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Compilation of European annual and quarterly accounts including flash estimates

Contents

1. INTRODUCTION

GDP growth is probably the most followed national accounts indicator. Preferably, economic decision makers would need the GDP data real-time. This is unfortunately not possible because of the need to collect and analyse the underlying primary statistical information. Still, considering the importance of this indicator, it seems to be reasonable to serve decision makers and other users with a quarterly GDP growth estimate as soon as possible after the end of the reference quarter. However, there is a delicate balance between the speed of publication and accuracy of the early estimate.

In Europe the earliest estimates for the quarterly GDP growth responding to the above demand are called flash estimates. This paper discusses the estimation methodology of the GDP flash estimates for the European Union (EU) and for the euro area (EA). In the quarterly national accounts variables, in principle, the methods should be as closely as possible the same as in annual accounts. Due to short deadlines for publication, less detailed input data and sometimes the input data provided only in the growth rate form, some shortcuts have to be made in quarterly estimates. However, even concerning the quickest quarterly GDP flash estimates, the shortcuts need to be justified and not give biased results with respect to the subsequent regular quarterly and annual estimates.

The national accounts for the EU and the EA are compiled indirectly based on the national accounts data of the Member States (MS) rather than surveying the same variables directly at the European level. The MS national accounts data, transmitted to Eurostat, are based on primary statistical data sources which the 28 national statistical institutes have gathered on their economic area. As a result, the EU and EA national accounts are a product of Eurostat but at the same time a product of the whole European Statistical System (ESS) comprised of the 28 MS and Eurostat.

The national accounts for the European Union and for the euro area share the same main principles as national accounts in the Member States (MS): double book-keeping simultaneously between flow and stock variables, quadruple entries as representing at the same time accounts for both buyer and seller, volumes with moving base year and chain-linking calculated for transactions directly concerning goods and services, three approaches to GDP compilation and balancing of them, the requirement for quarterly figures to sum up to the annual ones, etc. In addition, based on the use of MS national accounts data as an input, a characteristic additional feature is the aggregation of MS data.

The rest of the paper has the following structure: Section 2 discusses first more generally the compilation methodology of annual and quarterly European national accounts. After that the flash t+45 estimation methodology and is delineated and linked to the compilation of later regular European national accounts. Section 4 shortly addresses the work on advancing the GDP flash estimates for the euro area and the EU to 30 days after the end of the quarter.

2. ON THE COMPILATION OF EUROPEAN NATIONAL ACCOUNTS MAIN AGGREGATES, ANNUAL AND QUARTERLY

The European Statistical System (ESS) consists of 28 National Statistical Institutes (NSI) in the Member States (MS) together with the Directorate General Eurostat of the European Commission. The national accounts main aggregates figures for the euro area and for the European Union are compiled at Eurostat after the NSIs of the Member States have transmitted their national accounts figures to Eurostat. Therefore, the national accounts results for the European aggregates are naturally a product of Eurostat, but at the same time they are a product of the whole ESS.

In the area of national accounts main aggregates, this same principle applies from the Supply and Use Tables, transmitted in t+36 months and including most detailed breakdowns, to the quarterly flash GDP growth estimates t+45 days after the quarter. The transmitted national accounts data are based on primary statistical data sources that the 28 NSIs have gathered for their country. The national accounts for the European aggregates are therefore compiled following **an indirect approach based on the data gathered on the Member State level rather than surveying** the same variables only **directly at the European level**.

European System of Accounts 2010 (ESA2010) guides the countries in order to achieve harmonised national accounts data from each of the Member States. The purpose is that the country data are comparable with each other, and at the same time is harmonised for them to be used in the compilation of European national accounts. As an Annex of ESA2010 regulation, the ESA2010 Transmission Programme (ESA2010TP) sets out the deadlines for the national data transmissions to Eurostat.

With the annual deadlines Eurostat mainly receives the transmissions from all of the Member States, and a first step for European annual national accounts is to aggregate the national level data (in millions of euros) to form the euro area and the European Union national accounts in the aggregate level. The first aggregation is simple in the current price

euros that are additive. However, in chain linked volumes with moving base year the national level figures are not additive, the aggregate variables has be to summed up from the country data first in previous year price volumes. Only having both the previous year price figure for the European aggregate variable for year *T*, and the current price figure for year *T-1*, one can compute a chain-linked volume figure for the European aggregate variable in year *T*. Furthermore, after having accomplished the first aggregation, the European level national accounts data has to be balanced, even in current prices, so that e.g. the components of the three GDP compilation approaches will add up to the same figure.

For the quarterly national accounts data transmissions, for instance, in t+60 days after the quarter, some Member States may have derogation to the transmission time requirements. Therefore, for the European quarterly national accounts compilation, the data for the vast majority of the countries are available, but not for all Member States. What follows is that the quarterly European level figures cannot be directly aggregated because of missing countries. To solve this, **another indirect approach is used in the time dimension**: **the annual European national accounts level figures are temporally distributed to the quarters** based on the growth development of the received quarterly national accounts figures of the Member States. The temporal disaggregation is done **with Chow-Lin regression based method**. The temporal disaggregation process ensures at the same time that the quarterly figures add up to the annual ones: the non-adjusted quarterly figures sum up to the non-adjusted annual, and the seasonally and calendar adjusted quarterly figures add up to the calendar adjusted annual figure. In the regression based approach, a **linear** (/log-linear) **model** is specified to **describe the relationship of the quarterly GDP indicator with the annual GDP**. This specified model can also be used in estimating quarterly GDP level development for the latest quarter(s) for which annual GDP does not yet exist.

3. METHODOLOGY FOR THE EUROPEAN GDP T+45 FLASH ESTIMATIONS

According to the ESA2010 transmission programme regulation, the first quarterly national accounts transmission from the Member States is required at t+60 days after the quarter. Because of the user needs for sooner available data on GDP, in addition to the legal requirement, the majority of Member States have agreed with Eurostat to transmit a flash estimate on quarterly GDP for the compilation of EU/EA t+45 GDP flash estimate. At the moment, in most of the cases the MS and Eurostat publish the t+45 estimates on the same day.

As t+45 days after the quarter is a rather quick deadline for macroeconomic statistics, it was agreed already in the beginning of the t+45 transmissions that Member States may send only the seasonally and calendar adjusted GDP volume growth rates: first, the reference quarter is compared with the previous quarter (quarter-on-quarter growth) and second, the reference quarter is compared with the same quarter in the year before (year-on-year growth). **The seasonally adjusted** (including calendar adjustment when relevant) **quarter-on-quarter growth** was **seen as the main target of the euro area and European Union GDP t+45 flash**, and hence, whenever available for a Member State, Eurostat uses the quarter-on-quarter country GDP growth data as a primary information.

The GDP t+45 flashes for the euro area and for the European Union have been published since 2003Q1. In that year the euro area and the EU comprised of 12 and 15 countries. Before that the first release Eurostat had a GDP flash project, in which the methodology for the flash was developed and performance of the chosen methodology tested.

The first regular European GDP estimate was prepared already at that time by Chow-Lin regression based temporal disaggregation technique in a similar manner as described above. For the last quarter(s) the specified Chow-Lin regression model, between quarterly GDP indicator (deviating from the annual level) and annual GDP, was used for receiving a European quarterly GDP that continues on the annual level.

In the testing phase for the euro area and European Union t+45 GDP flashes, five Member States were producing GDP estimates before or at t+45 days: Germany (t+45), Greece (t+45), Italy (t+45), Netherlands (t+45) and United Kingdom (t+25). These countries were accounting for more than 50% of the European Union GDP. Before t+45 days the industrial production index on the reference quarter (three months) was available for two other big countries, for France and Spain, for which GDP t+45 estimates were not yet available. For these two countries GDP growth was estimated by a regression model based on one or more available indicators (mainly Industrial Production Index).

Next, the temporal disaggregation was prepared up to *Q-1* quarter from the reference quarter

a) by aggregating the annual GDPs of all countries up to the last year available and
b) by aggregating the quarterly GDPs of all the available countries up to *Q-1* quarter (Ireland and Luxembourg were missing at that time).

For continuing the quarterly GDP indicator time series to include the reference quarter (*Q*), the quarterly GDP growth rates of the above mentioned flash countries were aggregated for the reference quarter *Q* as a weighted average to form a growth estimate for the European

Union (with seven countries) and for the euro area (with six countries). The quarterly GDP indicator (in b) above) was prolonged to include the reference quarter *Q* by applying the aggregated flash country growth rates to the level series.

It is worth reminding that the level of the quarterly indicator (in b above) was not following the annual level due to missing quarterly GDP series for two countries. Therefore, finally temporal disaggregation Chow-Lin regression model was applied between the annual GDP and the quarterly GDP indicator in which the last quarter was developed by the weighted average of the flash country growth rates. The Chow-Lin regression relationship between the quarterly and annual series up to *Q-1* was used in the estimate for the reference quarter (*Q*).

The above methodology for the European GDP t+45 flash estimates was applied until 2013, after which the methodology was simplified. Since 2013 the quarterly GDP levels of the euro area and European Union are directly developed further with the quarter-on-quarter growth rate obtained by the aggregating the country GDP t+45 flash growth rates with year *y-1* current price weights. The main reasons allowing for the simplification in the t+45 flash were, first, that along the years after 2003, all the countries have started to provide quarterly GDPs, and second, along time the country coverage of flash t+45 producing Member States had grown to be higher than 90% of the euro area and European Union GDP.[1] Therefore, nowadays the t+45 flash estimates for the euro area and for the European Union are almost fully based on the input from Member States: estimation techniques and modelling are not used anymore in European t+45 estimates.

4. ON-GOING WORK ON EARLIER FLASH ESTIMATES

Eurostat established together with Member States a Task Force (TF) 'GDP flash estimates at t+30 days' in May 2013 with the mandate 'to assess if a sufficient reliable flash GDP for the euro area (EA) and the European Union (EU) is possible, based on the information available at t+30 days including internal national estimations'. The Task Force consisted of representatives of 16 European Union Member States and one EFTA country, Eurostat, European Central Bank and an external contractor Cambridge Econometrics.

[1] For instance, in the t+45 flash estimations for 2013Q1 the coverage percentages were 97% for the euro area and 95% for the European Union. In January 2016, six Member States do not provide t+45 estimates: Croatia, Denmark, Ireland, Luxembourg, Malta and Slovenia. (Sweden provides an estimate only for the 2nd quarter).

The purpose of the TF was to gather experience and best practices learnt by Member States that already publish a flash estimate at t+30 days, those that are testing or have tested its feasibility and those who are willing to start testing. The main purpose was to assess if a sufficient reliable flash GDP for the euro area and the EU is possible, based on the information available at t+30 days including internal national estimations. Therefore, the TF compiled test estimates.

In addition, the TF established three working groups: one for the estimation methods, one for the quality acceptance criteria and one for the communication in case there would be a decision to go live. The results of the EU/EA t+30 test estimates were reviewed and confronted with the a priori set quality acceptance criteria. The results satisfied all pre-defined criteria.

Supported by the positive advice of National Accounts Working Group and the Directors of Macro-Economic Statistics, Eurostat decided on mid-December 2015 to start the release of the EA/EU GDP estimate at 30 days after the end of the reference quarter in 2016. The start of the EA/EU GDP t+30 release is considered as an important achievement of the whole European Statistical System (ESS).

The first t+30 GDP flash estimates for the EU/EA was released on 29 April 2016. The analysis of the test results and the t+30 flash GDP methodology were also published by the time of this first release[2]. In addition, at the same date Eurostat released a methodological document that provides guidance to countries that start preparing early GDP estimates; the document provides a general overview of methods that are currently used by Member States to prepare early GDP estimates[3].

[2] See statistical working paper: EA and EU GDP flash estimates at 30 days

[3] See statistical working paper: GDP flash estimation methods for Member States