Spanish GDP Flash Estimate at t+30

Methodological document

Quarterly National Accounts Unit

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SUMMARY

The Spanish National Statistics Institute (INE) started publishing the Spanish GDP Flash Estimate in November 2004 referring to the third quarter of that year. The time lag of this publication has been approximately 45 days after the reference quarter (t+45). No more than fifteen days later, INE published the complete set of accounts and charts that comprise the Spanish Quarterly National Accounts (QNA). Due to the 2008 change of base, and after a deep feasibility study, this flash estimate has been brought forward to 30 days after the end of the reference quarter (t+30) since January 2012.

CONTENTS

1. INTRODUCTION

The Spanish Quarterly National Accounts (QNA) is elaborated by INE's Unit of National Accounts, according to the principles contained in the European System of Accounts (ESA) and the main manuals of quarterly national accounts (Eurostat 1999 and IMF 2001).

Since then, it has been published regularly every quarter, going through regular updates by means of base change operations, which, alongside the Spanish Annual and Regional National Accounts, incorporate methodological and statistical changes so as to offer a more precise estimate of the behavior of the Spanish economy at any time. In May 2012, the current methodology in the EU, set by a Regulation of the EU Council, is the 1995 European System of National and Regional Accounts (ESA-95), and the current base in the Spanish National Accounts is Base 2008.

No later than 60 days after the end of the reference quarter, INE publishes the whole set of accounts and charts that comprise the QNA. In compliance with the Regulation (EC) N° 1392/2007 of the European Parliament and the Council of 13 November 2007, currently in force, that regulates the National Accounts data transmission to Eurostat, this information includes Quarterly GDP and its components from the three approaches (production, expenditure and income), quarterly employment data in terms of National Accounts (full-time equivalent jobs, hours worked, persons and total employment), as well as the Quarterly Non-financial Accounts for the total economy and the Rest of the World sector.

In November 2004 a Quarterly GDP Flash estimate began to be published, about 45 days after the end of the reference quarter. This estimate consists of the year-on-year and quarter-on-quarter growth rates of GDP for chain-linked volume measures data adjusted for seasonal and calendar effect.

The elaboration of this flash estimate is made within the Economic and Monetary Union Action Plan. One of the objectives of this Plan has been to provide the Principal European Economic Indicators (PEEIs) for monitoring and analyzing the economy of the Monetary Union, comparable in timeliness and quality with those produced in other economies.

The Quarterly GDP Flash estimate is transmitted to Eurostat, which then elaborates the GDP Flash estimate of the European Union and the Euro zone, based on the info received.

In the second half of year 2008, feasibility studies began to be carried out to bring forward the GDP Flash estimate to t+30. The goal was to reach a balance between timeliness and precision. Among others, the main factors supporting

bringing forward the GDP advanced estimate were the proximity in time of the complete and the flash estimates (sometimes only 5 days) and the shortening of the short time indicators' time lags. Against it were the possibility of important revisions in this first estimate with respect to the complete one and the available resources.

Finally, due to the recent base change to Base 2008, the Quarterly GDP Flash Estimate is set to be published at t+30 in the short term statistics calendar for year 2012 that is published by INE every year. First publication of this t+30 advanced estimate was on 30 January 2012, with information concerning the last quarter of 2011.

The main contents of the press release mentioned before are the following:

IN ē **Instituto Nacional de Estadística** — **Press** *Release*

30 January 2012

Advance Estimate of the Quarterly National Accounts Base 2008
Fourth quarter of 2011

Gross Domestic Product registers a 0.3% increase in the fourth quarter of 2011

According to the quarterly GDP advance estimate, during the fourth quarter of 2011, Gross Domestic Product (GDP)[1] generated by the Spanish economy registered a real increase of 0.3%, as compared with the same period the previous year[2].

In this way, the global activity growth in the activity decreased five tenths as compared with the previous quarter. This fact was due to the negative contribution by domestic demand, partly compensated by the positive contribution of foreign demand that grew as compared with the previous quarter.

The quarter-on-quarter GDP growth was –0.3%, as compared with 0.0% for the previous quarter.

By temporary aggregation of the four quarters, **the real growth in GDP in the whole of the year 2011 was estimated at 0.7%.**

2. COMPROMISE TIMELINESS / PRECISION

One of the main elements in the elaboration of the QNA is the set of statistical sources or short-term indicators, which provide the information that will determine the growth of quarterly GDP. This indicators' information is received day by day, according to their availability calendar. If the main objective favors the *timeliness* of the estimate, the amount of information used will be smaller, and will therefore increase the chances of a revision of the estimated data when all information sources are available. Nevertheless, if the main objective favors *precision* in the sense that an important revision of the estimated data is not expected, it might be necessary to delay the publication date so that the amount of information available is larger, making it less useful for economic analysis.

Therefore, it is necessary to find an intermediate solution that meets these objectives, timeliness and precision. Along these lines, one of the most utilized tools for the feasibility study of the advance of the publication date of the GDP Flash Estimate, has been to define the variable *amount of accumulated information available each day* and to graph it in time, taking into account the different periodicities of the main sources, weighting differently the importance of each indicators in the GDP estimate.

This analysis was undertaken both from the expenditure approach and from the production approach. A description of this analysis can be found in Cristóbal and Martínez (2009). The following graph shows, for the estimate of GDP from the demand side, the situation in year 2011 regarding the amount of accumulated available information each day.
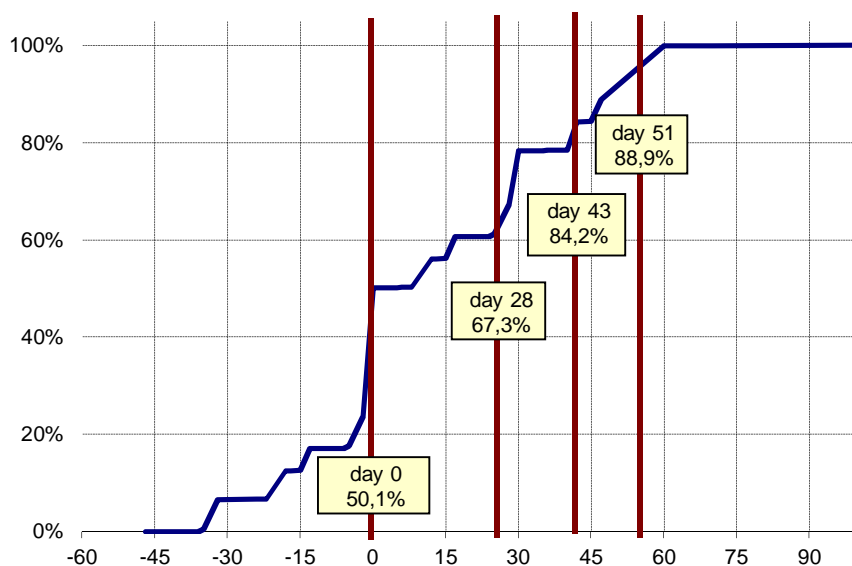
As it can be seen in the graph, the day of the end of the reference quarter (origin of the X-axis) 50.1% of the information needed for the quarterly GDP estimate is available, due to the availability, mainly, of first month data of many monthly indicators and in some cases of two months.

If we consider as a time reference t+45 when the former GDP Flash estimate was published, and dedicating a minimum of two days to the final closing of the estimate, the amount of information accumulated in 43 days is 84.2%. Thus, forecasts must be done for more than 15% of the information, which will determine, among other factors, the revisions of the estimated data.

Equally, if we take as a reference the moment in which the complete estimate of the QNA is published, which is t+55, and dedicating four days for the closing of the final estimate, the amount of information accumulated for the remaining 51 days is 88.9%. This almost 11% of information that is not available when elaborating the complete estimate of the quarter is one of the reasons for data revisions.

Therefore, there are hardly five additional percentage points of cumulative information between the complete QNA estimate and the former flash estimate at t+45. The difference is not significant and hence until this moment there have been no major revisions of the figures estimated in the flash regarding the complete estimation, so precision in this sense has been high.

Finally, leaving the same two days to close the flash estimate, the amount of information accumulated 28 days after the end of the quarter is 67.3%. Thus, in this case it would be necessary to forecast around 30% of the information needed. In particular, in monthly statistics, data for the third month would in many cases be missing for most indicators and there would only be data on the first two months. Then, the difference in accumulated information with respect to t+55 is around 20 percentage points, which still allows us to reach quite an important precision for this flash estimate.

3. METHODOLOGYCAL FEATURES OF THE QNA

As shown in previous sections, QNA integrate and conciliate a large number of short-term economic information sources. Although quarterly direct information for the General Government, Financial and External sectors exist, most of the information is indirect and on a monthly basis. For this reason, indirect methods are used to obtain quarterly estimates for most of the macro-economic operations. These procedures are the temporal disaggregation of annual estimation of the macro-economic aggregates (Annual National Accounts), according to mathematical or statistical methods, based on high frequency indicators (elaborated for each operation with the most relevant short-term information) that also make it possible to obtain the quarterly estimate for the quarters of the current year.

QNA use temporal disaggregation techniques of economic series based on models that are one of the main elements in its elaboration. They provide an operative and objective way of combining the relevance of the short-term indicators with the ampleness and internal consistency of the Annual National Accounts, and in addition, they provide tools to quantify the quality of the estimates. A summary of the main methods of temporal disaggregation techniques can be found in Quilis (2001).

The quarterly disaggregation method used in the QNA is mainly the Chow-Lin method (Chow and Lin (1971)). This procedure assumes that a quarterly regression model that links the unobservable quarterly estimates for a particular aggregate with the corresponding set of high-frequency indicators exists. In addition to being a general method comprising other very used methods as particular cases, it makes it possible to objectively quantify the quality of the quarterly disaggregation, as it has all the power the regression analysis (diagnostic tests, adjustment measures, etc.). Besides, it is an easily generalizable method to multivariate plane and to other more complex models.

The use of the Chow-Lin methods results in a set of quarterly linear unbiased and minimum variance estimates for each macro-economic aggregate, that are consistent with the annual estimates, integrating the information given by the short-term indicators.

Once the quarterly preliminary estimates for the reference quarter for each of the macro-economic operations involved are obtained, the data conciliation process follows, until the raw balanced quarterly macro-economic table is obtained (without seasonal adjustment).

Due to registration periodicity, the QNA time series are usually affected by seasonal fluctuations and calendar effects. These variations might mask relevant movement of the series in the short term and in the long term, not allowing a clear comprehension of economic phenomena. This fact reduces the usefulness of the QNA in raw terms as a tool to design economic policies, to

effectively analyze the economic cycle and to model. Therefore, the elimination of this kind of effects and the elaboration of seasonal and calendar adjusted series is very convenient.

The seasonal adjustment procedure used in the QNA follows the signal extraction methodology based in ARIMA models implemented in the TRAMO-SEATS software (Gómez and Maravall, 1996). Adjustment is done on the raw quarterly series and not on the indicators, and the models are selected and set once a year.

In the QNA, a direct method is used to seasonally adjust the quarterly GDP series. This method consists on obtaining the signals directly from the raw quarterly GDP series to obtain the seasonal and calendar adjusted series, instead of obtaining it by aggregating the corresponding adjusted components. Then, in the next step, signal extraction techniques are applied to the quarterly GDP series to obtain the seasonal and calendar adjusted GDP series. In the same way, seasonal and calendar adjusted series are obtained for each of the GDP components.

In the following stage, balancing and conciliation procedures are applied to adjusted data until a consistent macro-economic table is obtained.

Finally, before considering the estimations as definitive, a control procedure of feasibility and coherence and a joint assessment of the seasonally adjusted and raw data are applied.

In short, the QNA elaboration process could be summed up and structured in the stages below:

1. Indicators and direct information compilation

The QNA uses direct information regarding General Government sector (general audit information), Financial Sector (Bank of Spain information), and from the Rest of the World sector (Customs and Balance of Payments statistics).

In the case of the use of an indirect method, the quality of the estimates depends largely on the base information and how it is used. The main criteria taken into account when selecting the high-frequency basic indicators are conceptual consistency with the annual aggregate to be quarterly disaggregated, the correlation with this aggregate, the length of the series, the statistical quality of the indicator, its future availability and its time lag.

Among others, the main indirect indicators are:

➢ Production Statistics. For instance: Industrial Production Indices, Industrial Turnover Indices, Service Sector Activity Indicators, Sales of SMEs and Large Companies, Retail Trade Indices, Passenger transport

statistic, Hotel Tourism Short-term Trends, Hotel Occupancy Survey, Construction Activity indicators, Production of crops and livestock, ...

- ➢ Employment and labor costs statistics, such as the Labor Force Survey, Quarterly Labor Cost Survey or the Social Security Register.

- ➢ Statistics on prices, for instance, Consumer Price Indices, Industrial Price Indices, the Housing Price Indices, Export and Import Price Indices for Industrial Products, Unit Value Indices, Price Received by Agrarian Producers...

- ➢ Administrative registers and other quantitative sources.

- ➢ Other non-quantitative indicators like Confidence indicators or the Conjunctural Industry Survey or the Purchasing Managers Indexes

2. Univariate treatment of elemental series

Once the basic indicators are updated, they go through a series of treatments which main objective is to characterize the base information to analyze it. They mainly consist on: adaptation in terms of National Accounts, outlier identification, possible errors depuration and forecasting of missing data.

3. Elaboration of synthetic indicators

Information is synthesized from the elemental indicators series, and only one synthetic indicator is obtained for each aggregate at the corresponding level of aggregation with the aim of obtaining more parsimonious models in terms of parameter estimation. To design synthetic indicators, techniques like Principal Components, Factor Analysis or Weighted Average are used.

4. Use of temporal disaggregation procedures

Once there is a synthetic indicator for each aggregate, both for the variation in current terms or in terms of volume, temporal disaggregation methods are applied to the annual aggregates, using mainly the general Chow and Lin method, to obtain preliminary estimates of the quarterly aggregates. This way, a first version of the quarterly estimates is obtained, in current terms, at average prices of last year, and in terms of chain-linked volume measures, temporally consistent with the annual estimates.

5. Balancing and conciliation of raw data

To solve the supply-demand-income-employment inconsistency problems, preserve temporal consistency and obtain an almost definitive estimate of the quarterly aggregates in raw terms, the data balancing and conciliation processes are undertaken.

Before the end of this stage, data goes through a coherence and feasibility control and a validation process consisting, among others, on the following treatments:

1. Comparison of the resulting quarterly aggregates with the short-term basic information available.
2. Coherence analysis and interpretation of certain indices (deflators, productivity, unit costs, compensation of employees per employee etc.).
3. Study of the current data revisions with respect to those published in the former quarter.
4. Analysis of the resulting quarter-on-quarter and year-on-year growth rates.

Raw quarterly aggregates data series from the production approach, the expenditure approach and the income approach, and also for employment, obtained at the end of this step, will be definitive after a final feasibility study, which also includes the quarterly seasonal and calendar adjusted series

6. Application of signal extraction procedures

Signal extraction procedures are applied to each of the aggregates' series from the last paragraph, aiming to obtain the seasonal and calendar adjusted aggregates.

7. Balancing and conciliation of adjusted data

This step's objective is to reach temporal consistency and accounting balance for the quarterly adjusted series. Having gained the consistency of the adjusted data, they undergo a process to control residual seasonality.

8. Global validation of raw / adjusted data

Finally, a global validation of all the information is done (quarterly series of production, expenditure, income and employment aggregates, adjusted and not adjusted, both in current and in volume terms), undertaking many consistency and feasibility controls.

9. Elaboration of charts, tables, press release, etc

The last phase of the elaboration process of the QNA consists of preparing the information to be disseminated in different formats.

4. DIFFERENCES BETWEEN GDP FLASH ESTIMATE AND THE COMPLETE ESTIMATION OF QNA

Processes to elaborate the flash and the complete GDP estimates are essentially the same. The main difference is that the Flash Estimate makes a greater use of forecasting methods and additional validation elements. This indicator does not belong to the forecast framework but to the estimation framework, as it is a measuring statistical tool within the National Accounts.

Therefore, due to the time lag between both statistical operations, they differ in the amount of basic information that they content, so it is possible their results do not coincide.

It is in the development of high-frequency approximation indicators where the main difference between GDP Flash estimate and QNA complete estimate resides. When it comes to monthly indicators, usually two months of the reference quarter are available for the flash, and all three of them for the complete estimate. For this reason it is necessary to obtain a prediction for the third month of the quarter in the first case. When needed, it is also necessary to resort to such methods when these sources are quarterly. Still, quarterly indicators are not so common, and at times are available at the time of publication.

The following graphs plot the differences between year-on-year and quarter-on-quarter growth rates published to date in the flash estimate and in the complete QNA estimate. As it can be seen, differences are very small, affecting only 5 of the 31 published data, this is due to the limited temporal interval between their compilation. In the remaining 26 quarters both estimates have coincided.

Difference in year-on-year growth rates

Difference in quarter-on-quarter growth rates
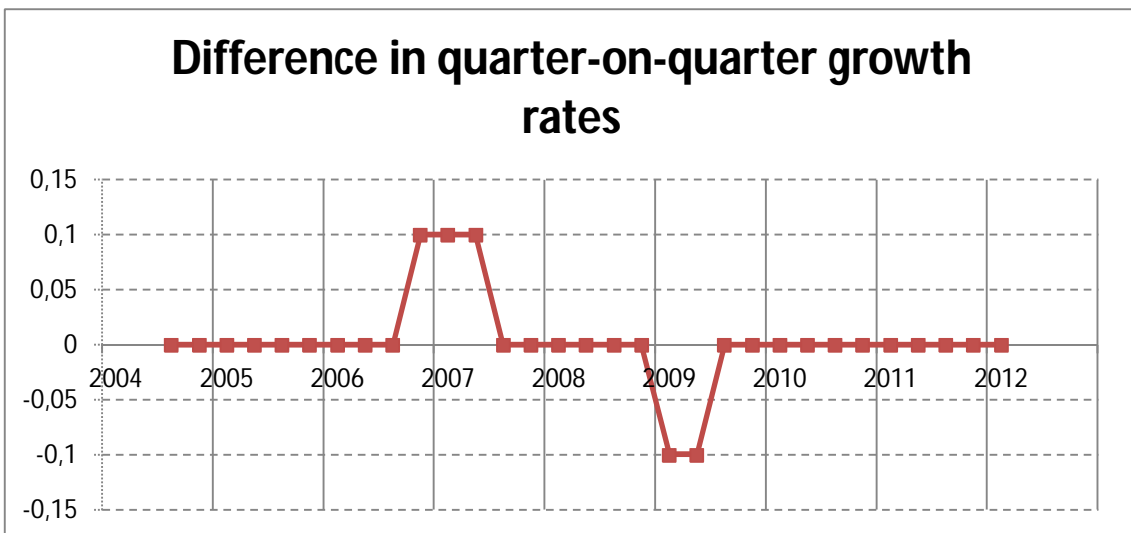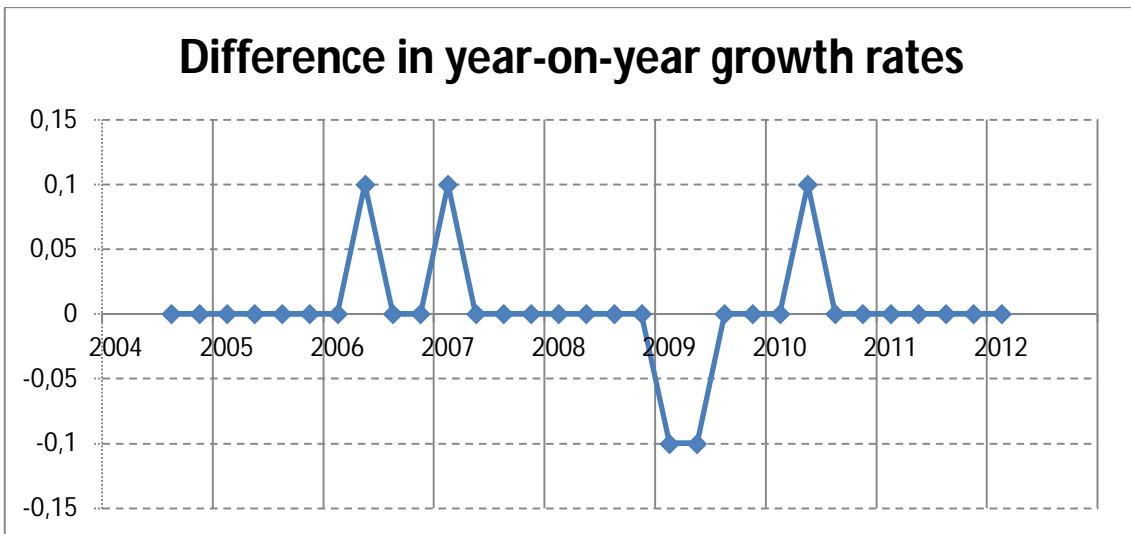
5. CONCLUSION

The increasing need for availability of timely and quick economic information has led the INE to consider the possibility of an earlier GDP Flash estimate since this economic crisis begun.

However, this estimate must fulfill precision requirements in order to be considered a useful tool of economic analysis. This is why we needed more than three years to make the publication of the GDP Flash estimate a reality.

On January 30th of 2012, INE first published the GDP Flash estimate with only a 30 day time lag. Before then, the time lag was about 45 days after the end of the reference quarter.

The methods and sources used to elaborate the flash estimate are the same that are used in the elaboration of the QNA complete estimate. Therefore, this advance estimate is a measuring statistical tool within the National Accounts, and does not belong to the forecast framework.

The differences between the flash and the complete estimates lie in a greater use of forecasting techniques and a greater weight of additional validation elements in the case of the advanced estimate.

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