoW is continuously monitored at micro level, with a focus on the non-financial corporations reporting the largest discrepancies between Statistics finances of enterprises survey and BoP statistics (larger than €250 million).

A longer-term goal is a full integration of sector accounts and the BoP. Completion of this project, which started in 2014, is expected in 2018.

Imports and exports of goods and services and the calculation of interest flows net of FISIM are estimated by CBS and directly adopted by DNB in the BoPs. So no differences are found for these transaction categories or for some other small items in the current account.

3.3.4 Others

No other consistency issues require reporting.'

Source: CBS

26: Metadata transmitted to Eurostat

Metadata transmitted to Eurostat for validation purposes should include short but clear explanations of inconsistencies. These metadata should be free for publication.

Metadata play an important role in data validation. They explain the numerical values, reduce the need for communication between the national compilers and Eurostat, and help to shorten the time between transmission and publication. They are an appropriate means of addressing reasonable numerical inconsistencies between datasets of different frequencies and between NA domains. Where there are rounding differences only, datasets are considered consistent and no metadata are necessary.

While metadata should be short, they should clearly identify:

- the variable;
- the reference period and the datasets concerned;
- the reason for the inconsistencies;
- whether they are temporary or permanent; and
- when they will be resolved.

Some inconsistencies may be observed on a temporary and recurrent basis in a dataset. In such cases, repetitive transmission of metadata can be avoided by providing Eurostat with national reference metadata for the dataset in question and linking it to Eurostat's relevant reference metadata. Several Member States are currently working to develop table-specific metadata that will be accessible from Eurostat's dissemination tree. Another solution is to include country footnotes or links to free text metadata in Eurostat's reference metadata. These practices apply for GFS and NFSAs respectively.

Example: National metadata on cross-domain consistency of sector accounts

Eurostat collects metadata on cross-domain consistency for annual and quarterly NFSAs. Metadata explain the differences between sector accounts and the NA and general government MAs. Examples of published metadata include:

> 'Discrepancies with QNA in final consumption expenditure (P3) breakdown into individual and collective consumption are due to different vintages.'
>
> 'Discrepancies for P5/P52 and B2AB3G of S1/S11 only are due to standard balancing of expenditure-/income-side statistical discrepancy.'
>
> 'Discrepancies present in D21 due to specific recording of taxes in QSA data.'
>
> 'Discrepancies in D3, D39, B8G, and B9 due to an action point in relation to subsidies from EU funds which is yet to be implemented in GFS while it is already implemented in table 801. The discrepancy then arises in B8G and B9.'
>
> 'Discrepancies for P5/P52 and B2AB3G of S1/S11 only are due to standard balancing of expenditure/income side statistical discrepancy.'

The above metadata clearly identify the variables for which numerical inconsistencies are observed. However, some are not fully explanatory in the absence of more detailed explanations in the inventories. Information is missing as regards the reference periods, the reason for and nature of the inconsistency, and when it will be resolved.

Source: Eurostat

27: Bridge tables

Bridge tables are appropriate tools for illustrating data coherence when similar concepts with different definitions are used in NAs and other statistical domains.

A number of variables are reported both in NAs and primary surveys (or administrative data). While the concepts are similar, the definitions frequently differ. In such cases, it is useful to include bridge tables in inventories, reference metadata or quality reports, because they illustrate aspects of the compilation methods and show the differences numerically.

Example: Bridge table between NA and labour force survey estimates of hours worked

Figure 8.2: Bridge table between labour force survey and NA employment

Country:

Year:

Employees numbers **Comments**

Indicate here if the numbers below correspond to persons or jobs [PERSONS/JOBS]		
(1) Number of persons/ jobs from original labour input source used for national accounts (NA) estimates		Persons (thousands)

	Adjustment made (Yes/No)	Adjustment (number/%)	Direction (up/down)	Comments
Adjustments made to adapt to NA concepts	☐ Yes ☐ No			
From jobs concept to persons concept	☐ Yes ☐ No			
Adjustment for economic territory	☐ Yes ☐ No			
Military/conscripts	☐ Yes ☐ No			
Other collective households not included in (2)	☐ Yes ☐ No			
Territories not covered by (2)	☐ Yes ☐ No			
Residents working outside the economic territory (-)	☐ Yes ☐ No			
Non residents working inside the economic territory (+)	☐ Yes ☐ No			
Adjustments for the non-observed economy	☐ Yes ☐ No			
	☐ Yes ☐ No			
	☐ Yes ☐ No			
	☐ Yes ☐ No			
	☐ Yes ☐ No			
Other adjustments (use the cells below to provide more details if needed)	☐ Yes ☐ No			
Adjustments for double counting	☐ Yes ☐ No			
Workers not liable for contributions/allocated under other social security authorities	☐ Yes ☐ No			
Working students	☐ Yes ☐ No			
Other adjustments	☐ Yes ☐ No			

		Comments
(2) Number of persons in the national accounts framework		Persons (thousands)

Indicate here if the numbers below correspond to persons or jobs [PERSONS/JOBS]		
(3) Number of persons/jobs from the national Labour Force Survey		Persons (thousands)

The bridge table has been constructed for the purpose of a questionnaire prepared jointly by the OECD and Eurostat to explain the recording of hours worked, as reported in labour force survey statistics and NAs. It shows the transition from primary data to the accounting framework conceptually and numerically.

Source: OECD, Eurostat

9 Conclusions and recommended improvements

Over a period of 2 years, Eurostat and the Member States worked together to collect and analyse 'state of the art' knowledge and practice on how to ensure the consistency of ESA 2010-based national accounts. This work is important because, while consistency is the most distinctive quality characteristic of NAs, it is difficult to achieve in practice. The application of concepts, definitions and methods outlined in ESA 2010 and the use of common classifications ensure that NA compilation is based on consistent methodology. Issues arise if the output of the compilation process (i.e. the published NAs) shows significant numerical differences for variables of the same concept and definition disseminated in different accounts. The results of the discussions are summarised in these guidelines in the form of recommendations and examples of good practice.

All NA compilers contributed to the analysis either through active participation in the dedicated task force or indirectly by responding to questionnaires. This shows a high level of engagement with data quality and a strong interest in finding more effective means of enhancing consistency.

The guidelines present **27 recommendations** on how to achieve, sustain and improve the consistency of NAs in the current ESA 2010 framework:

- nine recommendations and good practices focus on essential organisational factors to enforce a corporate data consistency policy within NA departments:
    - staff, procedures, infrastructure and internal coordination of NA departments; and
    - cooperation and communication with users, Eurostat and data providers.

  The foundation of these recommendations is the common practice established in many NSIs;
- 12 recommendations relate to the national compilation process. They give guidance on:
    - integrating NA compilation in terms of process, data flows and IT;
    - dealing with input data;
    - balancing and checking the accounts; and
    - automating the compilation steps.

  These recommendations are supported by practical examples of implementation in the Member States. The examples have been developed by national experts. They show that each national compiler has found good ways of organising NA compilation, including those for whom numerical consistency is still difficult to achieve in practice; and
- the last 6 recommendations call for transparent and clear communication on NA consistency to users through metadata. These are also supported by national examples.

The added value of the work on these guidelines is that the national state of the art has been shared within the ESS and is publicly available for use and reference.

The full numerical consistency of NAs is a target towards which NSIs and Eurostat will continue to work.

At national level, efforts to move to a more integrated and modern production of NAs will continue. As the situations in individual Member States vary, specific actions will be identified nationally. In summary, based on Eurostat's observations, we can say that:

- many NSIs still need to make a decisive move towards integrated NA compilation and modernising their infrastructure;
- while NA compilation benefits from access to a rich body of source data, further work is needed to overcome difficulties with the input data;
- there is ample scope to improve quality controls on the input, intermediate results and output of the compilation process; and
- transparency on data consistency *vis-à-vis* users should be further improved.

Eurostat is in a position to take additional action to support the NSIs.

The current ESA 2010 TP (as implemented since September 2014) is being reviewed from the point of view of consistency. If appropriate and agreed, suggestions for enhancing consistency will be taken on board in the anticipated review of Regulation (EU) No 549/2013.

Eurostat will continue to develop its services for the structural and content pre-validation of data transmitted by Member States. It will also take the lead in updating the rules in the *ESA 2010 validation handbook* in consultation with the Member States, with a view to complementing the rules with consistency checks where necessary. This will also lead to improvements in the internal validation process at Eurostat and in the published metadata.

List of recommendations and good practices

List of examples of national compilation practices

List of figures

List of tables

Acronyms and abbreviations

ANA	annual national accounts
ASA	annual sector accounts
BoP	balance of payments
BPM6	Balance of payments and international investment position manual (sixth edition)
COFOG	classification of the functions of government
COICOP	classification of individual consumption by purpose
DMESs	directors of macroeconomic statistics
EA	euro area
ECB	European Central Bank
EDF	European Development Fund
EDP	excessive deficit procedure
ESA	European system of national and regional accounts
ESA 2010 TP	ESA 2010 transmission programme
ESMS	Euro SDMX metadata structure
ESS	European statistical system
FAs	financial accounts
FDI	foreign direct investment
FISIMs	financial intermediation services indirectly measured
GFCF	gross fixed capital formation
GFS	government finance statistics
GGAA	annual general government accounts
GGAQ	quarterly general government accounts
GNI	gross national income
GNI OR	gross national income for EU's own resource purposes
GVA	gross value added
HERP	harmonised European revision policy
HFCE	household final consumption expenditure
IIP	international investment position
IO	input-output
LFS	labour force statistics
MAs	main aggregates
NA	national accounts
NACE	Nomenclature of economic activities
NAWG	national accounts working group
NFSAs	non-financial sector accounts
NSI	national statistical institute
NUTS	Nomenclature of territorial units for statistics
QAF	ESS quality assurance framework
QNA	quarterly national accounts
QSA	quarterly sector accounts
RAs	regional accounts
RoW	rest of the world
SBS	structural business statistics
SNA 2008	2008 system of national accounts
STS	short-term statistics
SUIOTs	supply, use and input-output tables
SUTs	supply and use tables

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Consistency of ESA 2010 based national accounts

These guidelines have been prepared to help national accounts compilers implement measures to improve the numerical consistency of the accounts. This handbook contains definitions, explanations, recommendations and examples of good practice under the current 2010 European system of national and regional accounts (ESA 2010). All recommendations aim to ensure that the output of national accounts compilation is numerically consistent across the related accounts and their datasets.

For more information
https://ec.europa.eu/eurostat/

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