

**Quarterly National Accounts Inventory**

**Sources and methods of the  
Quarterly National Accounts for Denmark**

by

Timmi Rølle Graversen  
Carmela Moreno Baquero  
Bahar Dudus  
Daníel Freyr Gústafsson  
Rasmus Rold Sørensen

September 2017



## QUARTERLY NATIONAL ACCOUNTS INVENTORY

---

Statistics Denmark  
September 2017

Timmi Rølle Graversen  
Chief Analyst  
National Accounts  
Phone: +45 39 17 38 65  
E-mail: [trg@dst.dk](mailto:trg@dst.dk)

Carmela Moreno Baquero  
Senior Adviser  
National Accounts  
Phone: +45 39 17 30 63  
E-mail: [cam@dst.dk](mailto:cam@dst.dk)

Bahar Dudus  
Head of Section  
National Accounts  
Phone: +45 39 17 36 57  
E-mail: [bdu@dst.dk](mailto:bdu@dst.dk)

Daníel Freyr Gústafsson  
Head of Section  
National Accounts  
Phone: +45 39 17 36 58  
E-mail: [dfg@dst.dk](mailto:dfg@dst.dk)

Rasmus Rold Sørensen  
Head of Section  
National Accounts

## Preface

These inventories are financed by the European Union<sup>1</sup>. The former inventory is from June 2008 and, since then, several changes have been made and needed to be described. The Danish Quarterly National Accounts (QNA) are constantly improved by incorporation of new quarterly indicator sources and compilation approach methods. Additionally, due to the major revision of the Danish National Accounts published in 2014, the QNA were revised. The major revision consisted of two parts: implementation of the ESA 2010 guidelines and incorporation of new improved data sources and methods, both implying changes in the QNA. In 2016 there was also a data revision in National Accounts in connection with a revision in the Balance of Payments. Due to resource restrictions, the incorporation of the reengineered quarterly supply and use tables, another Eurostat granted project, has not been possible yet, so no further mention to this project appears in the final report as otherwise implied in the Grant agreement. Otherwise, a detailed description of the sources and methods used in the compilation of the Danish QNA can be founded in the following pages.

The quarterly figures shown in this document (in for example 2.2.1, 5.5.3 or appendix 11.3) are consistent with the figures in the 2016 Q3 revised release.

---

<sup>1</sup> As agreed on the Action 3.2 of the Grant agreement 04121.2015.002-2015.163

# Contents

1	Overview of the system of quarterly national accounts.....	7
1.1	Organisation and institutional arrangements.....	7
1.2	Publication timetable, revisions policy and dissemination of the QNA .....	7
1.3	QNA compilation approach.....	8
1.4	Balancing, benchmarking and other reconciliation.....	8
1.5	Volume estimates.....	8
1.6	Seasonal adjustment and working day correction .....	8
1.7	Additional information.....	9
2	Publication timetable, revisions policy and dissemination of QNA.....	10
2.1	Release policy.....	10
2.1.1	Reliability of the quarterly national accounts .....	11
2.2	Contents published .....	14
2.3	Special transmissions .....	15
2.4	Policy for metadata .....	15
3	Overall QNA compilation approach.....	16
3.1	Overall compilation approach.....	16
3.1.1	Overview.....	16
3.1.2	Calculation of unbalanced estimates .....	17
3.2	Balancing, benchmarking and other reconciliation procedures .....	18
3.2.1	Quarterly GDP balancing procedure.....	18
3.2.2	Benchmarking of QNA and ANA .....	19
3.3	Volume estimates.....	20
3.3.1	General volume policy .....	20
3.3.2	Chain-linking and benchmarking .....	22
3.3.3	Chain-linking and seasonal adjustment .....	22
3.4	Seasonal adjustment and working day correction .....	23
3.4.1	Policy for seasonal adjustment.....	23
3.4.2	Policy for working-day correction.....	23
4	GDP components: the production approach.....	24
4.1	Gross value added .....	24
4.1.1	Agriculture, forestry and fishing (A).....	24
4.1.2	Mining and quarrying (B).....	25
4.1.3	Manufacturing (C) .....	25
4.1.4	Utility services (D_E) .....	25
4.1.5	Construction (F).....	25
4.1.6	Trade and transport etc. (G_I).....	26
4.1.7	Information and communication (J) .....	26
4.1.8	Financial and insurance (K) .....	26
4.1.9	Real estate activities and renting of non-residential buildings (LA) .....	27
4.1.10	Dwellings (LB) .....	27
4.1.11	Other business services (M_N).....	27
4.1.12	Public administration, education and health (O_Q) .....	27
4.1.13	Arts, entertainment and other services (R_S) .....	30
4.2	FISIM.....	30
4.3	Taxes less subsidies on products.....	30
4.3.1	Value added tax.....	30
4.3.2	Taxes on imports.....	31
4.3.3	Other taxes less subsidies on products .....	31
5	GDP components: the expenditure approach .....	32
5.1	Household final consumption.....	32
5.2	Government final consumption .....	37
5.3	NPISH final consumption .....	38
5.4	Gross capital formation .....	38
5.4.1	Gross fixed capital formation.....	38

5.4.2	Changes in inventories and valuables.....	39
5.4.3	Consumption of fixed capital .....	39
5.5	Imports and exports .....	39
5.5.1	Goods.....	41
5.5.2	Services.....	41
5.5.3	Consistency with Balance of Payments.....	42
6	GDP components: the income approach.....	43
6.1	Compensation of employees.....	43
6.1.1	First compilation of quarterly data .....	43
6.1.2	Compilation of revised quarterly data .....	43
6.2	Taxes less subsidies on production.....	43
6.3	Gross operating surplus and mixed income .....	43
7	Population and employment.....	44
7.1	Population .....	44
7.2	Employment.....	44
7.2.1	First compilation of quarterly data .....	44
7.2.2	Employees .....	45
7.2.3	Self-employed persons .....	45
7.2.4	Compilation of revised quarterly data .....	45
7.3	Employment: total hours worked .....	45
7.3.1	First compilation of quarterly data .....	45
7.3.2	Total hours worked: Employees.....	46
7.3.3	Total hours worked: Self-employed persons .....	46
7.3.4	Compilation of revised quarterly data .....	46
7.4	Reconciliation .....	46
8	From GDP to Net lending/borrowing.....	47
8.1	Primary income from/to the ROW, gross national income .....	47
8.2	Consumption of fixed capital, net national income, acquisitions less disposal of non-financial non-produced assets.....	47
8.3	Current transfers from/to the ROW, net national disposable income .....	47
8.4	Adjustment for the change in net equity, net savings.....	48
8.5	Capital transfers, net lending/borrowing.....	48
9	Flash estimates.....	49
9.1	General approach.....	49
9.2	Industrial breakdown and compilation of GDP growth .....	50
9.3	Revisions and reliability of flash estimates .....	51
10	References .....	52
11	Appendices .....	53
11.1	Statistics Denmark's organisation .....	53
11.2	Planned publishing of the national accounts .....	54
11.3	Overview of the contents published in the QNA .....	55

# 1 Overview of the system of quarterly national accounts

This chapter provides a summary description of the Danish system of Quarterly National Accounts (QNA) and gives an overview of the methods used during the compilation process. The Danish QNA are consistent with the European Commission's "European System of Accounts - [ESA2010](#)" and Eurostat's [Handbook on Quarterly National Accounts](#).

## 1.1 Organisation and institutional arrangements

The Danish Quarterly National Accounts (QNA) and Quarterly Sector Accounts (QSA) are compiled and disseminated by Statistics Denmark. Statistics Denmark is an independent central government institution governed by a Board of Governors, of which the chairman is the Director General of Statistics Denmark. The Board makes decisions of major financial significance, on the nature of information to be collected and also on the working plans of Statistics Denmark. All statistics are collected and published according to section 6 of the "Act on Statistics Denmark" (Consolidated Act No. 15 of 12 January 1972 and later amended by Act No. 386 of 13 June 1990 and Act No. 1025 of 19 December 1992).

Statistic Denmark's organisation chart is attached in Appendix 11.1. Statistics Denmark is divided into five directorates. The responsibility for National Accounts falls to the Directorate for Economic Statistics. The QNA and QSA are compiled and published by the National Accounts Division although part of the work is done in two other divisions: Government Finances Division and External Economy Division. The Government Finances Division calculates the General Government Sector accounts and the non-financial sector accounts for the Financial Sector. The External Economy Division compiles and publishes the Balance of Payments and compiles the Rest of the World Account, which is consistent with the Balance of Payments. With a few exceptions, all other data sources used in the QNA are compiled and separately published by the other divisions at Statistics Denmark.

## 1.2 Publication timetable, revisions policy and dissemination of the QNA

The QNA are published 12 times each year. The flash publication, 45 days after the end of the reference quarter, is still under development and by 2017 consists only of an estimate of the seasonally adjusted volume GDP growth rate of the latest quarter. The first or preliminary full version of the QNA is published 60 days after the end of the reference period. A revised version is published 30 days later and includes the QSA, which are fully consistent with the QNA.

This document refers to the sources and methods used in the full versions of the QNA, 60 and 90 days after the end of the reference quarter, where a comprehensive and consistent set of statistics is published. There are very limited descriptions of QSA in this inventory and only a few references to the QSA can be found. More information about sources and methods of QSA are available [here](http://www.dst.dk/ext/5529942592/0/national/Danish-Quarterly-Sector-Accounts--pdf) (<http://www.dst.dk/ext/5529942592/0/national/Danish-Quarterly-Sector-Accounts--pdf>). Chapter 9 deals with the compilation of the flash estimate, 45 days after the end of the reference quarter, where only a growth rate for the seasonally adjusted volume GDP is published for the time being.

## Overview of the system of quarterly national accounts

QNA data is released at 8 a.m. CET, from 1 November 2017 by issuing the press release "Nyt fra Danmarks Statistik" at [www.dst.dk](http://www.dst.dk) and the detailed figures are made available at [www.statbank.dk](http://www.statbank.dk) at the same time.

Statistics Denmark disseminates a [release calendar](http://www.dst.dk/en/Statistik/planlagte) (<http://www.dst.dk/en/Statistik/planlagte>) with the release dates one year in advance.

The revision policy is coordinated with the compilation of the Annual National Accounts (ANA) so that consistency with ANA is maintained. The final annual figures are published approximately three years after the statistical year in November. When a new final year is compiled the two preliminary years are re-estimated, and subsequently the quarterly figures are adjusted and updated to match the new annual totals through a time consistency procedure.

### 1.3 QNA compilation approach

The Danish quarterly accounts estimates are based on non-seasonally adjusted source data both in current and constant prices. The estimates are compiled in an integrated process where independent estimates from the production and the expenditure sides are balanced.

The compilation level is more detailed than the publication level and it is generally the same as for the provisional Annual National Accounts i.e. 81 industries, 15 groups of Gross Fixed Capital Formation, 66 groups of Households Final Consumption Expenditure, Non-profit institutions serving households (NPISH) Consumption Expenditure and two groups of Government Final Consumption (in total roughly 1,700 series).

The general method is to use the quarterly source data to extrapolate the relevant national accounts values from the latest unrevised quarter. Subsequent values for other components are calculated on the basis of identities, e.g. current price = constant price \* price index, and on the assumption of various correlations, e.g. fixed Input-Output coefficients or in the case of a few consumptions groups, the development in the corresponding industry output.

### 1.4 Balancing, benchmarking and other reconciliation

QNA in current and constant prices are balanced and any discrepancy between supply and use is eliminated in current and constant non-seasonally adjusted values. Balance between the income approach and the supply use result is ensured because Operating Surplus and Mixed Income are calculated as a residual.

Consistency between ANA and QNA is maintained. Whenever the ANA are revised, the Denton method is used to keep consistency between ANA and QNA.

### 1.5 Volume estimates

The QNA growth rates are based on chain-linked Laspeyres volume indices using the annual overlap method. Quarterly value added at constant prices is compiled using double deflation.

### 1.6 Seasonal adjustment and working day correction

The seasonally adjusted estimates are produced using the X12-ARIMA software package. The series in current and constant (chain linked) prices are seasonally adjusted by the indirect method and subsequently aggregated to the level of detail



## Overview of the system of quarterly national accounts

for publication. The discrepancies, which are created by the indirect method, are not balanced.

### 1.7 Additional information

QNA results are published in Statbank Denmark and are available [here](http://www.statbank.dk/statbank5a/default.asp?w=1280):  
<http://www.statbank.dk/statbank5a/default.asp?w=1280>.

Press releases are only available in Danish and can be found [here](http://www.dst.dk/da/Statistik/nyt?gmi=14):  
<http://www.dst.dk/da/Statistik/nyt?gmi=14>

## 2 Publication timetable, revisions policy and dissemination of QNA

This chapter addresses the issues of compilation and the release calendar for QNA as well as the revision policy and the level of disaggregation of the published series. Furthermore, a revision analysis of the different QNA estimates is provided.

### 2.1 Release policy

QNA are published 12 times each year. The flash publication (GDP45), 45 days after the end of the reference quarter, is still under development and, by 2017, consists only of an estimate of the seasonally adjusted volume GDP growth rate of the latest quarter. The preliminary full version of QNA (QNA60) is published 60 days after the end of the reference period. A revised version (QNA90) is published 30 days later and includes QSA, which are fully consistent with the QNA. [Release dates](#) are available one year in advance at Statistics Denmark's website (<http://www.dst.dk/en/Statistik/planlagte>).

QNA data is released at 8 a.m. CET by issuing the press release "Nyt fra Danmarks Statistik" at [www.dst.dk](http://www.dst.dk) and the detailed figures are made available at [www.statbank.dk](http://www.statbank.dk) at the same time.

The GDP45 estimate does not incorporate revisions to previous periods. The QNA60 is the first full version and the previous quarters of the same year are open for revisions, for the non-seasonally adjusted data. The same applies for the QNA90. However, for the seasonally adjusted data, revisions are expected both with the QNA60 and the QNA90 back to the latest final year (t-3).

The revision policy is coordinated with the compilation of the Annual National Accounts (ANA) so that consistency with ANA is maintained. The final annual figures are published approximately three years after the statistical year in November. When a new final year is compiled, the two preliminary years are re-estimated, and subsequently the quarterly figures are adjusted and updated to match the new annual totals through a time consistency procedure. So with the QNA60 for the third quarter every year, all quarters back to the newest final year are open for revisions. The following calculations of QNA take these new figures as a starting point.

Below, the revision policy for the Danish National Accounts followed by Statistics Denmark as in May 2017 is illustrated. The revision policy is openly disseminated so that users always know how many periods are being revised. An example of the published release calendar is shown in Appendix 11.2.

Table 2.1 Statistics Denmark: Publication schedule including revisions for National Accounts

Year	Statistics Denmark National Accounts Publication Schedule for 2017 (including revision schedule)					
	Month of publication	Year T Q1	Year T Q2	Year T Q3	Year T Q4	Year T
T	Mid May End May End June	A P R				
	Mid August End August End September	- R R	A P R			
	Mid November End November End December	- R R	- R R	A P R		
T+1	Mid February End February End March End June	- R R R	- R R R	- R R R	A P R R	P (SQ) R (SQ) R (SQ)
	Beginning November End November	- R	- R	- R	- R	R (AP1) -
T+2	Beginning November End November	- R	- R	- R	- R	R (AP2) -
T+3	Beginning November End November	- F	- F	- F	- F	F -

**Note:**

A Advanced or flash GDP estimate (GDP 45)  
P Preliminary QNA figures (QNA60)  
R Revised (applies both to QNA90 and to successive revisions)  
F Final (applies both to annual and quarterly figures) Annual figures include final SUTs and IOTs.  
SQ Sum of quarters  
AP1 First preliminary annual calculation including IOTs.  
AP2 Second preliminary annual calculation including IOTs.

The revisions of the quarterly figures in November T+1, T+2 and T+3 are made in order to make the quarterly figures consistent with the annual figures.

### 2.1.1 Reliability of the quarterly national accounts

This chapter attempts to address the issue of revision. As the flash estimate, GDP45, has only been published since 2016Q3, we concentrate here on the full releases of the QNA. Specifically, we compare the preliminary release, QNA60, to the revised release 30 days later, QNA90, and to the revised releases one year, two years and three years later.

It is expected that GDP estimates from Statistics Denmark are revised when new information is available, but it is important to avoid a systematic distortion. QNA revisions must be monitored as there should not be a systematic tendency to under-estimate or over-estimate the figures. There are two main reasons for revisions. Firstly, the deviations between QNA60 and the successive versions may occur as a consequence of the differences in the quality of the sources. QNA60 frequently make use of statistical primary data or indicators before these have been finally revised. To this can be added that, in connection with the compilation of QNA60, more frequent situations arise in which the statistical coverage is missing and figures must consequently be based on assumptions or alternative estimates. Secondly, some of the most important reasons for the deviations can primarily be attributed to the circumstance that the final QNA are verified against the far more well-founded final ANA, which is almost entirely based on accounting statistics. In this way, it is ensured that the higher quality level in the final ANA is incorporated into the final QNA. Such verification is, of course, not possible to conduct in the preliminary quarterly accounts.

Table 2.2 Revisions to quarter-on-quarter GDP growth rates of seasonally adjusted chain-linked volume estimates for Denmark

	2013				2014				2015				2016		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Given release-Previous															
14q3 preliminary	0,1	-0,4	-0,1	0,2	0,0	-0,1									
14q3 revised	0,0	0,0	0,0	0,0	0,1	0,0	-0,1								
14q4 preliminary	0,0	0,0	0,0	0,0	0,0	0,0	0,1								
14q4 revised	0,0	0,0	0,0	0,0	0,1	0,0	0,1	0,1							
15q1 preliminary	0,0	0,1	0,0	0,0	-0,1	0,1	0,0	0,0							
15q1 revised	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,2	0,1						
15q2 preliminary	0,0	-0,1	0,0	0,0	0,0	-0,1	0,1	0,0	0,0						
15q2 revised	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,1	-0,1					
15q3 preliminary	-0,3	0,0	0,2	0,2	0,1	-0,2	0,0	-0,1	0,1	0,0					
15q3 revised	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,1	0,0	-0,3				
15q4 preliminary	0,0	0,0	0,0	0,0	-0,1	0,0	0,0	0,0	0,1	0,0	-0,1				
15q4 revised	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,1	0,2	-0,1	-0,2			
16q1 preliminary	-0,1	0,1	0,0	0,0	-0,1	0,0	0,1	0,0	-0,1	0,0	0,1	0,0			
16q1 revised	0,0	0,0	0,0	0,0	0,0	0,0	-0,1	0,0	-0,1	0,0	-0,1	-0,3	0,1		
16q2 preliminary	0,0	0,0	0,0	0,0	0,1	-0,1	0,0	0,0	0,2	-0,3	0,0	0,1	0,0		
16q2 revised	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,1	0,0	-0,1	
16q3 preliminary	0,7	0,7	-0,3	-0,2	0,5	-0,1	0,0	0,4	-0,1	0,5	0,2	-0,1	0,1	-0,1	
16q3 revised	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,1	0,0

Table 2.2 shows the revisions to quarter-on-quarter GDP growth rates from 2013Q1 to 2016Q3. For every quarter in this period there are two releases, preliminary (QNA60) and revised (QNA90), which are indicated in the first column of the table. With every release, quarters within the same year are open for revisions in the non-seasonally adjusted data, except for the preliminary release of the third quarter where the annual benchmarking is undertaken for the latest three years. The seasonally adjusted data may be revised at all releases for the latest three years, and this applies for the quarters within the years where ANA is still not final.

Shaded in orange in table 2.2 it is possible to observe the effect of the annual benchmarking procedures that are published together with the preliminary estimate for the third quarter (QNA60 or preliminary). Otherwise, the table shows revisions in the given quarter and, to some extent, in the previous quarters, although these revisions mostly reflect the re-estimation of the seasonally adjusted figures.

Table 2.3 Average (12 quarters) GDP revisions 1 Year-Preliminary

	abs. revision	bias
2012q4-2015q3	0,37	0,13
2009q4-2012q3	0,31	0,15
2006q4-2009q3	0,42	-0,09
2003q4-2006q3	0,41	0,11
2000q4-2003q3	0,35	0,06
1997q4-2000q3	0,46	0,28

Note: absolute revision and bias are calculated as the preliminary release compared to the revised data released 12 months later

There are several ways of assessing the reliability of the QNA. Tables 2.3, 2.4 and 2.5 show two measures: the mean revision or bias and the absolute mean revision. In all cases, the revisions are showed as the average value over a 12 quarters period.

Table 2.3 shows the development of these measures over time. Due to the major revisions undertaken by Statistics Denmark in 2014, it can be difficult to make a comprehensive analysis of the reasons for revision as major revisions lead to larger

revisions in the quarterly figures. In the following table 2.4, it is possible to study the latest period in detail.

Table 2.4 Average revisions (2012q4-2015q3) of the main QNA figures 1 Year-Preliminary

	Average quarterly growth (preliminary release)	Average abs. revision	Average bias (>0 underestimation at preliminary release)
Gross Domestic product	0,14	0,37	0,13
Import of goods and services	0,18	0,82	0,44
Export of goods and services	-0,09	0,87	0,53
Households consumption	0,11	0,55	0,18
Government consumption expenditure	0,00	0,54	0,00
Gross fixed capital formation	0,51	0,92	-0,06
Other taxes less subsidies on products	0,18	0,70	0,28
Gross value added	0,13	0,40	0,11

Note: absolute revision and bias are calculated as the preliminary release compared to the revised data released 12 months later

Table 2.4 shows the average revisions of the main QNA figures in the period 2012Q4 to 2015Q3 measured as the difference between the QNA release one year later minus the preliminary release. This implies that the latest observation in the calculations behind table 2.4 corresponds to the preliminary release of 2016Q3 published 30 November 2016.

The first column of table 2.4 shows the average growth rate in this period for each of the quarterly figures according to the preliminary release. This is showed to help qualify the size of the revisions. The second column shows the average absolute mean revision and the third column shows the average mean revision or bias over this period. A positive value of the bias can indicate an underestimation of the preliminary release compared to the release one year later and vice versa for a negative value.

The largest average absolute mean revisions are observed for Import, Export, Gross Fixed Capital Formation and in Other taxes less subsidies on production. For Import and Export it is worth noticing that the QNA are fully consistent with the revision schedule for the Balance of Payments (BoP) and the Rest of the World Account and these seem to involve relatively large revisions. In the case of Gross Fixed Capital Formation and Other Taxes less Subsidies on Products, the observed large revisions indicate the relative weaknesses of the source data used as an indicator for the preliminary release.

Table 2.5 GDP average revisions over a three-year period (2010q4-2013q3) of the GDP growth rate

	Abs. revision	bias
1Year-preliminary	0,37	0,16
2Year-preliminary	0,42	-0,03
3Year-preliminary	0,48	-0,06

Finally, table 2.5 shows the absolute mean revision and mean revision or bias over 12 quarters for the preliminary release, QNA60, compared to the release one, two and three years later. Both table 2.4 and 2.5 show a positive value for the mean revision or bias of the GDP growth rate in QNA60 compared to the release one year later in the latest period. Statistics Denmark is aware of this situation, which could indicate an underestimation of the preliminary release, and monitors it consciously as a bias close to zero is desirable over time. However it is worth noticing that although the bias is positive for the preliminary release compared to the release one year later, it turns negative when the preliminary QNA is compared to the releases two and three years later.

## 2.2 Contents published

System of Accounts	<p>The Danish National Accounts are compiled in accordance with the definitions in the <a href="#">ESA2010</a>, which is a European version of the UN's "A System of National Accounts 2008 – <a href="#">SNA2008</a>". The main structure of the National Accounts consists of a number of consolidated accounts for the economy as a whole which are called: Goods and Services Account, Production Account, Generation of Income, Distribution and Use of Income Accounts, Capital Account and Rest of the World Account.</p> <p>The Goods and Services Account shows the value of the total supply of goods and services in the form of output and imports of goods and services. The supply is equivalent to the value of the total use of goods and services distributed between intermediate consumption, final consumption expenditure, gross fixed capital formation, changes in inventories and exports of goods and services. The central variable GDP - Gross Domestic Product - can be found in the Production Account. The Generation of Income, Distribution of Income and Use of Income Accounts show the incomes, which are a result of the Danish Value Added, to which these incomes accrue, and how they are used. The Capital Account shows how gross savings have been spent on gross fixed capital formation and changes in inventories, resulting in Net Lending/Borrowing. This, in turn, corresponds to the balance in the Rest of the World Account, which largely corresponds to the balance of the Current Account in the Balance of Payments. In the institutional system, the above mentioned accounts (except the Goods and Services Account) are divided into the following institutional sectors: Non-financial corporations, Financial corporations, General government, Households, Non-profit institutions serving households (NPISH) and Rest of the world.</p> <p>More specifically, the Danish Quarterly National Accounts comprise a full system of accounts from the Goods and Services Account to Net Lending/Borrowing. However, the level of detail is reduced compared to the final Annual National Accounts. An overview of the published variables can be found in Appendix 11.3.</p>
Economic variables	<p>The National Accounts statistics adopt two ways of describing economic flows, a functional view presented in the QNA and ANA and an institutional view presented in the QSA. The economic transactions are described with special reference to product flows in the form of output, intermediate consumption, household, non-profit institutions serving households and government consumption expenditure, import and export of goods and services and gross capital formation including changes in inventories. These flows are compiled in current prices as well as chained values. In addition, information is given on incomes generated in the form of wages and salaries and gross operating surplus plus information on employment. Information on the above-mentioned items is available at a disaggregated level. Besides, quarterly series are available seasonally adjusted as well as non-seasonally adjusted.</p>
Dissemination level of the QNA	<p>The main aggregates from the Production Account and Generation of Income Account are published for 13 industries plus a special item for the activities in general government (memorandum item). Figures on employment are also available at this level of detail. Taxes less subsidies on products are published as a net value. Imports and Export are available for both goods and services. Data about the country of destination or origin for import and export is not published, but the figures are calculated for the ESA transmission program.</p> <p>On the Production Account, the additional item consumption of fixed capital is published as a total for the economy and for the institutional sectors but no other level of detail is made available.</p> <p>On the Allocation of Income Accounts, national totals are published including the transactions between Denmark and abroad.</p>

On the Use of Disposable Income Account, the government consumption expenditure is published for individual and collective consumption expenditure. Final consumption expenditure of households is published divided into 13 consumer groups according to COICOP classification, and in another table according to 11 groups of durability.

On the Capital Account, there are seven categories of gross capital formation plus a special item for gross fixed capital formation in general government (memorandum item). On the Capital Account figures for the capital transfers to and from the rest of the world and net lending/borrowing are also published.

Industrial classification Statistics Denmark's industrial classification, DB07, which is a Danish version of the EU NACE, rev. 2, and the UN's ISIC, rev. 4, contains a number of standard classifications: the 127, 36, 19, and 10 classifications. The Quarterly National Accounts classification of 13 industries corresponds - with few deviations - to the 10 standard classifications. For this reason, national accounts figures can be compared to and used in connection with other statistics that are based on the DB07-standard classifications. Internationally, there is a high degree of comparability with the national accounts of other countries because the Danish national accounts are compiled in accordance with the definitions in the European System of National Accounts ESA2010.

### **2.3 Special transmissions**

QNA data is released at 8 a.m. CET by issuing the press release "Nyt fra Danmarks Statistik" at [www.dst.dk](http://www.dst.dk) and the detailed figures are made available at [www.statbank.dk](http://www.statbank.dk) at the same time.

In a few cases, more detailed data than the generally published data is calculated to users on a service basis.

### **2.4 Policy for metadata**

Documentation is available in the form of documentation of statistics at <http://www.dst.dk/declarations//b3395278-e265-4be2-9ab1-1f3044e4fcdc>.

Denmark subscribes to the IMF's Special Data Dissemination Standard Plus and is committed to observe the standard and to provide information about their data and data dissemination practices:

<http://dsbb.imf.org/Pages/SDDS/DQAfBase.aspx?ctycode=DNK&catcode=NAG00>

### 3 Overall QNA compilation approach

This chapter deals in more detail with the compilation process. The Danish quarterly accounts estimates are compiled in an integrated process where independent estimates from the production and the expenditure sides are balanced. Generally, the initial estimates of each of the quarterly series are calculated with a simple extrapolation from the quarterly growth in the corresponding indicators. The results are approximately 1,700 non-seasonally adjusted time series plus another 633 time series for wages and salaries, employment and hours worked.

This chapter describes the balancing procedure, the volume estimates and the seasonal adjustment methodology used in the QNA compilation process.

#### 3.1 Overall compilation approach

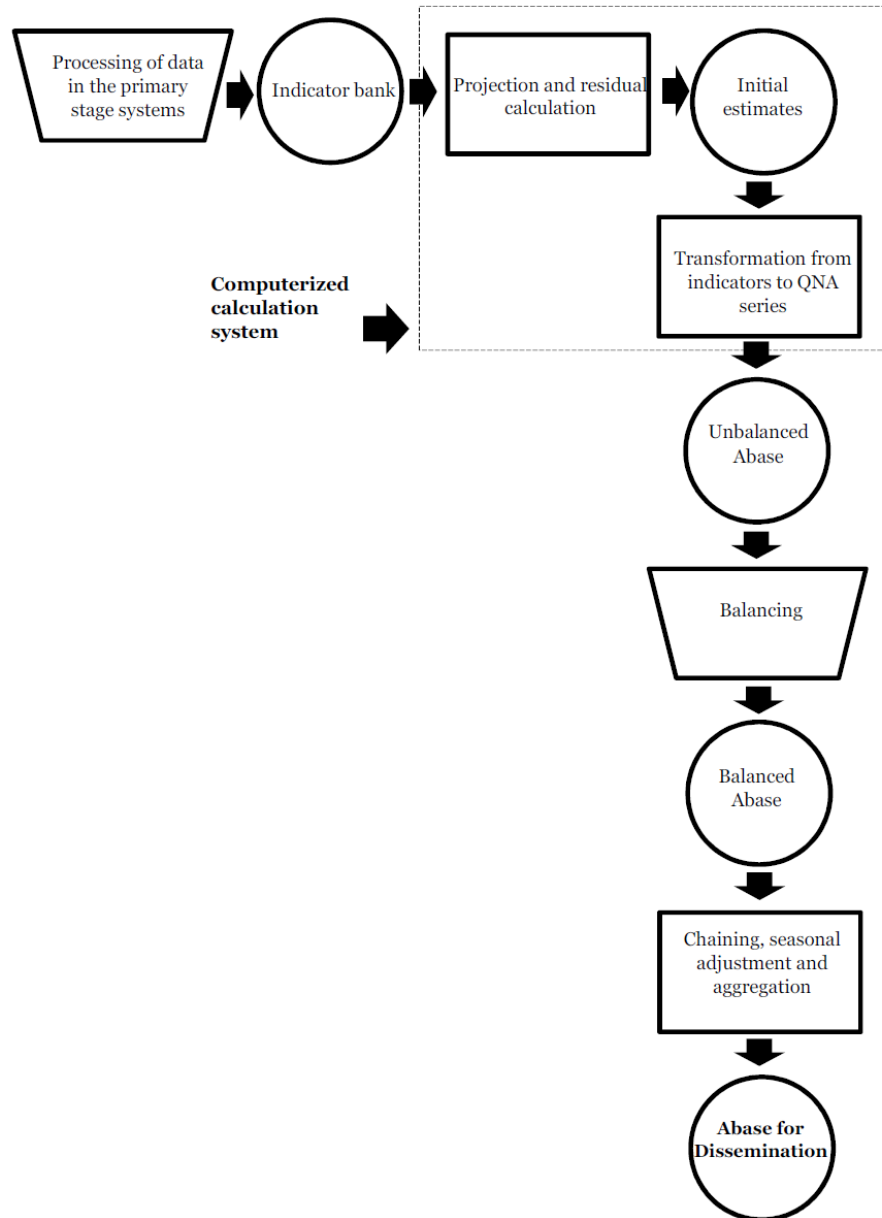
##### 3.1.1 Overview

The Danish Quarterly Accounts estimates are compiled in an integrated process where independent estimates from the production and the expenditure sides are balanced. The results are based on approximately 1,700 time series in the central database in the calculation system called the *Abase*, which furthermore includes another 633 time series for wages and salaries, employment and hours worked. The compilation of the QNA is divided into four steps:

1. Source data is collected in an indicator bank.
2. Production of the initial estimates of the quarterly data (not balanced)
3. Balancing
4. Finalisation.

The compilation of the QNA is based on non-seasonally adjusted figures. Quarterly figures are calculated for over 2,300 series, which are mostly grouped together in threes, in the form of series for current prices, constant prices and price indexes for each time series, with the exception of transfer items, wages and salaries, hours worked and the employment series. In the following, the steps stated above will be briefly described. The figure below shows a schematic outline of the production process in the QNA.





### 3.1.2 Calculation of unbalanced estimates

The *Abase* constitutes the most detailed basic database for the 'functional system'. It contains all series needed for dissemination. The level of compilation is more detailed than the level of dissemination and corresponds roughly to the dissemination level of the preliminary ANA for industries. The variables include: output and intermediate consumption corresponding to the 69 industry classification, taxes on products and value added taxes (VAT) specified by uses, other taxes on production specified by industries, imports and exports of goods and services specified by subgroups, government consumption expenditure, Household consumption expenditure classified to 66 groups, consumption expenditure of the non-profit institutions serving households (NPISH), capital formation by 15 types and changes in stocks classified to 36 subgroups. To this is added data series relating to compensation of employees and employment classified to 69 industries and data series relating to transfers, etc. for the Rest of the World Account. In connection with a regular calculation of a quarter, the full *Abase* is calculated for the new quarter. For the previous one, two or three quarters within the current year, a recalculation may be made if new relevant information has become available.

1. Indicator bank 

The compilation practice begins by processing the data in the primary stage systems, where source data are collected and processed for use in the National Accounts. An indicator bank with indicators for most of the time series in the *Abase* is thus created. Compilation of indicators is described in further detail in sections 4-8. The purpose of the primary stage systems is to create input data for an indicator data bank designed according to fixed guidelines. The systems are flexible, ensuring that changes, including any delays in the primary data, can be easily adapted. Work on the systems is performed as the input data becomes available. The deadline for input data is around 40 days for the preliminary (QNA60) calculation and 70 days after the end of the quarter for the revised (QNA90) calculation. If further source data are made available during the process phase, they will be included to the extent possible. The indicator data bank contains around 800 indicators.
  
2. Initial estimates 

The procedures to derive the initial and unbalanced estimates for the quarterly figures from the indicator bank are fully automated. The calculation of the initial estimates is derived by extrapolating the values of the latest unrevised quarter from the growth rates from the indicator data bank. A substantial number of series can be calculated residually by using the relationship that price x quantity = value (the indicator bank contains, as a rule, indicators for two of the three series for each component). As an exception to the rule, some series are calculated using various assumptions of correlations between the series. For a great part of the industries, the most essential correlation is the assumption that the percentages of raw material used in production (this is intermediate consumption or input) at constant prices remain unchanged compared with the same quarter as the previous year. A close correlation between the growth in production and household consumption expenditure of goods is also assumed for certain types of goods. Initial estimates are created for all 1,700 components based on the above assumptions and once again a »price x quantity = value« residual calculation.
  
3. -4. Reconciliation and evaluation 

So far, the quarterly figures are not balanced, in the sense that total supply will not be identical with total use. This is ensured manually and is described in further detail in section 3.2.1. At the same time, the resulting figures are evaluated. The work with reconciliation and evaluations continues for a week and is described in section 3.2 and 3.3 below.

## 3.2 Balancing, benchmarking and other reconciliation procedures

### 3.2.1 Quarterly GDP balancing procedure

The final reconciliation of supply and uses totals is conducted manually. One economist in the national accounts division is the 'coordinator' of the balancing process and is assisted by other 3-4 economists. The first step is a rough evaluation of the results. A printout of the total discrepancy between supply and use and the totals of the goods and services account, without breakdowns of categories, is used to evaluate the calculations. As a rule of thumb, a discrepancy of approximately one percent of the total supply is regarded as acceptable for continued calculations. If the discrepancy exceeds two percent of the total supply, the procedure will be to search the indicator databank for errors and to look for extreme and erroneous results in the preliminary estimates. In such cases, it is usually a human error somewhere in the preparatory stage and it is easily found. After undertaking corrections, the system is recalculated. When the discrepancy is acceptable, the manual balancing continues in two main steps. First the data editing and adjustment phase and at last the final balancing phase.

- Data editing and adjustment 

Tables are prepared with all published variables and supplemented by analytical tables of domestic production aggregated to 13 industries. In these latter tables, Gross Value Added (GVA) is calculated and the figures are combined with employment figures to calculate productivity and wage figures to calculate operating sur-

plus and wage quotas for each industry. The figures are then controlled for errors (sometimes new corrections to the primary statistics are already available at this time), evaluated for plausibility, and compared to other published results at different aggregation levels. Examples are comparison of the growth of total industrial production in the QNA with the published monthly Industrial Production Index or comparison of the changes in the implicit price index of household consumption expenditure with the changes in the Consumer Price Index etc. Each of the economists involved has a specific area of responsibility and makes suggestions for adjustments. These adjustments are partial in the sense that the direction of the discrepancy between total supply and use is not yet taken into account. Sometimes the suggested adjustments will even increase the discrepancy. The suggestions are finally discussed at a meeting and decisions are taken on which of the suggestions to apply. The meetings are important because they help to maintain discipline and prompt the economists to be conscious about the reasons for adjusting.

Final balancing After the partial adjustment, the estimates for imports, exports and domestic GVA are generally taken to be the most reliable. The final adjustment involves a 'global' evaluation of the supply and use and overall considerations about uncertainties in the primary statistical sources. Taking this and the arguments of the previous discussions of adjustments into account, one or two persons conduct the final balancing. It is mainly final domestic uses that are affected in this process but all variables are principally still open for adjustment.

In the final balancing, the general expectations in the macroeconomic community are also considered. Are the results surprising compared to the various forecasts made by government institutions and other interest groups (or are they not, but should be?) At this stage, it is very important to be aware of the independent role of Statistics Denmark. It is a strict working rule not to adjust to any external estimation, but on the other hand it is important to evaluate whether a surprising result is founded in new statistical results or should be taken as an indication of misjudgement in the balancing process. In the former case, further investigations and discussions have to be made either to give explanations of deviating results or to find causes to further adjustments. When supply and use are balanced the Abase is ready for the finalisation stage.

4. Finalisation The finalisation is fully automated and comprises compilation of level chain figures, annual calculations, seasonal adjustments, and printouts of tables, including tables for publication. All the results are carefully examined in a final meeting with experienced national accountants. Questions are asked and explanations evaluated. Sometimes a final adjustment is decided and the full balancing consequences are usually determined at this stage. As part of the finalisation, it is ensured that the quarterly figures of a given year add up to the figures of the year as a whole which have been calculated in the final and provisional annual accounts. This is discussed further in sections 3.2.2 and 3.3 below.

### 3.2.2 Benchmarking of QNA and ANA

While the first versions of the preliminary annual national accounts (ANA) to a large extent are based on the quarterly national accounts (QNA), the final ANA are compiled in more detail. Besides, statistical information on an annual basis is generally more reliable than the quarterly information. To secure time consistency, the QNA time series are benchmarked to the ANA when new final ANA are published. The purpose is, of course, to improve the QNA with new information about the annual development. At the same time, the benchmarking process must respect the development between quarters in the original series and be aware that the changes made to two successive quarters must be as similar as possible to avoid breaks of data between the fourth quarter in one year and the first quarter in the next year.

Benchmarking by the Denton method To secure especially the last criteria we use the Denton benchmarking method:

For all the time series, we minimize  $M$  with respect to the condition that for every year the sum of quarters must be equal to the annual figures:

$$(3.1) \quad M = \sum_q \left( (V_q - \tilde{V}_q) - (V_{q-1} - \tilde{V}_{q-1}) \right)^2 ,$$

where  $V_q$  is the original value of the series in quarter  $q$ , and  $\tilde{V}_q$  is the benchmarked value in quarter  $q$ .

Contrary to some other methods, the above-mentioned is easy to interpret, easy to use and secures that the benchmarked values preserves the identities of the National Accounts. Another advantage of the method is its ability to handle series with changes of signs (+/-) from one quarter to another.

3 years are benchmarked starting with the first quarter of year t-3

The QNA revision policy (see section 2.1) implies compilation of new revised ANA at the end of every year. The revisions involve preliminary ANA for year t-1 and year t-2 as well as final ANA for year t-3. ANA for earlier years are unchanged. Therefore, all these 3 years' QNA must be benchmarked (again). Keeping the QNA of year t-4 unchanged has implications for the first quarter of year t-3, because the changes of successive quarters must be as similar as possible, as mentioned above. Therefore, the minimization of (3.1) must also be done with respect to the condition that the fourth quarter of year t-4 is unchanged, implying that the revision of the first quarter of year t-3 must be kept as close to zero as possible.

“Flexible fixation” of the last quarter in the benchmarking procedure

The last quarter included in the benchmarking procedure is the fourth quarter of year t-1. When the benchmarking procedure takes place, we have already compiled QNA for the first and second quarter of year t. After the benchmarking, the figures of these two quarters will be compiled again with respect to the newly revised fourth quarter of year t-1.

To allow real revisions of the last quarter of the benchmarking procedure without accepting to massive changes, we use a “flexible fixation” of the fourth quarter of year t-1. We benefit from the mentioned circumstance that we, at the time of the benchmarking procedure already know the preliminary QNA for the first and second quarter of year t.

We expand the benchmarking procedure by including these two quarters with respect to the condition that for each benchmarked series, the revised sum of the first two quarters of year t must not differ more from the original sum of the quarters than one third of the difference in year t-1 between the figures in the ANA and the sum of quarters before the benchmarking.

The reason why we do not accept one half, but only one third of the difference between the ANA and the sum of quarters in year t-1, is that revisions in year t-1 cannot be expected to fully influence the figures of year t, because the compilation is not only based on extrapolation by means of indicators, but also to some extent consists of actual values.

### 3.3 Volume estimates

Quarterly volume estimates are published in chain-linked volumes at the price level of 2010.

#### 3.3.1 General volume policy

Chain-linking method

Quarterly volume estimates are published in chain-linked volumes at the price level of 2010. The chain-linked volume series are constructed of Laspeyres volume indices with use of the annual overlap method. The formula for a chain-linked volume series in the quarter  $q$  in the year  $t$  using the annual overlap method is

$$(3.2) \quad K_t^q = \bar{K}_{t-1} \cdot \frac{D_t^q}{V_{t-1}}$$

where  $D$  is the value in previous years prices,  $V$  is the value at current prices and

$$\bar{X}_t = \sum_{q=1}^4 X_t^q$$

The annual overlap method is chosen, because we want the quarterly data to be consistent with the annual national accounts, while we, at the same time, want indirect seasonally adjusted chain-linked series. The last condition implies that we must be able to aggregate the chain-linked (seasonally adjusted) volume data. This further implies that the chain-linked data cannot be directly benchmarked to the ANA, since the formula for aggregating chain-linked series stated below in (3.3) can only be used, when the chain-linked series have been constructed strictly according to formula (3.2). Since strict use of the annual overlap method ensures that the quarterly chain-linked data can be aggregated and is consistent with the annual data, when data in previous years and current prices are benchmarked to the ANA, this method ensures that both conditions are met. Because all series then are chain-linked strictly according to (3.2), problems can theoretically arise for series like changes in inventories which can get a value of zero, since the formula cannot handle zero observations. To avoid this problem in any such highly unlikely instance of a zero observation, we apply the rule of rounding away from zero.

Aggregating  
chain-linked data

As mentioned above, the chain-linked volume indices created from (3.2) are re-based, so 2010 is the reference year for the chain-linked volume series. Quarterly series in previous years' prices are constructed at the same level of detail as the series at constant prices by multiplying data at constant prices with the average price indices from the previous year (except data for taxes and change in inventories, where data in previous year's prices are constructed with the use of rules analogous to the annual national accounts). Data are then added together to a less detailed level, at which the chain-linked volumes are constructed cf. (3.2), and at which the chain-linked series are seasonally adjusted. Even though these chain-linked series lack the property of additivity, they can still be aggregated with the use of previous year's annual chain-linked price deflator. From the formula for the chain-linking method of annual overlap (3.2) and the property of additivity of data in previous year's prices follows, that the chain-linked volume series can be aggregated with the use of the formula (3.3) below. The formula shows how to aggregate the chain-linked components indexed by  $i$  to the aggregate at the left-hand side with the use of the previous year's annual price deflators for both the components and the aggregate.

$$(3.3) \quad K_t^q = \frac{\sum_i \bar{P}_{t-1}^i \cdot K_t^{iq}}{\bar{P}_{t-1}} \quad , \quad \text{where} \quad \bar{P}_t^i \equiv \frac{\bar{V}_t^i}{K_t^i}$$

Contributions to growth

It can also be shown that expressions for the contributions to growth from chain-linked series constructed with the annual overlap method can be deduced from the formula for aggregation (3.3). The contribution to the quarterly growth in the aggregate in (3.3) from the  $i$ th component can thus be calculated with the use of the formula (3.4) below, but only regarding the quarterly growth in the 2nd, 3rd and 4th quarter.

$$(3.4) \quad VB_t^{iq} = \frac{\bar{P}_{t-1}^i K_t^{iq} - K_t^{iq-1}}{\bar{P}_{t-1} K_t^{q-1}}, \quad \text{for } q = 2,3,4$$

When calculating the contributions to growth for the quarterly growth in the first quarter, the Danish QNA, from the release of 31 May 2017, follow the Eurostat recommendation in the [Handbook on quarterly national accounts](#), page 201. In (3.5) an extra term is added to formula (3.4) in order to achieve additivity, so the sum of the contributions to growth sum up exactly to the growth rate of the aggregate.

$$(3.5) \quad VB_t^{i,1} = \frac{\bar{P}_{t-1}^i K_t^{i,1} - K_{t-1}^{i,4}}{\bar{P}_{t-1} \quad K_{t-1}^4} + \left[ \frac{K_{t-1}^{i,4}}{K_{t-1}^4} - \frac{\bar{K}_{t-1}^i}{\bar{K}_{t-1}} \right] \left[ \frac{\bar{P}_{t-1}^i}{\bar{P}_{t-1}} - \frac{\bar{P}_{t-2}^i}{\bar{P}_{t-2}} \right],$$

for the first quarter compared to the last quarter of the previous year.

Contributions to growth in GDP from changes in inventories are published regarding both the seasonally adjusted quarterly growth and the annual growth (growth from the same quarter(s) of the previous year) in the newsletters following every publication. Additive contributions to the annual growth (year-on-year changes) can be calculated with (3.6) shown below.

$$(3.6) \quad VB_t^{i,q} = \frac{\bar{P}_{t-1}^i K_t^{i,q} - K_{t-1}^{i,q}}{\bar{P}_{t-1} \quad K_{t-1}^q} + \left[ \frac{K_{t-1}^{i,q}}{K_{t-1}^q} - \frac{\bar{K}_{t-1}^i}{\bar{K}_{t-1}} \right] \left[ \frac{\bar{P}_{t-1}^i}{\bar{P}_{t-1}} - \frac{\bar{P}_{t-2}^i}{\bar{P}_{t-2}} \right]$$

### 3.3.2 Chain-linking and benchmarking

Benchmarking of data in previous year's prices

Quarterly data in previous year's prices are benchmarked to the annual national accounts. The benchmarking is done by calculating each quarter's quota of the annual total for every variable, and then distributing the annual differences between the annual and quarterly national accounts onto the quarterly data for the series according to each quarter's quota of the annual sum. This method corresponds to adjusting each quarter of a series with the same percentage as the annual sum differs from the value of the series in the annual national accounts. After conducting this benchmarking procedure, supply-use will not be balanced in the previous year's prices. The balance between supply and demand is obtained by adding the difference to a special balancing inventory change item.

No need for benchmarking of chain-linked volumes

As mentioned in 3.3.1, the annual overlap method is used to derive the chain-linked values. From use of this method follows that the chain-linked volume series will have the same annual values as the chained-linked series in the annual national accounts, since values at both the previous year's prices and current prices are benchmarked to the annual national accounts. Because of that, there is no need for further benchmarking of the quarterly chain-linked series and it is possible to use the formula (3.3) above for aggregation of chain-linked values.

### 3.3.3 Chain-linking and seasonal adjustment

Indirect seasonal adjustment

It was mentioned in 3.3.1 that one of the reasons for using the annual overlap method, cf. (3.2), is to avoid direct benchmarking of the chain-linked volume series, so these can be seasonally adjusted using an indirect approach. The chain-linked volumes are seasonally adjusted at the most detailed level at which they are constructed, and afterwards the seasonally adjusted chain-linked series are aggregated, including the main components with the use of the formula for aggregation in (3.3). This also means that no seasonally adjusted values at the previous year's prices are produced, since the seasonal adjustments are done after construction of the chain-linked volumes.

Seasonally adjusted contributions to growth

Because the aggregation function (3.3) is used to produce the seasonally adjusted chain-linked volumes, the formulas for calculating contributions to growth, cf. (3.4) and (3.5), can also be used to calculate contributions to growth for seasonally adjusted series. The contributions to the seasonally adjusted GDP growth from the change in inventories are, as mentioned in 3.3.1, published in the newsletter following every release of new quarterly national accounts data.

## 3.4 Seasonal adjustment and working day correction

### 3.4.1 Policy for seasonal adjustment

The seasonally adjusted estimates are produced using the X12-ARIMA software package. Seasonal adjustment is made at a detailed level implying the adjustment of around 450 series. The series in current and constant (chain-linked) prices are seasonally adjusted by the indirect method and subsequently aggregated to the level of publishing. The discrepancies, which are created by the indirect method, are not balanced. This means for example that GDP compiled from the output approach will not be equal to GDP compiled from the expenditure approach in the seasonally adjusted series as it is when compiling GDP with the non-seasonally adjusted series.

As it is rather time-consuming to evaluate the seasonal adjustment specifications for so many series, this is done once a year in connection with the publication of the final annual figures and the recalculation of the quarterly series from year t-3 to Q3 in the statistical year. As part of this process, the sum of the quarters is forced to sum up to the annual totals using the Denton method. As part of the seasonal adjustment process, the error tests are monitored and any problematic series are investigated and a more appropriate model is sought. In case no fully satisfying model can be found, a visual check of the adjusted series is made to determine the appropriateness of the seasonal adjustment.

The annual evaluation of the seasonal adjustment specification includes an assessment for calendar effects (Easter), level shifts, additive outliers and temporary change and ramp effects. The seasonal adjustment models are also checked once a year for plausibility and are updated by November (QNA60 Q3 publication). We use fixed models for all series during the rest of the year. The reason we use fixed models is twofold. First, it reduces the “noise” from revisions in seasonal adjusted data by avoiding changes in the model used. Experience has taught us that these revisions rather cause confusion than add new information on the seasonal adjustment. Second, the use of fixed models ensures that we avoid using asymmetric filters.<sup>2</sup> Asymmetric filters might also lead to greater revisions in the seasonally adjusted series as new quarters are added because of the lack of forecasting.

Both the original and the seasonally adjusted series are published, whereas series only adjusted for calendar effects are not published. The parameters used in the models are re-estimated with every new seasonal adjustment. Also, to the extent possible, an assessment for outliers and other significant specifications is conducted at every QNA calculation.

### 3.4.2 Policy for working-day correction

At the time being no correction is made for working days besides Easter. Earlier attempts to adjust for working-days gave rise to implausible and counter-intuitive results.

Under the 2014 mayor revision, the seasonal adjustment methodology was reassessed and some readjustments were undertaken. The most significant were the reassessment of the Easter effects and the change to direct seasonal adjustment of the gross value added (GVA) by industry instead of the former method whereby both output and intermediate consumption were seasonally adjusted separately for each industry before calculating the indirectly seasonally adjusted gross value added. This method has improved the quality of the seasonally adjusted GVA and consequently the seasonally adjusted GDP.

---

<sup>2</sup> Asymmetric filters are used by X12-Arima when no appropriate model can be found by the automatic model selection procedure

## 4 GDP components: the production approach

### 4.1 Gross value added

The quarterly gross value added is derived as the difference between output and intermediate consumption, which are compiled independently.

Compilation of output Generally, the initial estimates of each of the output or domestic production series are calculated with a simple extrapolation from the quarterly growth in the corresponding indicators (exceptions will be explicitly mentioned below). This implies, of course, the strong assumption that the indicator and the corresponding variable follow the same growth path in all circumstances.

The initial estimates are compiled simultaneously at current and constant prices. This enables us to use the connection between values, prices and volume described in section 3.3.1.

We always have indicators for two of the three values: current prices, constant prices and/or price indices (mainly the producers' price index), which enables us to residually calculate the variables to which no indicator values are linked.

For some areas of domestic production the calculation is more complicated, which will also be described more explicitly below.

Compilation of intermediate consumption When it comes to intermediate consumption, hardly any indicators are available for the non-financial market sector. The general principle is to calculate intermediate consumption at constant prices using the fixed coefficients from the same quarter last year. For each industry, the intermediate consumption is estimated as the same proportion of domestic production as in four quarters earlier.

Subsequently, the current price values for intermediate consumption are calculated by inflating the constant price volumes using the price indices from a special price calculation model described below.

The method described for compiling intermediate consumption is used for all industries except *financial and insurance* and *public administration, education and health*, and accordingly the following industry breakdowns are mainly focusing on the compilation of the production output.

Input price calculations are based on the I-O tables Contrary to domestic production and imports, almost no independently collected price information is available for intermediate consumption as well as exports and gross fixed capital formation other than construction. To solve this problem, a price model based on input-output (I-O) tables for the latest final ANA is applied to calculate price indices for the missing categories on the uses side in the QNA.

In order to build an I-O table at current prices, the ANA information is aggregated to the level of 69 industries for domestic production, 69 industries for intermediate consumption and over 100 specially selected categories of imported and exported goods and services. Rows (supply) in the I-O table are each multiplied with a price index for the current quarter. Implicit price indices for the use (demand) side can then be derived from the columns' totals. This information on the price indices of the use side is used when no other price information is available, which is the case for most of the Intermediate Consumption series, Export of goods and services and most of the Gross Fixed Capital Formation groups.

#### 4.1.1 Agriculture, forestry and fishing (A)

The statistical source for *agriculture, forestry and fishing* mainly consists of Statistics Denmark's agricultural statistics. The output of animal products at both current and constant prices is extrapolated by indicators based on surveys from the



agricultural statistics. The output of crop products is compiled on 9 types of sub products at both current and constant prices on the basis of an estimation of the annual production (harvest) and a distribution on quarterly values in proportion to inputs through the changes in stocks of “work in progress”.

For *forestry*, the production output at current prices is extrapolated from indicators from a sales survey undertaken by the Danish Nature Agency. The output at constant prices is estimated by deflating the output at current prices with the price index for domestic supply for woods.

The statistical source for *fishing* is the Danish AgriFish Agency statistics of landings. It covers landings by fish. The production output at current prices is extrapolated from an indicator based on the total landings. The output at constant prices is estimated by deflating the output at current prices with the net price index for fish and seafood.

#### **4.1.2 Mining and quarrying (B)**

The production output of extraction of crude petroleum etc. at constant prices is extrapolated from quantity indicators based on monthly supply statistics from the Danish Energy Agency. The output at current prices is calculated by inflating the output at constant prices with the unit value indices from export of goods.

The output at constant prices of the extraction of gravel, clay, salt etc. is assumed to be the same as in the similar quarter of the year of the last preliminary ANA. The output at current prices is calculated by inflating the output at constant prices with the wholesale price index for salt etc.

#### **4.1.3 Manufacturing (C)**

The statistical source for manufacturing is Statistics Denmark’s industrial accounts statistics. For all manufacturing industries, the production output at current prices is extrapolated from indicators, while the output in constant prices is calculated by deflating the current price values with the industrial output price indices. The only exception to this method is the output of the mineral oil industry. At both current and constant prices, it is extrapolated from indicators based on survey information from the Danish Energy Authority.

For the remaining sectors of the manufacturing industries, the first compilation of data is based on turnover indices from the industrial production and turnover statistics and the compilation of revised data is based on Industrial Commodity Statistics.

#### **4.1.4 Utility services (D\_E)**

The production output of the electricity, gas and district heating is extrapolated from data from the Danish Energy Agency and inflation/deflation is based on relevant net consumer price indices.

The production at constant prices of water supply is projected with a fixed annual growth rate. The output at current prices is calculated by inflating the output at constant prices with relevant net consumer price indices. The production in renovation, waste management etc. at current prices is extrapolated from quarterly indicators based on Value Added Tax (VAT) statistics. The output at constant prices is calculated by deflating the output at current prices with a price index for refuse collection.

#### **4.1.5 Construction (F)**

The construction industry covers all construction and civil engineering activities in the Danish economy. The production output (as well as the intermediate consumption) of construction at both current and constant prices is compiled in a compre-

hensive system based on detailed calculations. Accordingly, no extrapolation from indicators is taking place. Construction of new buildings is based on information of produced square meters of different kinds of buildings (complete coverage). Repairs are based on employment in the industry. Civil engineering is based on employment and government accounts and budgets.

#### 4.1.6 Trade and transport etc. (G\_I)

Wholesale and retail sale (G) The production output at current prices of *wholesale, retail trade and wholesale and retail trade of motor vehicles* is compiled by extrapolation from indicators based on the monthly VAT statistics (see box 5.1.2), which is based on assessments to the tax authorities and has a complete coverage. The only exception from this approach is repair of motor vehicles and motorcycles. Here, the output is being extrapolated from traffic indicators from the Danish Road Directorate. The output at constant prices for the *wholesale and retail trade* is calculated by deflating the output at current prices with the price indices for the total for Price Index for Domestic Supply and the total for Net Price Index, respectively. The output at constant prices for *repair of motor vehicles etc.* is calculated using the relevant net price index.

Transportation (H) The *water transport* industry has a significant weight in the Danish economy. The output at current prices is assumed to follow exports of sea transport and likewise intermediate consumption utilises information from the imports of water transports and the imports of bunkered oil products by Danish companies' ships abroad. The imports and exports are based on information from the Balance of Payment (BoP) statistics. The calculation of output at constant prices is made using service output price indices for this industry when available (usually at the QNA90 publication). If the service output price indices are not available at the time of calculation, preliminary data at micro-level or publicly available financial report data are used.

The output of the remaining industries: *water transport of passengers, land transport and transport via pipelines, air transport, support activities for transportation and postal and courier activities* is compiled partly by extrapolation from indicators based on the monthly VAT statistics (see box 5.1.2) and partly by using information from quantity indicators for transportation. Compilation of constant and current prices is derived in combination with a deflator or inflator based on the relevant net price index.

Accommodation and food services activities (I) The production output of *hotels and restaurants* is also based on the turnover of the enterprises in the industry. The output at current prices is compiled by extrapolation from indicators based on the VAT statistics (see box 5.1.2), while the output at constant prices is calculated using the relevant net price index.

#### 4.1.7 Information and communication (J)

The production output of *information and communication* is also based on the turnover of the enterprises in the industry. The output at current prices is compiled by extrapolation from indicators based on the VAT statistics (see box 5.1.2), while the output at constant prices is calculated using the relevant net price index or producer price index.

#### 4.1.8 Financial and insurance (K)

The production at current prices of financial intermediation, insurance and pension funding as well as the activities auxiliary to financial intermediation is compiled by Statistics Denmark's Government Finance Division. The data is based on accounting information of the financial sector from the Danish Financial Supervisory Authority. This information is available for the revised version of QNA (QNA90). Data and calculations made for the preliminary version (QNA60) are identical to those made for the GDP45 version. The main activity is FISIM and pro-

duction of directly paid bank services. FISIM is calculated with a combination of financial statistics on interest rates, deposits and loans. Using information from financial statements, an indicator is calculated for production of directly paid bank services. The indicator is used to project production information for other financial activities.

Output at constant prices of FISIM is calculated by using the deflated amount of deposits and loans and the interest rate margins of the previous year. Output at constant prices of other financial services is calculated by using a net price index for financial fees as deflator.

#### **4.1.9 Real estate activities and renting of non-residential buildings (LA)**

The production output of real estate, renting and business activities at current prices is compiled by extrapolation from indicators based on the VAT statistics (see box 5.1.2). Output at constant prices is calculated by using the relevant net price index as deflator, except for the real estate industry, where we use the index of average earnings as deflator.

#### **4.1.10 Dwellings (LB)**

The compilation of output of dwellings at constant prices is based on an assumption that output develops in line with the stock of buildings. For housing, the stock of homes is adjusted with information on finished and demolished homes. Intermediate consumption in the industry is extrapolated from the output in construction of repairs.

#### **4.1.11 Other business services (M\_N)**

The production output of other business services at current prices is compiled by extrapolation from indicators based on the VAT statistics (see box 5.1.2). Output at constant prices is calculated by using the relevant net price index as deflator.

#### **4.1.12 Public administration, education and health (O\_Q)**

The statistical source for *public administration, education and health* is quarterly public finances. The first full version of quarterly national accounts is based on an internal version of this set of statistics. Production output as well as intermediate consumption is extrapolated using production and intermediate consumption respectively for non-market industries in *public administration, education and health*. Production output in market industries within *public administration, education and health* are extrapolated based on the VAT statistics. A brief description of the quarterly public finances can be found in box 4.1.12.

##### **Box 4.1.12 Quarterly public finances**

The basic idea behind the quarterly accounting system is that the same principles and methods of calculation should be used as those used to compile annual accounts for general government. Production and final consumption expenditure are calculated using the following variables:

1. Compensation of employees
2. Consumption of fixed capital
3. Intermediate consumption
4. Other taxes on production and other subsidies on production, net
5. Production (1+2+3+4)
6. Social benefits in kind
7. Sales of goods and services
8. Final consumption expenditure (5+6+7)

In the text below, the principles used for the compilation of some of these variables are explained.

#### 1. Compensation of employees

Data for the quarterly accounted expenditure on wages and salaries of central and local governments is included as the main indicator for the compensation of employees. In practice, an indicator-based figure for compensation of employees and a figure based on the accounted primary information are compiled. These two figures are compared and if we observe a difference, corrections are made to either the indicator-based or the accounted figure. The sources and methods concerning the account-based figure are the same as described under intermediate consumption.

Imputed social contributions cannot be described on the basis of the existing sources and are therefore replaced by values from budget statistics, distributed among quarters using the Denton algorithm.

#### 2. Consumption of fixed capital

Consumption of fixed capital cannot be described on the basis of the existing sources and is therefore replaced by values from budget statistics, distributed among quarters using the Denton algorithm.

#### 3. Intermediate consumption

##### 3.1 The central government sector

###### 1st step

Central government institutions send their accounting records to Moderniseringsstyrelsen (the Agency for Modernisation Ministry of Finance) from which Statistics Denmark receive the data. Monthly data from the agency are combined to form quarterly data. All expenditure and revenue with identical account numbers is aggregated into an account showing a value corresponding to the sum of the amounts in the monthly accounts under that account number.

###### 2nd step

All expenditure and revenue items are classified at the most detailed accounting level into a national accounts classification. The first stage is to transfer the national accounts classification from the same year's budget statistics to account numbers which are identical. The use of budget statistics makes it possible to transfer new accounts introduced during the year (since the accounts in question are included in the budget). The remainder, such as account numbers set up after the budget was approved, are extracted and classified manually. Amounts for this remainder group are insignificant.

###### 3rd step

The figures are validated by comparing the quarterly calculation with the budget statistics for the same year, the previous year's accounts-based annual versions and the latest quarters. Validation is at the level of areas of ministerial responsibility. It may reveal incorrect classifications and missing entries, and corrections are made wherever possible.

###### 4th step

An estimate from the latest budget statistics is used to include the extra budgetary units. This estimate is based on a projection of the most recent year for which accounting figures are available. The annual figure is divided among quarters using the Denton algorithm.

##### 3.2 The local government sector

###### 1st step

Statistics Denmark receives quarterly data from the municipalities and regions. They are not error searched and Statistics Denmark corrects any significant identified errors. The municipalities and regions send detailed quarterly accounting information to Statistics Denmark. This information is at the same level of detail as the final annual accounts. Since the quarterly accounting information does not include the supplement period, the total for the four quarters reported does not add up to the national accounts total.

###### 2nd step

There is no data of the supplement period of the municipal sector, thus it has to be calculated as a residual, i.e. the difference between the entries in the first to the fourth quarters and the final accounts. The supplement period entries have to be divided up over the previous four

quarters. This cannot be done until the final annual account is available. The supplement period figures therefore have to be estimated even when the first quarter is worked out. This is based on information on the supplement period of the previous year, the total budget for the year and the entries available for the first quarter. The estimate of the supplement period figure is revised continually as figures are worked out for new quarters. The final supplement period figure is calculated when the final annual accounts are available. Thus, corrections may be made at any time to previous quarters as a result of new and improved estimates of supplement period figures, and again when the annual account is available and the supplement period is calculated.

#### 3rd step

Some of the entries in the supplement period refer to the fourth quarter and should therefore be transferred to that period. Some of the entries made in the fourth quarter refer to the third quarter and should therefore be transferred to the third quarter. The same applies to the other quarters with the exception of the first, where the previous year's supplement period collected late records. There will be entries referring to other than the previous quarter, but they are ignored, since they are assumed to be insignificant. A complete and correct transfer of entries between quarters is not possible, since there are no data sources which can provide information on this flow between quarters. It is therefore assumed that the flow remains constant from one quarter to the next and that it is therefore sufficient to transfer an amount corresponding to the estimated flow from the supplement period to the first quarter. The share of the supplement period which is deemed not to be a flow from the previous quarter is divided equally among the remaining quarters.

#### 8. Individual/collective consumption

The split-up of final consumption into the individual and collective part is calculated using the ratio from the newest annual figures. This method is used due to the fact that the quarterly figures are not classified by the COFOG manual (Classification of the Functions of Government), which is the basis for the split-up into individual and collective final consumption in the annual figures.

More information about the Quarterly public finances can be found at the: <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/government-finance--quarterly-accounts>

Constant price values for individual government consumption in the ANA are based on quantity indicators. However for the QNA most of these indicators are not yet available so growth is calculated by extrapolating with constant price values calculated with the input method. From 2018 Q1 compilation of quantity indicators for individual government consumption will be introduced gradually for the different types of individual consumption beginning with indicators for hospital services. The price indices used for the input method for subcomponents of government production are as follows:

- Compensation of employees

Constant prices are derived using the indices of average earnings in the public sector, central and local government.

- Consumption of fixed capital/depreciation

Constant prices are found by deflating current prices with the price index for investment from the input-output price model.

- Intermediate consumption

The price index for intermediate consumption follows the price indices from the input-output price model for intermediate consumption in industries dominated by public sector activity.

- Taxes less subsidies on production

Subsidies on production are deflated using the implicit wage index in general government, while taxes on production in constant prices are calculated as the value for the same quarter the previous year.

- Transfers in kind

Constant price estimates are found by deflating values at current prices with the same price index for outpatient services from the net price index.

#### 4.1.13 Arts, entertainment and other services (R\_S)

The production output of art, entertainment and other services at current prices is compiled by extrapolation of indicators based on the VAT statistics (see box 5.1.2). Output at constant prices is calculated by using the relevant net price index as deflator.

## 4.2 FISIM

Financial intermediation services indirectly measured (FISIM) occurs as the indirect payment for intermediation service to the financial institutions, which is paid by their customers through an interest rate on loans which is higher than the reference rate and an interest rate on deposits which is lower than the reference rate. The supply of FISIM is produced in the financial institutions and imported by residents who pay interest for loans abroad and by residents who have deposits abroad. The demand for FISIM is used for Intermediate Consumption, Final Consumption Expenditure and Export. In QNA, the production of FISIM is a part of the production in financial institutions as described in above section 4.1.8. The consumption of FISIM is determined by extrapolation from the production as mentioned in section 5 below. Intermediate consumption of FISIM is regarded as a service similar to other services in the Intermediate Consumption and is thus part of the fixed coefficient estimation of Intermediate Consumption. The import and exports of FISIM are based on data from the Balance of Payments Statistics. Four types of FISIM to and from the Rest of the World (ROW) are estimated.

## 4.3 Taxes less subsidies on products

We differentiate between three different types of taxes and subsidies on products: *value added tax*, *taxes on imports* and *other taxes less subsidies on products*. Detailed information from the Danish Tax Authority classified according to type of product tax and subsidy is available for the revised version of the QNA (QNA90) at current prices. This information is collected by the Government Finances Division. However, for the preliminary version (QNA60), taxes and subsidies on products are compiled using the same tax coefficients as the previous quarter for each use category. The compilation of taxes and subsidies on products in constant prices are compiled in a similar way as current prices for QNA60 but using the same tax coefficients as in the same quarter in the previous year both for QNA60 and QNA90.

Even though there are great similarities in the method of compilation of the different types of taxes and subsidies on products, they are explained separately below.

### 4.3.1 Value added tax

Compilation of the preliminary version of the QNA

For QNA60, Value Added Tax (VAT) at current as well as constant prices is calculated at a detailed level (for all types of use). For each type of use, we multiply the value with the VAT coefficients of the previous quarter for current prices and for constant prices we use the VAT coefficient from the same quarter in the previous year. The new VAT figures for each type of use are afterwards aggregated to calculate the total VAT at current and constant prices.

Compilation of the revised version of the QNA For the compilation of QNA90, VAT at constant prices is calculated the same way as mentioned above. For the VAT at current prices, we base our calculations on the Government Finance Division's compilation of total VAT based on information from the Central Customs and Tax Administration, Ministry of Taxation, Ministry of the Interior as well as general government budgets and accounts. VAT at current prices is benchmarked to the new total without changing the relative distribution between the types of use.

#### **4.3.2 Taxes on imports**

In contrast to the VAT, we only compile the total for taxes on imports.

Current prices A preliminary estimate of the total amount for taxes on imports at current prices is already available at the QNA60. This is compiled by the Government Finances Division based on information from the Central Customs and Tax Administration and can be revised for the QNA90 compilation.

Constant prices For both the QNA60 and QNA90, taxes on imports at constant prices are compiled by deflating taxes on imports at current prices with the implicit price index of imports of goods.

#### **4.3.3 Other taxes less subsidies on products**

For other taxes and subsidies on products, we compile net values at the detailed level (for all types of use). At constant prices we also just compile the net value for the total economy, while we compile both the total taxes and the total subsidies at constant prices.

Constant prices For both QNA60 and QNA90 we calculate the taxes less subsidies at constant prices on the basis of the net tax coefficient of the same quarter in the previous year. The detailed net values are afterwards aggregated to calculate the total taxes less subsidies at constant prices.

Current prices For the first compilation of taxes less subsidies at current prices, the detailed calculations are based on the net tax coefficients from the previous quarter. The revised taxes and subsidies at current prices are compiled by the Government Finance Division based on information from the Central Customs and Tax Administration, Ministry of Taxation, Ministry of the Interior as well as general government budgets and accounts.

## 5 GDP components: the expenditure approach

### 5.1 Household final consumption

Final domestic consumption of the Danish households is, at the most detailed level, compiled for 64 different consumption groups (excluding tourism), corresponding to the most detailed level of publication in the ANA (72 consumption groups) except for “Food”, which is in the QNA is compiled aggregated to only one consumption group (and not 12 groups as in the ANA). The publication level in the QNA is 11 groups. The National Accounts’ household consumption classifications are consistent with the COICOP classification (Classification of Individual Consumption by Purpose). The calculation of quarterly data for household consumption in these 64 groups is based on extrapolation with the quarterly growth from indicator series, where several different statistics are used to create these indicators. The different sources and methods used to extrapolate the values and volumes of the consumption growth are explained below for each of the consumption groups.

Data for the resident households’ consumption in the ROW and non-resident households’ consumption on the economic territory (expenditure on and income from tourism) are based on data from the Balance of Payments Statistics and are only calculated as aggregates.

For every consumption group, we have an indicator (in volume or value) and a price index, mainly the Consumer Price Index, so we can extrapolate both the growth in current and constant prices. In order to describe the indicators used to extrapolate the quarterly growth of the household consumption groups, we will distinguish between consumption of goods where we use current price indicators, consumption of goods that uses volume indicators, consumption of services for which growth is extrapolated from VAT indicators, consumption of services that uses output indicators and finally the indicators for tourism consumption.



## Household final consumption main indicators

Consumption group	Main indicator	Good (by duration) and Services
Food	VAT statistics and Retail Trade Index	Non-durable goods
Coffee, tea and cocoa	Volume	Non-durable goods
Mineral waters, soft drinks, fruit and vegetable juices	Barcode	Non-durable goods
Spirits and wine	Volume	Non-durable goods
Beer	Volume	Non-durable goods
Tobacco etc.	Volume	Non-durable goods
Articles of clothing	VAT statistics and Retail Trade Index	Semi-durable goods
Cleaning, repair and hire of clothing	VAT statistics	Service
Footwear	VAT statistics and Retail Trade Index	Semi-durable goods
Actual rentals for housing	Output in the corresponding industry	Service
Imputed rentals for housing	Output in the corresponding industry	Service
Maintenance and repair of the dwelling	Output in the corresponding industry	Service
Water supply and sewerage services	Output in the corresponding industry	Service
Refuse collection, other services n.e.c.	VAT statistics	Service
Electricity	Volume	Non-durable goods
Gas	Volume	Non-durable goods
Liquid fuels	Volume	Non-durable goods
District heating etc.	Output in the corresponding industry	Non-durable goods
Furniture and furnishings, carpets and other floor coverings	VAT statistics and Retail Trade Index	Durable goods
Household textiles	VAT statistics and Retail Trade Index	Semi-durable goods
Household appliances	VAT statistics and Retail Trade Index	Durable goods
Repair of major household appliances	VAT statistics	Service
Glassware, tableware and household utensils	VAT statistics and Retail Trade Index	Semi-durable goods
Tools and equipment for house and garden	VAT statistics and Retail Trade Index	Semi-durable goods
Non-durable household goods	VAT statistics and Retail Trade Index	Non-durable goods
Domestic services and household services	Output in the corresponding industry	Service
Pharmaceutical products and other medical products	VAT statistics and Retail Trade Index	Non-durable goods
Therapeutic appliances and equipment	VAT statistics and Retail Trade Index	Durable goods
Out-patient services	Output in the corresponding industry	Service
Hospital services	Output in the corresponding industry	Service
Purchase of vehicles	Volume	Durable goods
Maintenance and repair of vehicles	Output in the corresponding industry	Service
Fuels and lubricants for personal transport equipment	Volume	Non-durable goods
Other services in respect of personal transport equipment	VAT statistics	Service
Transport services	Output in the corresponding industry	Service
Postal services	Output in the corresponding industry	Service
Telephone and data communication equipment	VAT statistics and Retail Trade Index	Durable goods
Telephone and data communication services	Output in the corresponding industry	Service
Radio and television sets etc.	VAT statistics and Retail Trade Index	Durable goods
Photographic equipment etc.	VAT statistics and Retail Trade Index	Durable goods
Data processing equipment	VAT statistics and Retail Trade Index	Durable goods
Recording media for pictures and sound	VAT statistics and Retail Trade Index	Semi-durable goods
Repair of a/v and data processing equipment	VAT statistics	Service
Other major durables for recreation and culture	VAT statistics and Retail Trade Index	Durable goods
Other recreational items and equipment, gardens and pets	VAT statistics and Retail Trade Index	Semi-durable goods
Recreational and cultural services	VAT statistics	Service
Books, newspapers, periodicals and miscellaneous printed matter	VAT statistics and Retail Trade Index	Non-durable goods
Stationery and drawing materials etc.	VAT statistics and Retail Trade Index	Semi-durable goods
Package holidays	Volume	Service
Education	Output in the corresponding industry	Service
Catering services	VAT statistics	Service
Accommodation services	Volume	Service
Hairdressing salons and personal grooming establishments	VAT statistics	Service
Appliances, articles and products for personal care	VAT statistics and Retail Trade Index	Semi-durable goods
Jewellery, clocks and watches	VAT statistics and Retail Trade Index	Durable goods
Other personal effects	VAT statistics and Retail Trade Index	Semi-durable goods
Retirement homes, day-care centres etc.	Output in the corresponding industry	Service
Kindergartens, creches etc.	Output in the corresponding industry	Service
Insurance	Output in the corresponding industry	Service
Financial services n.e.c.	Output in the corresponding industry	Service
Other services n.e.c.	VAT statistics	Service

Consumption of goods  
with current price  
indicators

As mentioned above, several statistics are used as indicators to extrapolate the quarterly growth in the Danish households' final domestic consumption for 64 different consumption groups. The two most important statistics are the Retail Trade Index and the VAT statistics. Both of these statistics measure the current price value of the sales of businesses, and they are described below in boxes 5.1.1 and 5.1.2. Because these two statistics are compiled for industries, plans of distribution between sales in industries and consumption groups are used to construct sales indices for the part of the above-mentioned 64 consumption groups covered by these statistics. For most of the consumption groups containing goods, an index is constructed as the average of the indices from these two statistics, and the growth in this index is then used to extrapolate the quarterly growth in the current price consumption. Furthermore, for the consumption group "Food", barcode data from supermarkets is available and delivered by the Prices and Consumption Division in Statistics Denmark, so this is also included in the indicator for growth of "Food".

Indices from the Consumer Price Index described in box 5.1.3 below are used to extrapolate the quarterly growth in the price deflators for each of the above-mentioned consumption groups, and the constant price consumption is calculated as a residual. The Consumer Price Index is available at the same level of detail as the household consumption is compiled at, so there is a direct correspondence to the consumption groups in the QNA. The growth in the price deflator for 'Data processing equipment' is, however, not calculated with the use of the Consumer Price Index. Instead, the geometric mean of the wage index for business activities and a hedonic computer import price index from the US Bureau of Labor Statistics are used due to the large impact of the quality component.

#### Box 5.1.1 Retail Trade Index

The Retail Trade Statistics show the development in turnover at current prices. The turnover index is published for all 43 subindustries within the retail trade industry and for the 3 main commodity groups: "Food and other everyday commodities", "Clothing etc." and "Other consumer goods".

The enterprises in the Retail Trade Index are all legal units. In the Central Business Register of Statistics Denmark (CBR) the legal units are identified by their CVR number. The delimitation of the population is based on the Central Business Register of Statistics Denmark and the Danish industrial classifications, DB07.

The statistics cover the population consisting of all enterprises with their main activity, or in a few rare cases secondary activity, within retail trade, with the exception of retail trade of motor vehicles. Furthermore, bakeries with their own production are also included in the population. Enterprises with an annual turnover below DKK 2.5m (DKK 1.0m for some industries) are disregarded. The population consists altogether of approximately 10,000 enterprises.

Turnover figures are collected each month from a sample of 3,500 retail trade enterprises, reporting the figures either by web or by dial-in. The submitted data is error checked by a number of measures, e.g. by comparing the turnover growth in similar enterprises. Survey data is grossed up in part by including information from administrative sources on the VAT turnover in the previous quarter for the entire population. From the estimated turnover, indices on industry level as well as commodity group and total level are calculated. The total and the commodity group indices are seasonally adjusted.

The first published figures for a given month are published 20-22 days after the end of the reference period and only include figures on commodity groups (not industries). However, these first unrevised figures distributed by industries are made available for internal use for the QNA calculations. On industry level, the first publication in the Retail Trade Index is one month later. At the same time, the first published figures on commodity groups are revised. Accordingly, these figures are published 50-52 days after the end of the reference period. One month later, the final revision of the figures is made for both the commodity groups and the figures on industry level (which are thus only revised once). Accordingly, the final figures are published 70-72 days after the end of the reference month.

More information about the Retail Trade Index can be found at the [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/retail-trade-index): <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/retail-trade-index>

#### Box 5.1.2 Purchases and Sales by firms or Value Added Tax (VAT) statistics

The VAT statistics give a monthly picture of the development in most business sectors in Denmark. For each group (industry, trade etc.) information is available regarding total purchases and total sales, and the domestic part of it.

The statistical reference unit is the legal unit (corporation/enterprise/firm) identifiable through its code number (CVR number) in the Central Business Register. In Denmark, a busi-

ness must register for VAT if its annual turnover is expected to exceed DKK 50,000. VAT declarations, i.e. monthly, quarterly or semi-annual reports (forms) submitted to the Central Customs and Tax Administration in connection with the payment of VAT.

The yearly turnover of a business enterprise determines its VAT declaration frequency. The frequency is monthly if the amount exceeds DKK 50 million, quarterly in the interval between DKK 5 million and DKK 50 million, and half-yearly if it is less than DKK 5 million. Large enterprises, with an annual turnover of more than DKK 50m, have to submit VAT returns monthly, at least 25 days after the end of the month, although not for June, as the deadline has been extended so that it does not fall in the middle of the summer holiday period.

This frequency was set by 1 January 2014 and is a more relaxed frequency than before 2014. The relaxation has reduced the percentage of total turnover reported and has also exacerbated the need to estimate the turnover of a large number of enterprises increasing the uncertainty of the statistics. This affects calculation of both GDP45 and QNA60. Work is ongoing to implement a new estimation model that can improve the estimates of the turnover of small and medium-sized enterprises.

More information about the statistics on Purchases and Sales by firms can be found at the [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentation-ofstatistics/purchases-and-sales-by-firms): <http://www.dst.dk/en/Statistik/dokumentation/documentation-ofstatistics/purchases-and-sales-by-firms>

Consumption of goods with volume indicators

There are some groups within consumption of goods that are not extrapolated according to the above-mentioned method using the Retail Trade Index and VAT statistics. These are the groups containing beverages, tobacco, vehicles, electricity, gas and other fuels. Volume indices and other alternative value indicators are available or can be calculated for these groups. These volume indices are then used to extrapolate the quarterly growth at the constant price consumptions, and the relevant price indices from the Consumer Price Index cf. box 5.1.3 are used to extrapolate the price inflators. The consumption at current prices is then calculated as a residual.

Beverages and tobacco

Tobacco and many beverages are imposed with excise duties per item, so the volumes of the sales of tobacco and beverages can be found with the use of data from the Danish Tax Authority (named "SKAT" in Danish). For the consumption group 'Tobacco', the exact number of sold cigarettes is obtained. For beverages, the tax revenues are used to make volume indicators for the different types of beverages for which consumption groups exist. These are 'Coffee, tea and cocoa', 'Wine and spirits' and 'Beer'. Both 'Tobacco' and the three groups containing beverages are categorized as non-durable goods. Barcode data from supermarkets is available and delivered by the Prices and Consumption Division. We use this source as an indicator for food and for several types of beverages, such as 'Mineral waters, soft drinks and juices' that are not imposed with excise duties and therefore there is no volume indicator from the Danish Tax Authority.

Purchase of vehicles

The volume indicator for 'Purchase of vehicles', which is a durable good, is the number of new registered passenger cars plus vans for private use, both of which are obtained from the Car register described below in box 5.1.4. The number of cars and vans also include an estimation of used cars sold from businesses to households.

Electricity, gas and other fuels

The total domestic supply of electricity, exclusive of transmission losses measured in gigawatt hours, is used as the volume indicator for the consumption group 'Electricity'. Sales of heating oil and similar and sales of petrol, both in cubic metres, are used to construct volume indicators for 'Liquid fuels'. The volume indicator for 'Gas' is the total consumption of natural gas measured in normal cubic metres. The data for these volume indicators are all obtained from the Danish Energy Authority. Consumption of "District heating etc." at constant prices is extrapolated using the growth in the corresponding industry output (see 4.1.4.) as the production must be almost exclusively for the Danish households. All the above-mentioned con-

sumption groups containing “electricity, gas and other fuels” are categorized as non-durable goods.

#### Box 5.1.3 Consumer Price Index

The consumer price index shows the development of prices for goods and services bought by private households in Denmark. Thus, the index also covers foreign households' consumption expenditure in Denmark, but not Danish households' consumption expenditure abroad. The index shows the monthly changes in the costs of buying a fixed basket of goods, the composition of which is made up in accordance with the households' consumption of goods and services.

The consumer price index can best be characterized as a fixed weight index of a Laspeyres-type. The prices that are included in the consumer price index are the prices paid by the consumers, i.e. including VAT and taxes and after deduction of any subsidies. The only exception to this is rent payments where the total rent, i.e. the share of rent payments plus any housing benefits, is included.

The weights are calculated on the basis of data from the national accounts on final consumption expenditure of households in Denmark, distributed among 70 commodity groups. For each of these, a further division is made by using the detailed information on consumption expenditure of Danish households from the Household Budget Survey. So for instance, the weights in connection with calculating the index for January 2017 are based on private consumption expenditure in 2015. The weights are updated on a yearly basis.

The grouping of data and calculations take place in accordance with COICOP (Classification of Individual Consumption by Purpose).

More information about the Consumer Price Index can be found at [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/consumer-price-index): <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/consumer-price-index>

#### Box 5.1.4 Car register

The car register was established in 1992. It contains actual as well as historical data for the vehicles which were registered then and the vehicles which have been registered since then.

The car register today is a database with approx. 400 tables containing new and historical information on vehicles that are registered in the *Digital Motor Register* according to the Danish Act on the registration of motor vehicles (Lov om registrering af motorkøretøjer) and their owners and users.

The register does not contain vehicles that do not have to be registered, for example contractors' supplies or military vehicles. Certain other vehicles that have to be registered are, however, not included in the register, for example some of the vehicles belonging to the police and vehicles only used within closed areas such as ports and airports.

Looking at the households, the ownership figures can be supplemented to cover the entire population, while industries can be supplemented to cover all enterprises.

More information about the Car register statistics can be found at [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/car-register-and-publications): <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/car-register-and-publications>

Services with indicators based on VAT

For most of the consumption groups containing services which are subject to VAT, the sales growth from the VAT statistics is used to extrapolate the growth in the current price consumption. For these consumption groups, indices from the Consumer Price Index are used to extrapolate the growth of the price deflators, and the constant price consumption is then calculated residually.

Services with output indicator

The method used to estimate the growth in most of the consumption groups containing services which are not subject to VAT, is to extrapolate the growth of the

consumption group with the growth in the relevant industry production or output, which implies the assumption that consumption is a fixed percentage of the production. In general, this assumption is reasonable if the production sector corresponds well to the consumption group, or the consumption group can be assumed to consume a constant percentage of the industry output, because domestic production of these services is almost exclusively consumed by the resident households. Some of the groups are, however, estimated this way because there are no other good indicators available, primarily services produced mainly by the public sector where no data on sales are available. Growth in the price index is extrapolated from the growth in the Consumer Price Index for the corresponding consumption group or with a wage index for local government, social institutions etc. for the consumption of some services provided by the public sector.

Housing The method using output as an indicator is also used for 'Actual rentals for housing', 'Imputed rentals for housing' and 'Maintenance and repair of the dwelling'. But for these three consumption groups concerning housing, the quarterly growth for both the current and constant price consumption (and therefore also the price deflator) are extrapolated using output indicators. For actual and imputed rentals, the output group 'Dwellings' is used, and for maintenance and repair, the output group 'Repair and maintenance of buildings' is used.

Other services The growth in four consumption groups containing services is not estimated with either of the above two methods (VAT or output indicator). The constant price consumption growth of these four groups is instead extrapolated according to the growth in individual volume indicators. The growth in the price deflators is for all four groups estimated using indices from the Consumer Price Index, and the current price consumption is calculated as a residual. The growth in the consumption group 'Maintenance and repair of vehicles' is extrapolated from an index for the car traffic compiled by the Danish Road Directorate. The number of Danish charter tourists travelling from Copenhagen Airports are used as the volume indicator for 'Package holidays'. An average of three separate indices measuring respectively the number of persons travelling by bus, the number of persons travelling by train and the weight of the freight traffic by train is the volume indicator used to estimate the growth in 'Transport services'. For 'Accommodation services', the number of nights spent at hotels and holiday resorts is used as the volume indicator.

Tourism The current price value of both the consumption of non-residents on the economic territory (income from tourism) and the consumption of resident households in the ROW (expenditure on tourism) are updated with the same values as the corresponding series from the exports and imports part of the QNA, cf. 5.5, which is based on information from the Balance of Payments Statistics. The price deflator for income from tourism is extrapolated using the Consumer Price Index adjusted to reflect the goods and services that tourists normally buy. For example purchases of vehicles and purchases of goods and services relating to housing are excluded. A weighted average of the Consumer Price Index from eight foreign countries is used to extrapolate the growth in the price deflator for the expenditure on tourism. The constant price volume of both expenditure on and income from tourism is calculated as a residual.

## 5.2 Government final consumption

The statistical source for *government final consumption* is quarterly public finances. A brief description of the quarterly public finances can be found in box 4.1.12. As with production output in *public administration, education and health*, the first full version of quarterly national accounts is based on an internal version of this set of statistics. *Government individual consumption expenditure* in the ANA is deflated using the output method. However, initial volume estimates of *government individual consumption expenditure* in the QNA are calculated using the input method. When volume measures are readily available, constant price figures are

estimated directly; otherwise price indices are calculated and constant price figures are calculated with the input method by deflating the cost components of government consumption.

Price indices The price indices for the subcomponents of government consumption are as follows:

- Transfers in kind

Constant prices are found by deflating current prices using the net price index for outpatient services from the net price index.

- Sales fees

Using the output method volume, estimates are calculated using the implicit deflator of the individual government consumption expenditure. When only annual figures are available, quarterly profiles using the input method are benchmarked to the annual figures. Constant prices are found by deflating current prices with the price index for sales fees extrapolated from the growth in the price index for production output of general government.

- Individual consumption expenditure

A description of estimation of volumes measures in general government using the output method can be found in [General government output and productivity](#). When annual figures are available, quarterly profiles using the input method are benchmarked to the annual figures. Constant prices using the input method are found by deflating current prices with the price index for government individual consumption expenditure extrapolated from the growth in the price index for production output of general government.

- Collective consumption expenditure

Collective consumption at current prices is calculated residually as the production value plus transfers in kind less sales fees and individual consumption. Constant price values are calculated using the input-method (see 4.1.12)

### 5.3 NPISH final consumption

Quarterly growth in the final consumption at constant prices by non-profit institutions serving households (NPISH) is extrapolated using the quarterly growth in full-time employees in private non-profit organisations as an indicator. NPISH's final consumption at current prices is derived using as an assumption that NPISH's final consumption has the same price index growth as output in the industry 'Activities of membership organisations', which is based on indices of average earnings for the industry.

### 5.4 Gross capital formation

#### 5.4.1 Gross fixed capital formation

Machinery & Equipment,  
ICT equipment etc.

For the compilation of GFCF of Machinery and Equipment, ITC equipment and parts of transport equipment, the source-data from the Industrial Commodity Statistics and the Foreign Trade Statistics is classified according to the Harmonized System (HS) Nomenclature. Information from the detailed Annual Supply-Use tables is used to classify the HS-numbers which includes capital-goods of Machinery and Equipment in these source statistics. The aggregated values are used to calculate an indicator as:

Domestic supply = Import + Danish production – Export.

The indicator for Domestic Supply is used to extrapolate the current price QNA-value of Machinery and Equipment from the previous quarter. Constant prices are calculated by deflating the value in current prices by a price index for Machinery and Equipment calculated by the IO price calculation model.

Construction	The GFCF of construction at current as well as constant prices is compiled in the same comprehensive system as the production output. The system is based on detailed information of produced square meters of different kinds of buildings (complete coverage).
Transport equipment	The GFCF of the remaining parts of transport equipment is compiled on the basis of registrations.
IPP	The GFCF of Intellectual property products (IPP) is extrapolated from the production in industries with a high share of IPP production.

#### 5.4.2 Changes in inventories and valuables

Manufacturing, raw materials and trade	The changes in inventories of the manufacturing industry in current prices are adopted from the statistics on Stocks of manufacturers and wholesalers. The current price values are deflated with the industry-specific price indices of production in the manufacturing industry. The changes in inventories of raw materials and the wholesale industry are adopted from the same statistics in both current and constant prices. Stock changes for the retail trade are estimated using a simple model of causality between change in the stock of wholesale and retail trade.
Agricultural products	The stock changes for agricultural products are estimated in the calculation of production in the industry and on a quarterly basis includes estimation of changes in inventories of work in progress from growing of crops. Changes in inventories of energy products at constant prices are adopted from the Danish Energy Agency. The price is extrapolated from the PPIs for the type of energy stock in question.
Indirect seasonally adjustment	The acquisitions less disposals of valuables at current prices are estimated from the supply side using the commodity flow based on development in turnovers in the industries of Retail sale of jewellery, Art shops and galleries and Antique shops. Constant prices are calculated using the total consumer price index as deflator.

#### 5.4.3 Consumption of fixed capital

There is no quarterly data available on the Consumption of Fixed Capital. Instead, it is assumed that the Consumption of Fixed Capital in constant terms equals the Consumption of Fixed Capital in the previous period plus a constant percentage of the net change in the capital stock from the last quarter:

$$D_t = c * (I_t - D_{t-1}) + D_{t-1}$$

where  $D_t$  is consumption of fixed capital in period  $t$  and  $I_t$  is Gross Fixed Capital Formation in period  $t$ . Constant  $c$  is an estimate from the Capital Stock calculation which measures the average service life of the Net Fixed Capital Formation. Constant  $c$  is evaluated every year in connection with the publication of the new final year in the National Accounts.

The growth in the implicit price index for total Gross Fixed Capital Formation is used to extrapolate the price index for Consumption of Fixed Capital. The current price is calculated residually.

### 5.5 Imports and exports

Current prices	Exports and imports of goods and services at current prices in the national accounts are based on information from the Balance of Payment statistic (BoP). A few minor adjustments are made to the data before implementing it directly, these adjustments can be seen in the good and services sections, respectively.
----------------	---



Price indices For all import and export series the constant prices are calculated residually using various price indices as described in more detail in the following sections. The only exception, where the price index is the residual, is the service imports of Danish ships expenses abroad. For imports and exports of goods we have two estimates of the price movements, one from the input-output based price-model and another from the foreign trade unit values. The movement of the price indices of imports and exports in goods is usually kept between the movements of the two indices.

Country-specific statistics Imports and exports can be found by country in the Danish BoP statistics. Hence, it is possible to make the aggregations needed, be it the euro area or the EU as a whole.

#### Box 5.5 The balance of payments statistics and the external trade statistics

The main source for the balance of payments statistics trade in goods is the external trade statistics. The external trade statistics in goods are compiled in two systems: Intrastat (trade with EU countries) and Extrastat (trade with non-EU countries). The information for the statistics on Denmark's external trade in services is included in the raising procedure, which consists of two separate parts: Monthly data reports by Denmark's approximately 350 largest service enterprises covering about 70 per cent of all trade in services, while quarterly data reports from a sample of about 1,200 enterprises, which represent, in principle, more than 20,000 small and medium-sized enterprises covering the remaining 30 per cent of trade in services. The enterprises in the sample are stratified according to industry and size to ensure that all types of services and enterprises are covered in a representative manner by the statistics. The sample is updated annually.

Information on travels is based on several sources. For the item of earnings on the travel account, VisitDenmark compiles statistics on the basis of information from interviews with foreign visitors in Denmark concerning their daily spending habits. This information is supplemented by information from the statistics on nights spent in hotels, etc. and from special surveys of bed-nights, which are not covered by the statistics. To this is added more summary information on students, one-day visitors and commuters, where the statistics on commuters between Skåne and Sjælland (Øresund region) are used. Until now, the item of expenditure on the travel account has been primarily based on information from the statistics on holiday and business trips obtained from telephone-based interviews with households concerning, e.g. trips made abroad.

Several corrections are made to the trade statistics to make it tally with the delimitation of the BoP statistics. In table 1 below, the transition between the external trade statistics is shown.

More information about the Balance of Payments can be found at [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/balance-of-payments) <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/balance-of-payments>

Regarding services, the net price index is used to deflate the following import series: Air travel and postal services & telecommunication and the export series for air travel, audio & cultural services, transportation services and postal services & telecommunication. The price indices for the service exports of software & film etc., insurance services, public services and shipping agents, and service exports and imports of banking services (FISIM) and consultancy & research & development are extrapolated from the growth in weighted averages of the indices of average earnings. The price indices for imports of software & film etc. and audio & cultural services are extrapolated from the growth in American hourly earnings. The price index for the import of transportation services is extrapolated from a weighted average of the net price index for public transportation and lorry transport. The price indices for the import of business travels, household expenditure on tourism and wholesale trade are extrapolated from the growth in the weighted average of



the consumer price indices of Norway, Sweden, Germany, UK, Italy, France, US and Spain. The price index for exports of household expenditures on tourism is extrapolated from the growth in the consumer price index. The price indices for imports and exports of non-classified goods and exports of activities connected to the extraction of oil in The North Sea and wholesale trade are extrapolated from the growth in the price index for domestic supply. The price index for imports of insurance services is extrapolated from a weighted average of the indices of average earnings and the net price index. The price index for imports and exports of ship and plain repairs is extrapolated from an index based on Lloyd's shipping Economist. The price index for imports of bunkered oil products is extrapolated from the growth in the price of heavy fuel from the price index for domestic supply.

The price index for service exports of shipping companies is extrapolated from the growth in the service price index for shipping. Service imports of Danish ships' expenses in foreign harbours at constant prices follow the growth in service exports of shipping companies in constant prices. The price index for the service imports of oil exploration is extrapolated from a weighted average of the price index for total domestic supply and the weighted average of the indices of average earnings.

### 5.5.1 Goods

From BoP to National Accounts

The BoP data is imported directly into the National Accounts in levels. The only adjustment made to the goods trade is the addition of freight costs. See the transition from the external trade to the BoP and the national accounts in table 5.5.1. When the freight is added, the levels from the BoP statistic are maintained.

Table 5.5.1: Transition between external trade and balance of payments statistics

Credit	Debit
External trade exports (fob)	External trade imports (cif)
	+ procurements
+ goods for processing	+ goods for processing
+ merchanting	
- goods returned	- goods returned
	- freight
+ other corrections	+ other corrections
= NA exports of goods (fob)	= NA imports of goods (cif)
	- freight
= Balance of payments exports of goods (fob)	= Balance of payments imports of goods (fob)

Price indices

In most cases, the results from the before-mentioned IO price model are adopted to describe the prices of goods trade. Specific price indices of energy, minerals and transportation equipment use unit value indices from the goods trade statistics. A few price indices for typical investment products in the imports of transportation equipment use the price indices of the gross fixed capital formation of the specific product. The exports of merchanting follow the price index of production in wholesale trade.

### 5.5.2 Services

From BoP to National Accounts

The only adjustment made to the BoP statistics when implementing them in the national accounts is that travel expenditures in the BoP are split into travel expenditures by households and business travels in national accounts. Additionally, travel expenditures by households also include expenditures for embassies. When these corrections are made, the data are used directly in the national accounts.

Price indices A large group of service trade price indices follow wage growth in the producing industries, including trade in processing, construction, financial and insurance services and royalties. A second group follows various net price sub-indices; air transport, other transport, data- and information services, AV equipment and services relating to education, health, culture and leisure. Exports of sea freight, R&D-services, consultant services and technical, trade related and other services follow service sector supply indices.

### 5.5.3 Consistency with Balance of Payments

The consistency to the BoP is almost perfect, with the few aforementioned exceptions. On an aggregate level, an example of the discrepancies can be seen for the 3<sup>rd</sup> quarter of 2016 in table 5.5.3.

**Table 5.5.3: Imports and exports of goods and services in 2016q3 (million DKK)**

Source:	BoP trade	Freight	National Accounts
StatBank table:	BB1	BBUHV	NKH1
Exports – Goods	172 932		172 932
Exports – Services	102 727		102 727
Imports – Goods	143 507	3 887	147 394
Imports – Services	94 307	-3 887	90 420

## **6 GDP components: the income approach**

### **6.1 Compensation of employees**

The statistical source for compensation of employees is the quarterly Working Time Account (WTA). The WTA is based on monthly reporting of wages to the Danish tax authorities, and is available to the national accounts for 69 industries. Because the WTA constitute integrated statistics covering employment, hours worked and wages and salaries, there has already been a reconciliation of data. Thus, each industry at the QNA compilation level can be extrapolated using the WTA. It is not possible to distinguish wages and salaries and social contributions in the WTA and hence both are extrapolated using wages and salaries from the WTA.

There are two exemptions though: in industries dominated by financial corporations, compensation of employees is extrapolated using accounts data from financial corporations provided through the Danish Financial Supervisory Authority; and in industries covered mostly by the general government sector, wages and salaries are extrapolated using accounts data from central government, municipalities, regions and social security funds. Please refer to 4.1.12 for a description of the general government sector and 4.1.8 for a description of the financial corporations sector.

#### **6.1.1 First compilation of quarterly data**

For the first compilation of the quarterly national accounts, compensation of employees is based on internal non-published versions of the quarterly WTA and quarterly public finances. Both are published for the revised compilation of the quarterly national accounts. Compensation of employees in financial corporations is only available for the revised QNA. In the first compilation, industries dominated by financial corporations are extrapolated using yearly growth rates from the WTA.

#### **6.1.2 Compilation of revised quarterly data**

For the revised version of the quarterly national accounts, compensation of employees is based on the published versions of the quarterly WTA and quarterly public finances. Compensation of employees in financial corporations is only available for the revised QNA.

### **6.2 Taxes less subsidies on production**

Data on taxes and subsidies on production are received from the Danish tax authorities on a monthly basis. For the breakdown by industries, the relative distribution from the latest final year is used.

### **6.3 Gross operating surplus and mixed income**

The gross operating surplus is calculated residually by subtracting compensation of employees and taxes less subsidies on production from gross value added.

## 7 Population and employment

Coherence between annual and quarterly data

As is generally the case, the quarterly figures for employment, wages and hours worked are consistent with annual data i.e. the sum of quarters (average of quarters for employment) equal the annual figures. In essence, this means that adjustments made when calculating annual figures are also reflected in the quarterly data. As there are no quarterly indicators for most of the adjustments made in annual accounts and because of the inherently more summary treatment of quarterly figures, this implies that the adjustments are constant as a share of the total in the various industries.

Domestic and national concept

The description below covers domestic employment. To go from domestic to national employment, the non-residents must be subtracted and residents working in non-resident firms added. In both cases, the calculation is based on the *Compensation of employees, current receipts* from the balance of payments statistics divided by the average earnings of all employees.

### 7.1 Population

The population concept used in national accounts is in accordance with the concept of population used in the demographic statistics, which is based on register data. The population variable in national accounts is the average of the value at the beginning of the quarter and at the end of the quarter of the population in the demographic statistics for the reference period, i.e. for the 1st quarter it would be the average of the population as of 1 January and 31 March.

### 7.2 Employment

#### 7.2.1 First compilation of quarterly data

The statistical source for employment is the quarterly Working Time Account (WTA). A brief description of employment in the quarterly WTA can be found in the box below.

##### Box 7.2.1 Employment in the Quarterly Working Time Accounts

The annual Working Time Accounts (WTA) use the register-based Labour Market Accounts (LMA) as statistical source. The LMA are based on a range of administrative data, most notably reports of monthly earnings from the Danish Tax Authority (eIndkomstregisteret, abbreviated eIR), to create employment records at individual level.

For quarters in years not covered by the LMA, the quarterly WTA are extrapolated over the course of the year using the statistics for Employees (Danish abbreviation, BfL), which are also based on eIR. The BfL describe the number of jobs held by employees during a month. These figures are converted to quarterly averages before entering the Working Time Accounts.

For self-employed persons, the employment level is extrapolated using the same level as in the latest LMA.

More information about the Working Time Accounts can be found at [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/the-annual-and-quarterly-working-time-accounts) <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/the-annual-and-quarterly-working-time-accounts>

As for compensation of employees, the compilation of the first full version of the quarterly national accounts is made using an internal non-published version of the quarterly WTA. The revised QNA are based on the final published quarterly WTA.

## 7.2.2 Employees

As the WTA use the same concept of industries as the national accounts<sup>3</sup>, it is possible to use the WTA straightforward in the extrapolation of national accounts employment. The extrapolation takes place at the same detailed level as the extrapolation in our first compilation, i.e. 69 industries.

Correction for non-residents in resident firms

To obtain an estimate of employment using the national concept, a special indicator has been introduced to describe the trend in foreign labour. The source for this indicator is *Compensation of employees, current expenditure* from the Balance of Payments Statistics. The number of non-residents is extrapolated from the quarterly growth in *Compensation of employees abroad* corrected for the wage inflation in the same quarter as measured by the *Indices of average earnings*. For the first full version, *Indices of average earnings* is not available however. Instead wage indices from the Confederation of Danish Enterprise are used. Employment using the national concept is not broken down on industries, and, thus, only calculated for total employment.

## 7.2.3 Self-employed persons

The extrapolation of the number of self-employed persons is based on data from the WTA. The definition of industries is broadly the same in the WTA and NA. The WTA can therefore be used directly when extrapolating employment. As is the case with employees, the extrapolation is made for 69 industries.

## 7.2.4 Compilation of revised quarterly data

As for compensation of employees, the compilation of the first full version of the quarterly national accounts is made using an internal non-published version of the quarterly WTA. The revised QNA are based on the final published quarterly WTA.

## 7.3 Employment: total hours worked

### 7.3.1 First compilation of quarterly data

For the total hours worked, the Working Time Accounts (WTA) is the statistical source as well. For a brief description of the estimation of hours in the WTA, please refer to the box below.

#### Box 7.3.1 Estimation of WTA hours worked

The annual WTA is the basis for the quarterly WTA. In the annual working time accounts, the number of hours worked are calculated on the basis of paid hours from the Labour Market Accounts (LMA). Paid hours of work performed are defined as hours paid by employers, including paid overtime and excluding paid hours of absence. Paid meal breaks are regarded as hours of availability and are included in hours worked. Paid hours of overtime are defined as the number of paid hours that are worked in excess of normal paid hours (i.e. contractual hours) and include extra hours of work for part-time employed persons without additional overtime pay. Unpaid overtime hours and black work are excluded from the calculation of hours of work performed in the WTA. Paid hours are converted into actual hours worked using the statistics for Structure of Earning. Actual hours worked are distributed over the year using paid hours corrected for the relationship between paid hours for employees paid by the hour and permanently employed (with a fixed salary).

When calculating hours worked by self-employed persons, the WTA use data from employees working full time, adjusted by the amount self-employed persons report that they work extra compared to employees. This method accounts for the fact that people working longer hours

<sup>3</sup> There are some differences between the WTA and the NA. The most important are: owners of partnerships are categorized as self-employed in the WTA whereas they are employees in the NA. Relocation of all retail trade from other industries to the retail trades industry. By using the WTA directly when extrapolating employment, one implicitly assumes these corrections are a constant share of total employment in the affected industries.

tend to over-report more than people working fewer hours. The method on the other hand does not take into account that self-employed persons tend to over-report more than employed persons.

For years not covered by the annual WTA, the quarterly WTA extrapolate the number of paid hours using paid hours from the statistics for Employees (BfL), and convert paid hours into actual hours worked using the relationship between paid hours for employees paid by the hour and permanently employed persons from a reference year. The reference year is chosen as the year, where the placement of the Easter is the closest to placement in the current year.

More information about the Working Time Accounts can be found at [documentation of statistics](http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/the-annual-and-quarterly-working-time-accounts) <http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/the-annual-and-quarterly-working-time-accounts>

For the first full version of the QNA, again, a non-published internal version of the WTA is used as source. For the revised QNA, the published WTA is used.

### **7.3.2 Total hours worked: Employees**

The extrapolation of hours worked takes place at the 69-industry level. No adjustment of the WTA is made prior to the extrapolation.

### **7.3.3 Total hours worked: Self-employed persons**

Also the total hours worked by self-employed persons is extrapolated using quarterly growth rates from the WTA directly at the 69-industry level.

### **7.3.4 Compilation of revised quarterly data**

For the first full version of the QNA, again, a non-published internal version of the WTA is used as source. For the revised QNA, the published WTA is used.

## **7.4 Reconciliation**

Minor adjustments can be made to ensure consistency between employment figures, hours worked, compensation of employees and measures of economic activity such as production or gross value added. As employment, hours worked and compensation of employees use the same statistical source, most reconciliation between these variables is usually taken care of a priori in the WTA. Reconciliation with activity measures such as production and gross value added is quite rare.

## 8 From GDP to Net lending/borrowing

All series from the Balance of Payments statistics (BoP) enter the National Accounts statistics in level i.e. there is a consistency in the nominal level of the values and BoP data is not used as an indicator to extrapolate from.

### 8.1 Primary income from/to the ROW, gross national income

Compensation of employees	Compensation of employees to and from the Rest of the World (ROW) is based on information from the BoP statistics. Compensation of employees to and from the ROW in the BoP statistics are covered by information from the reports of monthly earnings (eIndkomstregisteret) from the Danish Tax Authority supplemented with information from the International Trade in Services statistics.
Property income	Quarterly data on property income to and from the ROW in the BoP statistics is based mainly on financial data from the Danish Central Bank. Statement of the interest payments follows the accrual basis of accounting.
Taxes on production and imports and subsidies	Quarterly data on taxes on production and imports to the ROW and subsidies from the ROW in the BoP statistics are based on information from the General Government Accounts provided by the Government Finance Division.
Gross National Income	Gross National Income is derived by adjusting the Gross Domestic Product for the net flows of the above-mentioned items.

### 8.2 Consumption of fixed capital, net national income, acquisitions less disposal of non-financial non-produced assets

Consumption of Fixed Capital	There is no quarterly data available on Consumption of Fixed Capital. Instead, it is assumed that Consumption of Fixed Capital in constant terms equals the Consumption of Fixed Capital in the previous period plus a constant percentage of the net change in the capital stock from the last quarter:
------------------------------	--

$$D_t = c * (I_t - D_{t-1}) + D_{t-1}$$

where  $D_t$  is consumption of fixed capital in period  $t$  and  $I_t$  is Gross Fixed Capital Formation in period  $t$ . Constant  $c$  is an estimate from the Capital Stock calculation which measures the average service life of the Net Fixed Capital Formation. Constant  $c$  is evaluated every year in connection with the publication of the new final year in the National Accounts.

The growth in the implicit price index for total Gross Fixed Capital Formation is used to extrapolate the price index for Consumption of Fixed Capital. The current price is calculated residually.

Net National Income	Net National Income is compiled by subtracting Consumption of Fixed Capital from Gross National Income.
Non-financial non-produced assets	Information and Acquisitions less disposal of non-financial non-produced assets are obtained from the BoP statistics. This data is gathered as part of the questionnaire regarding International Trade in Services described in Box 5.5.

### 8.3 Current transfers from/to the ROW, net national disposable income

Taxes on income, wealth etc.	Current taxes on income, wealth, etc. to and from the ROW in the BoP are based on information from the Danish Tax Authority. When no data from the tax authorities is available, it is assumed that the tax revenues are constant, except for Taxes on Income where the tax percent is assumed to be constant and the revenue is derived
------------------------------	--

by multiplying *Compensation of employees, current expenditure* by the tax percentage.

Social contributions and benefits	Social contributions and Social benefits other than social transfers in kind to and from the ROW in the BoP are based on information from the General Government Accounts.
Other current transfers	Other current transfers to and from the ROW in the BoP are based on information from General Government Accounts for the public sector transfers. For private sector transfers, information is obtained from the International Trade in Services questionnaire in Box 5.5.
Net national disposable income	Net National Disposable Income is derived by subtracting from Net National Income, Net current transfers to and from the ROW.

#### **8.4 Adjustment for the change in net equity, net savings**

Changes in net equity	Changes in net equity of households in pension fund reserves are based on information from the General Government Accounts.
Net savings	Net savings are derived by subtracting Final Consumption Expenditures at current prices and Changes in net equity from Net National Disposable Income.

#### **8.5 Capital transfers, net lending/borrowing**

Capital transfers	As is the case for other Current transfers to and from the ROW, Capital transfers in the BoP are based on information from General Government Accounts for public sector transfers and information obtained from the International Trade in Services questionnaire for the private sector.
Net lending/ borrowing	Net lending/borrowing is found by subtracting from Net savings, Net capital transfers, Net capital formation and Acquisitions less disposal of non-financial non-produced assets.



## 9 Flash estimates

The GDP indicator (GDP45) provides a flash estimate of the seasonally adjusted quarterly growth for the gross domestic product (GDP) for the most recently closed quarter. The GDP indicator is published about 15 days before the first full version of the Quarterly National Accounts, which is issued 60 days after the end of the quarter (QNA60). In order to attain the best possible estimate, the calculation of GDP45 is based, as far as possible, on the same sources and methods as QNA60. However, it is necessary to deviate from the usual method of calculation behind QNA60 in a number of areas, as other sources have to be used and consequently other methods. In order to make the calculation of the GDP indicator sufficiently fast, it includes only 15 industries and fewer and less detailed data. The calculation of the GDP indicator only includes GDP from the production (supply) side and accordingly does not include all information from the approximately 1,500 indicators that are usually included in QNA60. Without a calculation from the demand side, it is not possible to systematically take into account information on foreign trade, consumption and investment. Neither is it possible to balance supply and demand (use) in the economy.

### 9.1 General approach

As a rule, calculation of GDP45 starts by extrapolating the time series for production in the Quarterly National Accounts from the growth in the source data that is available about 35 days after the end of the quarter. In some cases, where data is not yet available, econometric estimations are used. The production estimates are then used to calculate estimates of intermediate consumption according to the same methods used in the calculation of QNA60 and QNA90. This produces an estimate of GVA, which after an estimation of taxes less subsidies on products is used to produce an estimate of GDP growth.

In order to maintain a methodological approach as close to QNA60 as possible, chaining and seasonal adjustment is carried out using the same level of detail and the same methods as in QNA60 and QNA90.

## 9.2 Industrial breakdown and compilation of GDP growth

The calculation is made for each of the following 15 industries, coinciding with the level of detail used for seasonal adjustment of production and GVA broken down by industry:

### Level of detail for calculation of the GDP indicator

		Percentage of GVA in 2015	Source area
1	A Agriculture, forestry and fishing	1.1	agriculture
2	B Mining and quarrying	1.6	energy
3	C Manufacturing	14.7	manufacturing
4	D_E Utility services	2.4	energy
5	F Construction	4.5	construction & dwellings
6	G Trade	11.9	VAT
7	H Transport	5.4	transport
8	I Hotels and restaurants	1.5	VAT
9	J Information and communication	4.6	VAT
10	K Financial and insurance	6.4	finance
11	LA Real estate activities and renting of non-residential buildings	2.5	VAT
12	LB Dwellings	7.8	construction & dwellings
13	M_N Other business services	8.8	VAT
14	O_Q Public administration, education and health	23.1	public sector
15	R_S Arts, entertainment and other services	3.6	VAT
16	<b>Total gross value added (1+...+15)</b>	<b>100.0</b>	
17	D.21-D.31 Product taxes minus product subsidies	15.6	
18	<b>Gross domestic product (16+17)</b>	<b>115.6</b>	

A short description of the difference between the calculation of industry-specific GVA in GDP45 and QNA60 will be provided below. For a more detailed review see [Documentation of the GDP indicator](#).

### Differences in the derivations of industry-specific GVA in GDP45 and QNA60

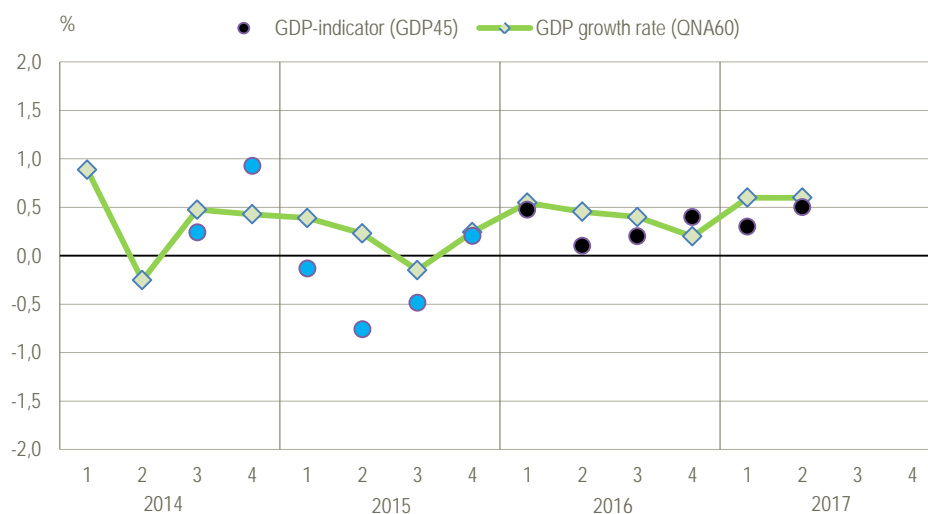
Source area	Method difference
Agriculture	Same method
Energy	Production data is not available for the last month of the quarter. In most cases there are preliminary figures, which are included in the calculation. Failing that, ARIMA methods are used to produce forecasts of production in the last month of the quarter.
Manufacturing	There are two differences. First, the adjustment to preliminary Manufacturers' sales of goods results cannot be carried out. Second, the changes in inventories statistics are of a more preliminary nature and are therefore more likely to be revised.
Construction & dwellings	A few of the price indices used to deflate production in civil engineering are not available and are therefore forecast using ARIMA methods.
VAT	Same method
Transport	Price indices for sea freight are of a more preliminary nature and are therefore more likely to be revised.
Finance	Same method
Public sector	ARIMA methods are used to produce forecasts of earnings in the public sector. The earnings are used to deflate compensation of employees.

### 9.3 Revisions and reliability of flash estimates

As already mentioned, as far as possible, the GDP indicator is calculated using the same sources and methods as those used in the preliminary version. However, calculation of the indicator will be different from the QNA60 calculation, primarily for two reasons. Firstly, there is less data available when the calculation is made at an earlier stage. Secondly, it is not possible to reconcile supply and use, as only the production side is calculated. Both factors contribute to increasing uncertainty with regard to QNA60.

A typical revision of the GDP growth from GDP45 to QNA60 can be a revision of growth in total production because more data becomes available about production. A revision can also be made because the estimate of enterprises' intermediate consumption is adjusted in connection with the balancing process of the economy's supply and use in QNA60. The estimated taxes and subsidies on products can also be changed in a revision because of new information about household consumption and other demand components. The method behind the GDP indicator is still under development, and because of the short time series it is not yet relevant to calculate a summary measurement of uncertainty for the indicator. During development of the indicator, there were attempts to complete calculations of the indicator for the period from 2014Q3 to 2015Q4, and final live-test calculations have been made for 2016Q1 and 2016Q2. The results are illustrated in the figure below. The figure shows GDP growth according to GDP45 and QNA60. It is difficult to calculate the GDP45 estimates for quarters in 2014 and 2015 because it is not possible to fully reproduce the relevant dataset as they would have been at that moment. The calculations for the period before 2016 should therefore be viewed with this in mind (light-blue dots in the figure).

Real GDP growth



The quarterly GDP growth in the National Accounts is revised regularly after the release of QNA60. It is first revised 90 days after the end of the quarter, and finally, in connection with the publication of the final annual figures, almost three years after the end of the reference year.

Read more about the GDP indicator [her: https://www.dst.dk/en/Statistik/emner/nationalregnskab-og-offentlige-finanser/kvartalsvist-nationalregnskab/bnp-indikator](https://www.dst.dk/en/Statistik/emner/nationalregnskab-og-offentlige-finanser/kvartalsvist-nationalregnskab/bnp-indikator).

## **10 References**

**Eurostat**

2013, Handbook on quarterly national accounts

**European Commission**

2013, European system of accounts – ESA 2010

**International Monetary Fund (IMF)**

2001, Quarterly National Accounts Manual

**Statistics Denmark**

2017, Documentation of the GDP indicator (Only as online publication)

2016, General Government Output and Productivity 2008-2014 (Only as online publication)

2016, Danish GDP and GNI, Sources and methods (Only as online publication)

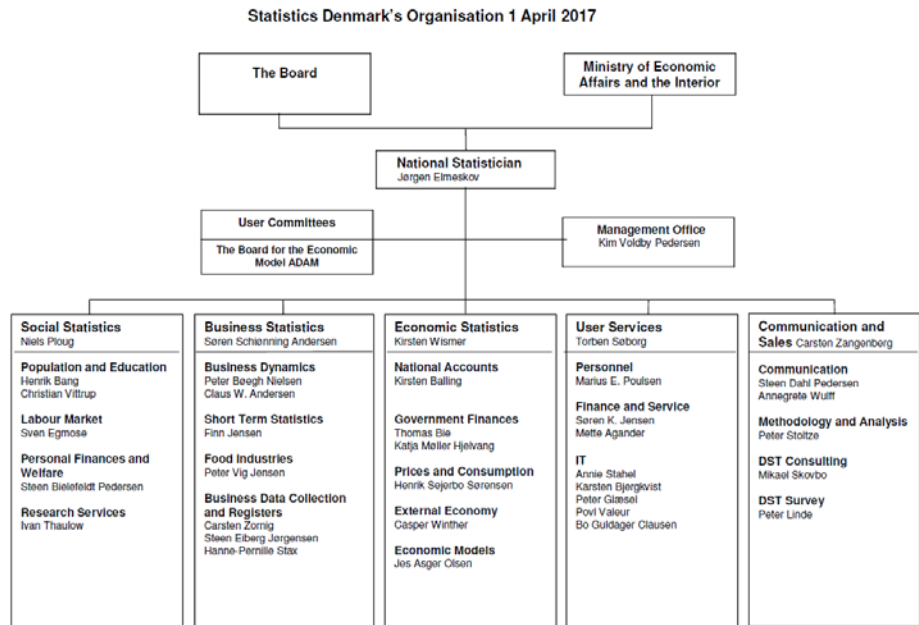
2009, Danish Quarterly Sector Accounts – a description of sources, methods and statistical treatments used (Only as online publication)

**United Nations**

2008, System of National Accounts

# 11 Appendices

## 11.1 Statistics Denmark's organisation



## 11.2 Planned publishing of the national accounts

### Planned publishing of the National Accounts

Quarterly-/ Annual compilation	Scope of calculations	Publishing	
		Newsletter and Databanks	Statistical bulletin
Annual compilation 2016 (November version)	Final figures for 2014 Preliminary figures for 2015-2016	Beginning of No- vember 2017	Beginning of November 2017
GDP-Indicator	3rd Quarter 2017	Middle of November 2017 (Newsletter only)	
Quarterly compilation 3rd Quarter 2017	1st Quarter 2014- 3rd Quarter 2017	End of November 2017	
Quarterly compilation 3rd Quarter 2017, revised	1st Quarter 2017- 3rd. Quarter 2017 <sup>3</sup>	End of December 2017	End of December 2017
GDP-Indicator	4th Quarter 2017	Middle of February 2018 (Newsletter only)	
Quarterly compilation 4th Quarter 2017	4th Quarter 2017	End of February 2018 <sup>4</sup>	
Quarterly compilation 4th Quarter 2017, revised	1st - 4th Quarter 4th Quarter 2017, revised 2017	End of March 2018	Beginning of April 2018
Annual compilation 2017 (March version)	Preliminary figures for 2017	End of March 2018	Beginning of April 2018
GDP-Indicator	1st Quarter 2018	Middle of May 2018	
Quarterly compilation 1st quarter 2018	1st Quarter 2018	End of May 2018	
Quarterly compilation 1st quarter 2018, revised	1st Quarter 2018- 1st Quarter 2018	End of June 2018	Beginning of July 2018
Annual compilation 2017 (June version)	Preliminary figures for 2017	End of June 2018	Beginning of July 2018
GDP-Indicator	2nd Quarter 2018	Middle of August 2018 (Newsletter only)	
Quarterly compilation 2nd Quarter 2017	2nd Quarter 2018	End of August 2018	
Quarterly compilation 2nd Quarter 2018, re- vised	1st Quarter 2018- 2nd Quarter 2018	Middle of Septem- ber 2018	Beginning of October 2018

## 11.3 Overview of the contents published in the QNA

### Overview of the contents published in the QNA

DKK m., current prices

3rd quarter 2016, non-seasonally adjusted

Million DKK.

<b>Account 0: Goods and services</b>	
P.1 Total output	882,573
+ D.21-D.31 Taxes less subsidies on products	67,234
+ P.7 Imports of goods and services	237,814
Resources of goods and services	<b>1,187,621</b>
P.2 Intermediate consumption	435,832
+ P.3 Government consumption expenditure	135,626
+ P.3 Final private consumption	238,256
+ P.6 Exports of goods and services	275,659
+ P.51+P.53 Gross fixed capital formation	101,714
+ P.52 Changes in inventories	535
Uses of goods and services	<b>1,187,621</b>
<b>Account 1: Production</b>	
P.1 Output	882,573
+ D.21-D.31 Taxes less subsidies on products	67,234
- P.2 Intermediate consumption	435,832
B.1*g Gross domestic product	<b>513,976</b>
- P.51c consumption of fixed capital	87,160
B.1*n Net domestic product	<b>426,816</b>
<b>Account 2.1.1: Generation of income</b>	
B.1*g Gross domestic product	513,976
- D.21-D.31 Taxes less subsidies on products	67,234
B.1g Gross value added	<b>446,742</b>
- D.29-D.39 Other taxes less subsidies on production	6,120
B.1GF Gross domestic product at factor cost	<b>440,621</b>
- D.1 Compensation of employees	266,178
B.2g+B.3g Gross operating surplus and mixed income	<b>174,444</b>
<b>Account 2.1.2: Allocation of primary income</b>	
B.2g+B.3g Gross operating surplus and mixed income	174,444
+ D.1 Compensation of employees, receivable	263,605
+ D.2 Taxes on production and imports, receivable	82,631
- D.3 Subsidies, receivable	9,959
+ D.4 Property income, receivable	39,807
- D.4 Property income, payable	22,528
B.5*g Gross national income	<b>527,999</b>
<b>Account 2.2: Secondary distribution of income</b>	
B.5*g Gross national income	527,999
+ D.5-D.7 Current transfers, net	-7,684
B.6g Gross disposable income	<b>520,315</b>
<b>Account 2.4: Use of disposable income</b>	
B.6g Gross disposable income	520,315
- P.3 Final consumption expenditure	373,881
B.8g Saving, gross	<b>146,434</b>
<b>Account 3.1: Capital account</b>	
B.8g Saving, gross	146,434
+ D.9 Capital transfers, receivable	265
- D.9 Capital transfers, payable	136
- P.51 Gross fixed Capital formation	100,962
- P.52-P.53 Changes in inventories etc.	1,288
B.9 Net lending	<b>44,300</b>
<b>Account 4: Rest of the world (ROW)</b>	
P.6 Exports of goods and services	275,659
+ D.1-D.4 Compensation of employees, taxes and property income from ROW, net	14,023
+ D.5-D.7 Other current transfers from ROW, net	-7,684
- P.7 Imports of goods and services	237,814
B.12 Current external balance	<b>44,184</b>
+ D.9 Capital transfers from ROW, net	115
B.9 Net lending	<b>44,300</b>