

Methodological note

GUIDANCE ON QUARTERLY NATIONAL ACCOUNTS (INCLUDING FLASH) ESTIMATES IN THE CONTEXT OF THE COVID-19 CRISIS

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Background

The COVID-19 outbreak in Europe will have severe economic impacts that will affect the estimation of quarterly national accounts aggregates (QNA) from 2020Q1 onwards. Government restrictions imposed on the movement of people and non-essential economic activities will not only affect specific QNA aggregates in different ways, but also have implications for the quality and availability of many source data normally used in the QNA estimation process. This poses unprecedented challenges to national compilers, who have not only to carry out their estimates with more limited information than usual, but also under difficult personal working conditions.

While Eurostat and the national statistical institutes (NSIs) are committed to maintain the usual dissemination pattern of QNA estimates with best possible estimates, it is clear that notably first estimates may show significantly higher revisions than usual. This is especially the case for GDP and employment flash estimates that are already compiled 30 or 45 days after the end of the quarter and are thus based on partial data for the last month of the quarter even under normal circumstances. Regular QNA estimates will also be affected by the lower availability and quality of source data as well as structural breaks in economic relationships, so that higher revisions than usual can be expected, as additional information will become available over time. Especially under the current circumstances it is, however, crucial that NSIs and Eurostat make best efforts to provide European policy makers and the general public with information on the economic situation that is as timely and accurate as possible.

Against this background, Eurostat has contacted NSIs to exchange information on main problems and the provision of useful guidance where possible. This consultation identified mainly issues related to the estimation of GDP and employment flash estimates, incomplete or lower quality source data, alternative sources as well as estimates for specific areas, such as non-market services and accounting for government measures.

Based on most acute needs, this note focusses mainly on issues affecting the compilation of GDP and employment estimates, including modelling techniques. Guidance on other areas (e.g. seasonal adjustment, government measures and activities estimations of source data) is more specifically addressed in other guidance notes (available [here](#)). Some practical guidance on transmission and publication aspects is included at the end.

The aim of this note is to support the compilation of NSIs with practical guidance and achieve a harmonised approach across EU Member States for main QNA estimates where possible. It also aims to inform users that specific issues may lower the quality of estimates in the exceptional current circumstances. The note may be updated to elaborate on other aspects if needed.

Available guidance for QNA and flash estimates

General guidance on QNA compilation methods is already available on the Eurostat website: [The Handbook on quarterly national accounts - 2013 edition](#) covers information on main sources and compilation aspects, and information and national compilation practices have been documented by a number of countries in [QNA inventories](#) and responses to a [joint Eurostat-OECD employment questionnaire](#).

The Task Forces preceding the introduction of the GDP T+30 and EMP T+45 flash estimates documented not only the approach for European [GDP](#) and [employment](#) flash aggregates, but also included a stock taking of national compilation methods and how to estimate flash estimates, which already offer some guidance on how to deal with missing or incomplete information:

- [GDP flash at 30 days estimation methods for Member States](#)
- [Employment flash estimation method for Member States](#)

However, specific issues arising in relation to the COVID-19 crisis and the usual QNA transmission are discussed in the following sections.

COVID-19 challenges for European QNA releases

The effects of COVID-19 on the economy will be reflected in European main GDP aggregates (including employment) from 2020Q1 onwards. According to the [preannounced release schedule](#), preliminary European GDP aggregates are already published 30 days after the end of the quarter; GDP and employment flash estimates after 45 days. These releases are based on voluntary transmission of estimates by a majority of NSIs one day before the agreed publication date.

Normally, 16 Member States send their data for GDP at T+ 30 days covering 88% of the EU27 GDP and 93% of the euro area. GDP estimates at T+45 days, are usually based on 20 Member States covering 93% of the EU27 GDP and 96% of the euro area. Regarding the T+45 employment flash, 22 Member States covering 93% of EU27 and 96% of euro area total employment send data on time. GDP estimates are expressed in seasonal and calendar adjusted quarter-on-quarter growth rates. Employment estimates are expressed in seasonal and calendar adjusted quarter-on-quarter growth rates and unadjusted year-on-year growth rates.

Eurostat's regular estimates are based on countries [legally required transmissions](#) that are due two months after the end of each quarter and cover a range of output, expenditure, income and employment aggregates expressed in levels and volume terms (where appropriate). Following the expiry of all derogations in 2020, these estimates are, in principle, already based on a full datasets from all EU Member States.

While all NSIs and Eurostat have confirmed their commitment to respect the usual release schedule and provide users with these important data, NSIs have informed that the compilation of QNA estimates will be associated with severe challenges reflecting specific aspects of the COVID-19 pandemic, with a probable negative impact on the reliability of both GDP and employment estimates. This concerns not only flash estimates for 2020Q1, where the main

challenge consists in estimating the impact of COVID-19 on March 2020 aggregates, for which most source data are still missing. Challenges may even accentuate to compile subsequent regular estimates for 2020Q1 and 2020Q2, where the disruption of some source data (e.g. survey based), accounting for government interventions and structural breaks in economic relationships will be even more difficult to address.

The following sections discuss COVID-19 specific challenges identified by NSIs, distinguishing mainly between GDP and employment estimates as well as modelling techniques.

Problems and guidance for GDP estimates

Under normal circumstances, GDP estimates are based on established sources and estimation techniques, which have been tested and evaluated carefully, as well as documented. In most countries, GDP is estimated independently from the output approach and expenditure approach, complemented by the estimates of income related data. These estimates are based on a multitude of sources such as short term business statistic (STS), trade and balance of payment statistics, as well as administrative data.

In general NSIs expect, that the impact of the containment measures taken will be felt heavily on the data from the second half of March onwards. The exact timing and scope may vary between Member States, depending on the stage of infections and concrete measures taken, and some effects may already be noticeable in the data of February. Moreover, developments in specific industries or sectors will be diverse. See e.g. first estimates of COVID-19 impacts published by [DESTATIS](#), [INSEE](#) and [ISTAT](#)).

Impacts on administrative sources are also relevant, e.g. due to specific measures taken by government to support the economy such as wage subsidies or a delay of payment of VAT. Since especially VAT statistics are considered to be a very important source of data both for the output of service industries and for private consumption in some countries, NSIs warn that the quality of their estimates will be lower, or that they would even consider a delay in their estimation or publication process in the extreme case.

In terms of mitigating efforts, national accounts departments already work in close cooperation with other departments to determine the impact on sources and obtain information on delays in data availability, response rates and quality issues. While it is difficult to already assess the precise impact at this stage, it is important to explore alternative or complementary sources that could be used to improve the estimation process, e.g. complementing information usually provided by VAT statistics, which is however clearly not easy. Still, any additional available data (e.g. payments statistics, road traffic data) and benchmarking to forecast information should be explored in view to improve estimates based on expert judgements where possible.

Problems and guidance for employment estimates

Employment estimates are normally based on a number of established sources and techniques, notably data collected via labour force surveys (LFS), business survey, short-term statistics and administrative data. In relation to the COVID-19 outbreak, countries are facing difficulties in collecting the data sources normally used for calculating employment flash estimates.

NSIs were notably concerned about the availability of source data, both from LFS and business surveys, since the results of surveys may arrive late or be incomplete. It may perhaps not be possible to contact or follow-up with respondents. Some countries are adjusting to the situation by converting to online data collection and telephone interviews. Also administrative data sources are being explored, for example from social security registers.

The Eurostat task force “Early employment estimates” produced guidelines in the overview of employment flash estimation methods, which proposes and discusses estimation methods that

may be explored as options. The document also contains an annex, describing the different sources usually used in the Member States for the calculation of flash employment estimates. This may be helpful if seeking advice from other NSIs.

In the absence of reliable source data normally used in the estimation, other methodological solutions may be explored. For the flash estimates, some countries use forecasting and models to estimate for missing source data. The models and underlying parameters should be reviewed and other “non-traditional” explanatory variables may be considered, if available.

The document “[Overview of employment flash estimation methods](#)” contains a chapter on how to forecast missing data and dealing with outliers. Different modelling approaches are presented in the context of employment flash estimates (e.g. ARIMA, ADL), as well as the use of explanatory variables such as:

- the industry production index (e.g. energy, mining, manufacturing);
- tourism indicators (arrivals, overnight stays);
- value added tax collected over quarters –an increase in tax revenues may indicate an increase in sales and thus in employment (assuming constant tax rate over time);
- exports (an increase in exports of goods and services may indicate an increase in employment);
- work construction index (an increase in construction projects requires an increase in work force);
- total loans, as only those who are employed may be eligible;
- quarterly GDP or any of its components.

More specifically, many employees across Europe are currently not working and their salaries may be partly or fully paid by the government through subsidies. Guidance on the treatment of these schemes for the compilation of government finance statistics has been provided in a separate note ([available here](#)).

For employment estimates, it seems worth stressing that the [ESA 2010](#) includes the following paragraph concerning employees that are temporarily not working (11.14):

Persons temporarily not at work are also considered as employees provided they have a formal job attachment. This formal attachment shall be determined according to one or more of the following criteria:

- (a) the continued receipt of a wage or salary;
- (b) an assurance of a return to work following the end of the contingency, or an agreement as to the date of return.

This means employment covers persons temporarily not at work because of illness or injury, holiday or vacation, strike or lockout, educational or training leave, maternity or parental leave, reduction in economic activity, temporary disorganisation or suspension of work due to reasons such as: bad weather, mechanical or electrical breakdown, or shortage of raw materials or fuels. It also covers other temporary absences with or without leave.

It would therefore be expected, that national compilers carefully assess the nature of employment related support schemes to decide on their treatment for employment estimates. In principle, it would be expected that many government schemes imply that the impact of COVID-19 on employment in persons will be mitigated, while effects on working hours are more pronounced.

Problems and guidance for modelling

The compilation of QNA also typically includes modelling techniques. These are notably needed for flash estimates, where information for the last month is typically missing, but also the regular compilation of QNA which may, to a different extent depending on the country, rely on use of econometric models to estimate some aggregates. Since these models rely on established sources and stable economic assumptions and relationships, the COVID-19 crisis poses specific challenges in this area.

The Eurostat task force for ‘GDP flash estimates at T+30 days’ produced an [overview of GDP flash estimation methods and techniques](#) that national accountants can use to estimate GDP soon after the end of the reference period. In the context of the COVID-19 and its consequences on data availabilities, this document can provide a good start to correct current methods or use alternative methods in case of lack of a source.

First, this document gives some advice about available data to be used as proxies or as explanatory variables in a model. ‘Related indicators could be official short-term statistics, other relevant economic data, or business and consumer surveys. If indicators with the same detail as GDP components are not available, the analysis could be performed at aggregated level (e.g. broad or aggregated NACE). Analysis of available data is limited to volume indicators. For data expression of nominal measures (such as turnover indexes and retail sales) a suitable deflation should be performed first.’

Modelling can be naive (e.g. forecasts obtained from growth rates of related indicators) or more elaborated:

- Regression based models using related short-term indicators (e.g. STS) such as Autoregressive Distributed Lag (ADL) models or dynamic factor models.
- Pure forecasting models such as ARIMA models or structural time series (STS) models.
- Multivariate models such as Vector AutoRegressive models.

For instance, one NSI highlighted that the lockdown imposed by governments to fight against the COVID-19 pandemic complicates the flash estimate of 2020Q1 accounts for various reasons: First, some indicators normally used by QNA will come too late or be missing entirely. Then, the lockdown leads to an unprecedented drop in activity in March. The extrapolation of some of the indicators are missing for the last month of the quarter, particularly in services, will therefore not be accurate this quarter. Moreover, the construction of the QNA are based on econometric relationships, which implicitly assume stability and linearity in the relationships between economic aggregates (between output and IC for example) and also between indicators and national accounts (benchmarking relationships). These assumptions may no longer be valid in the new economic context of this quarter.

The problem of missing VAT data for March, means that the impact of the COVID-19 crisis is not yet affecting the indicator. One solution proposed is to estimate March 2020 with usual techniques (e.g. ARIMA regressions) but to subsequently applying a correction factor based on assumptions at a detailed level (e.g. up to NACE 5 digits for certain branches). Information for these assumptions can e.g. be taken from newsfeeds, business surveys, and punctual contact with enterprises and industry federations. Still, this obviously means that estimates will be less reliable than usual, which should also be communicated to users.

More general problems arise for countries, who also rely on models for part of their regular estimates. For instance, one NSI informed that its employment estimates after T+2 months are based on a macro-economic model. This model is essentially based on the evolution of paid employment for the previous quarters, value added for industry and the number of bankruptcies, since administrative data is still missing and only available later. However, the effect of COVID-19 on employment cannot be modelled easily in the underlying parameters and detailed information on temporary employment is only available for hours worked but not persons. Since

companies may first discharge employees with a temporary contract, these factors will reduce the reliability of the employment flash estimate.

Another NSI reported, that employment data are heavily dependent on indicators from a survey, in which case the NSI is looking for alternative solutions based on administrative data. The approach for the labour cost index was based on the consideration that the treatment implemented for partial unemployment (impact on wages) should be neutral on the cost of labour and all other things being equal. However, concerns about the provision of indicators of hours worked, so that alternative solutions are also being sought by mobilising administrative data.

Whatever the method chosen, compilers will have to insert the impact of the COVID-19 either at the level of input data (explanatory variables) or at the level of the forecast result (manual ad-hoc correction). While in principle, all new methods should be tested in theory for several quarters it is clear that the current situation does not allow for a long testing period, so that any model adaptation under the current conditions may lead to lower quality results and subsequent higher revisions as additional source data become available.

Additional uncertainties arise from the fact that comparisons of quarter-on-quarter growth rates and year-on-year growth rates cannot be used for plausibility checks under the current circumstances. Moreover, it should be emphasised that abrupt changes in the composition of GDP may also affect the quality of price and volume estimates since these are carried out using chained-linked indices whose weights reflect, at best, the economic structure of the previous year. Users should take this into consideration when interpreting the figures.

Problems and guidance for seasonal adjustment

When estimations are compiled, the question on how to treat data in terms of seasonal adjustment is also an important question on which a [separate guidance note](#) has been provided.

NSIs should consider that an indirect approach to seasonal adjustment would seem preferable under COVID-19 circumstances. This means to seasonally adjust detailed series separately and then aggregated the results to obtain total levels, followed by running a residual seasonality test on the total aggregates. This approach would avoid that COVID-19 effects cancel out (e.g. between industries or sectors) and minimise discrepancies between the total and the components, which can be an issue when using direct seasonal adjustment on all series.

The observation for 2020Q1 produced by SARIMA models should be treated in such a way that the COVID-19 impact remain visible in the both the final raw data and in the seasonally adjusted time series. Later, when observations for the next quarters (2020Q2, 2020Q3) will be available, if 2020Q1 is identified as a turning point, the modelling can be adapted and include eventually explanatory variable or simply a dummy variable that would mirror the impact of COVID-19.

Problems and guidance for benchmarking

The fact that the components of National Account figures can change sharply, and by extremely different rates during a crisis such as COVID-19, has also to be considered when applying temporal disaggregation and benchmarking techniques since the indicators used for extrapolation can lose their reliability. For example, it could be that the non-observed value added can increase, while the observed value added drops during a major crisis. Therefore, univariate benchmark techniques may lead to misleading results, and the different dynamics of the components should be also taken into account during the benchmarking process.

More specifically, one NSI pointed out that using a regression model for benchmarking could create a bias in the estimates, especially if there is only a loose relation with the indicator, since monthly or quarterly estimate built with this methodology can be separated in two parts –

one that evolves as the indicator and one that shows a smoothed evolution. While this is an appreciated feature of the methodology under normal economic circumstances, which does not create any significant bias, it may not be appropriate in the COVID-19 context where large drops in economy are expected from March onwards.

Under these circumstances, a solution explored is to exceptionally calibrate the benchmark estimates so that they follow exactly the indicators for the months strongly impacted by the COVID-19 crisis. This applies especially if there is no reason to think that the indicator is biased up or down, even if it may be more imprecise due to the crisis. Practically, the NSI will aim to identify the series where the problem will be the largest and correct only them. These series are (i) large in level terms (ii) where the residual is a large part of the estimated account and (iii) the evolution rate is particularly low. The threshold for carrying out corrections would be decided based on practical considerations.

Another NSI confirmed to experience similar problems. The proposed approach would theoretically imply to restrict the range of regressions to last observation(s) instead of running them considering the full sample. If this is not done, the sharp decrease observed in the last observation corrupts the long-run relationship among dependent and independent variables and consequently result in the pointed out smoothing effect.

However, the question how to extrapolate missing information for the last month (or quarter) taking into consideration that auxiliary information or assumption normally used to extrapolate the missing month/quarter might not be useful under COVID-19 circumstances should, in principle, be separated from techniques to derive QNA from a set of indicators. Many countries do not use modelling or econometric techniques but on mathematical techniques (Denton). In this case, the issue is not the statistical properties of the relationship, but if the indicator is still meaningful to calculate the QNA. If it is not the case, using the Denton approach will revise only 2020 quarters when annual data in 2020 is available.

The [ESS guidelines on temporal disaggregation, benchmarking and reconciliation](#) (2018 edition) can be consulted for further information and advice.

Other problems identified in relation to COVID-19

Other problems identified for QNA estimations in relation to COVID-19 are how to account specific measures taken by the governments to support the economy or estimates of non-market services, which are treated in other, more methodological notes. With respect to estimating missing value in input data (surveys, administrative data), specific guidance notes have been published for LFS and STS statistics. All guidance notes are available [here](#).

Practical transmission and publication guidance

While it is clear that QNA estimates may be less reliable than usual in relation to the exceptional circumstances of the COVID-19 pandemic, it is essential that key indicators are available to guide European and national policy decisions. Eurostat therefore appreciates the general commitment of NSIs to transmit key QNA indicators in line with the usual timeliness and the best quality possible, and encourages NSIs to disseminate national estimates as the best source for official data for policy uses. If NSIs are reluctant to publish (part of) the estimates due to quality reasons, they should consider to use available flags to inform users. Suppression of dissemination of data due to quality reasons should not be the first choice. Appropriate metadata are also important to inform Eurostat and users.

Eurostat will publish a separate guidance note on the publication and transmission of national accounts data and metadata in the context of the COVID-19 crisis on this [website](#). QNA compilers are asked to follow the guidelines.