THE QUARTERLY NATIONAL ACCOUNTS IN REAL-TIME: AN ANALYSIS OF THE REVISIONS OVER THE LAST DECADE*

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ABSTRACT

In this article, the revisions of the Portuguese Quarterly National Accounts over the last decade are analyzed. We assess the real-time behaviour of GDP estimates and corresponding expenditure and supply side components. In particular, we focus on the revisions up to one year after the release of the first estimate as well as on the revisions resulting from the inclusion of the Annual National Accounts. In the case of GDP, the reliability of the flash estimate, more recently made available by *INE*, is also assessed. The results for GDP suggest that the revisions up to one year are not significant although the revisions can be larger when the Annual National Accounts are included. The expenditure components related with external trade present the largest revisions while the supply side estimates are more fragile than those from the expenditure side.

1. Introduction

The Quarterly National Accounts (QNA) constitutes one of the most important pieces of information regarding the economic developments of a given country. It includes estimates for the major macroeconomic variables and represents the most updated overall picture concerning the economic situation, which serves as basis for macroeconomic projections as well as for policy-making. However, the national accounts are subject to revisions throughout time which reflect the arrival of new information as well as methodological changes so as to improve its quality. The importance of the national accounts and the need to be as timely as possible, lead inevitably to revisions as the first estimates will always have a preliminary nature. Given its relevance in the economic short-term analysis, the evaluation of its real-time reliability becomes crucial.

The assessment of reliability relates to the issue of measuring how close an initial estimate is to subsequent estimates and not to discuss the degree of approximation of this estimate to the reality that intends to measure. The analysis of the revisions consists in comparing an estimate available at a given point in time with the one which will be available afterwards for the same reference period. Note that the revisions make part of the statistical production process and reflect not only the arrival of new information as well as the revisions policy of the statistical authorities. Hence, one should not conclude that an estimate subject to smaller revisions is necessarily better than other more revised. However, as the presence of significant revisions may harm the economic situation assessment and the corresponding forecasting exercise, it is important to quantify the revisions magnitude. According to Aruoba (2008), a good initial estimate ("well-behaved" revisions) results in revisions that are not very significant (both in size and volatility) and unpredictable, that is, the revisions should not present a systematic behaviour.

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* The opinions expressed in the article are those of the authors and do not necessarily coincide with those of the Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

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The analysis of revisions of macroeconomic data, in particular the main aggregates of QNA, has been widely discussed in literature. In fact, there is a wide range of studies that look at various countries the issue of revisions to GDP and its components. See, for example, Aruoba (2008) for the U.S., Meader (2007) for the United Kingdom or Kholodim and Silivesstivs (2009) for Germany. In turn, Faust (2005) analyzes the revisions to the first estimates of GDP for the G-7 countries. It should be noted that this topic has also received attention from international institutions such as the OECD and the ECB. See for example, Ahmad *et al*. (2004) and McKenzie (2006) for comparative analysis of GDP revisions for several OECD countries and ECB (2009) for the euro area.

The existence of such revisions resulted in a growing interest in evaluating its impact on various areas of macroeconomic analysis. For example, Orphanides (2001, 2003) discusses the importance of revisions in the implementation and interpretation of monetary policy rules, in particular, the Taylor rule. In turn, Orphanides and van Norden (2002) analyze the impact on estimating the output gap and Stark and Croushore (2002) evaluate their relevance in the context of forecasting.[1] A recent overview of this strand of literature can be found in Croushore (2011).

In the Portuguese case, the methodology used to compile the QNA, at least for part of the aggregates, is indirect, that is, it is based on the relationship between the values of the Annual National Accounts (ANA) already released and associated indicators, available quarterly. Whenever ANA are released, the QNA are revised so as to be coherent with these annual values. Discarding substantial methodological changes, revisions to the QNA are essentially of two types: revisions to the associated indicators that underlie the estimation of the QNA and changes to the annual reference values (with the release of new ANA). The inclusion of ANA (which are estimated with a greater degree of detail and information) may lead to more substantial revisions in the quarterly values of a given year. Moreover, the arrival of annual reference values may have an impact not only in the estimates of that year but in the whole series due to potential adjustments in the estimated coefficients. Besides these two types of revisions, there may be minor revisions due to seasonal adjustment.

In particular, José (2004) evaluated the revisions of the Portuguese QNA for the period between the 4th quarter of 1991 and the 1st quarter of 2004. However, the analysis of the revisions in that sample period faces several problems including: the change of the European system of accounts from ESA79 to ESA95 in the 2nd quarter of 2000, implying a series break due to methodological and conceptual changes; periods of interruption in the release of the QNA; the change in the release calendar with the first estimate being released 70 days after the reference period instead of 120 days starting from the 4th quarter of 2002. Therefore, this article intends to revisit the real-time reliability of the QNA by considering a homogeneous sample period, *i.e.*, unaffected by the above mentioned problems. Thus, the period examined runs from the 4th quarter of 2002 up to the 1st quarter of 2011, corresponding to the period of regular dissemination of the QNA with the current framework, that is, estimates according to ESA 95 with the first estimate (*i.e.*, detailed QNA) being released 70 days after the reference period. Moreover, since the 1st quarter of 2007, the *INE* releases a flash estimate for GDP 45 days after the end of the reference quarter, which justifies an assessment of this advance estimate for GDP. The flash estimate will be analyzed separately. The analysis of revisions to the QNA will be performed resorting to a set of descriptive statistics commonly used in such studies.

The article is organized as follows. In section 2, the data and methodology are described, that is, the type of revisions and the measures used are discussed. In section 3, we analyze the revisions to the main economic aggregate, that is, GDP. This section provides a more comprehensive analysis, including also the analysis of the flash estimate revisions, as well as the revisions to the quarterly estimates due to the

1 For example, in the case of the UK, the fact that GDP is subject to revisions led the Bank of England, under the release of its macroeconomic projections, to incorporate such information in the construction of the so-called fan chart for GDP in order to reflect the uncertainty about the past (see Bank of England (2007)).

inclusion of the ANA. In addition, we analyze the revisions to the rates of change in volume of the main aggregates of QNA, including the various components on the expenditure and supply sides, as well as the deflators. Section 4 presents the main conclusions.

2. Data and methodology

The first estimate of the QNA for a given quarter (including expenditure and supply side disaggregation) is currently released 70 days after the end of the reference period. This estimate may be revised in the following publications which are released with a quarterly periodicity. Hence, simultaneously with the release of the first estimate of quarter t, a second estimate for the quarter t-1, a third estimate for the quarter t-2 and so on, are also released. In the current format, each publication includes a collection of quarterly data[2] for the period from the 1st quarter of 1995 to the reference quarter.

The data to be analysed include GDP and its main expenditure components as well as Gross Value Added (GVA) and corresponding breakdown by main branches of activity, available in 34 vintages for the period between the 4th quarter of 2002 (released in March 2003) and the 1st quarter of 2011 (disclosed in June 2011).

With such database it is possible to analyze several types of revisions. The first revision for a given quarter is the difference between the second and the first estimates. For subsequent quarters, we can analyze revisions *vis-à-vis* the previous quarter estimate or *vis-à-vis* the first estimate.

Since estimates are likely to be revised in each QNA release, the values for the most remote quarters are subject to a longer period of revision. When considering the most recently published data (that is, the latest estimate), it includes different revision horizons for each quarter *vis-à-vis* the first estimate. Moreover, the last quarterly figures are not yet subject to any annual restriction imposed by the ANA while the more remote quarterly figures already incorporate the corresponding ANA. Hence, only revisions with the same horizon for all quarters will be analyzed and therefore the revision to the first estimate *vis-à-vis* the currently available estimate will not be considered. In particular, we focus on the revisions up to one year after the release of the first estimate. On one hand, within this time frame of revision, the estimates have not yet been subject to the potentially more substantial revisions due to the inclusion of the respective ANA. In fact, the ANA are usually released with a lag of more than one year after the disclosure of the first estimate for the fourth quarter of the corresponding year. On the other hand, by considering a limited time interval of revision (which also allows not to lose many observations in the analysis), it minimizes the inclusion of revisions due to more significant methodological changes (as, for example, base changes, which affect the whole series) and that do not reflect the regular revision process.

Concerning the flash estimate (which is released 45 days after the end of the respective quarter), since it is only available for GDP and for a shorter sample period (from the 1st quarter of 2007 onwards) it is analyzed separately. In this case, we evaluate the revisions to the flash estimate *vis-à-vis* the first estimate (which is disclosed 70 days after the end of the quarter).

We also assess, for GDP, the impact of the inclusion of the ANA on the quarterly values of the corresponding year. Although in this case, the revisions are less comparable, as annual figures have been released with different time lags, it is important to have an idea of how much the quarterly figures may change after the inclusion of the respective ANA. Therefore, the revisions to the GDP quarterly figures of a given year, after the inclusion of the respective ANA, are presented. The analysis of the revisions due to the inclusion of the ANA is also done, although more briefly, for the GDP main components as well as for GVA and its breakdown by activity branches.

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2 In real-time data analysis, the data collections corresponding to each publication are usually called vintages.

The analysis of the revisions is conducted using a wide range of statistical measures commonly used in this kind of studies. For ease of exposition, let us consider the revision as being the difference between the rates of change (on year-on-year terms or on quarter-on-quarter terms) of the initial and final estimates (here understood as the estimates before and after revision, respectively).

As a sign indicator, the mean revision is computed. The closer to zero is the mean, the less biased is the initial estimate. To assess this, a test on the significance of the mean is performed, that is, we test whether or not the mean is statistically different from zero. A statistically significant and positive (negative) mean revision indicates that the variable was under(over)estimated in the initial estimate, suggesting a systematic behaviour of the revisions. The proportion of positive revisions can also be seen as an indicator of the sign of the revision of the initial estimate (a high percentage of positive or negative revisions suggests a bias of the initial estimate).

Since revisions of opposite sign tend to cancel out, the main indicator used to measure the size of revisions is the mean absolute revision, *i.e.* the average of the absolute value of the revisions. Alternatively, in order to take into account the scale of the variable, we also calculate the relative mean absolute revision, that is, the ratio between the absolute average of the revisions and the absolute average of the variable (in this case, in terms of the rates of change) corresponding to the final estimate. This measure can be interpreted as the average proportion of the estimate that is revised. Other measures are also calculated, as the sign concordance for the rates of change (when comparing the initial and final estimates) as well as the direction (acceleration/deceleration) concordance.

Besides a small mean, it is also desirable that the revisions have a low volatility. Thus, we calculate some measures of volatility such as the standard deviation of the revisions and the noise-to-signal ratio, *i.e.*, the ratio between the standard deviation of the revisions and the standard deviation of the final estimate, which takes into account the volatility of the variable itself. In addition, we present the decomposition of the mean squared revision (MSR), which is the average of the squared revisions (for a description of a set of measures including this decomposition, see, for example, Di Fonzo (2005) and McKenzie (2006)). This measure is decomposed into 3 components (UM, UR, and UD) such that UM+UR+UD=100. UM is the proportion of MSR due to mean revision not being equal to zero, UR is the proportion that results from the correlation between the initial and final estimates being different from 1 (in particular, UR is higher the lower the correlation between the initial and final estimates) and UD is the residual component. Reliable estimates imply small values for UM and UR and a high value for UD, that is, the proportion not caused by systematic differences between the estimates before and after revision.

In the next section, revisions to both the year-on-year (yoy) and quarter-on-quarter (qoq) rates of change, in volume terms as well as deflators, are analysed. It should be noted that, as the yoy relates to the qoq rates of change, there is a relationship between the revisions to the yoy and qoq rates of change for a given release. A revision to the yoy rate of change roughly corresponds to a weighted sum of the revisions to the four qoq rates of change (between quarter t and quarter t-4) implicit in the vintage of quarter t. Most of the analysis conducted in section 3 focuses on the rates of change in volume terms but revisions to the deflators are also briefly discussed in subsection 3.4.

3. Revisions

3.1 GDP

3.1.1 First estimate and following estimates up to one year

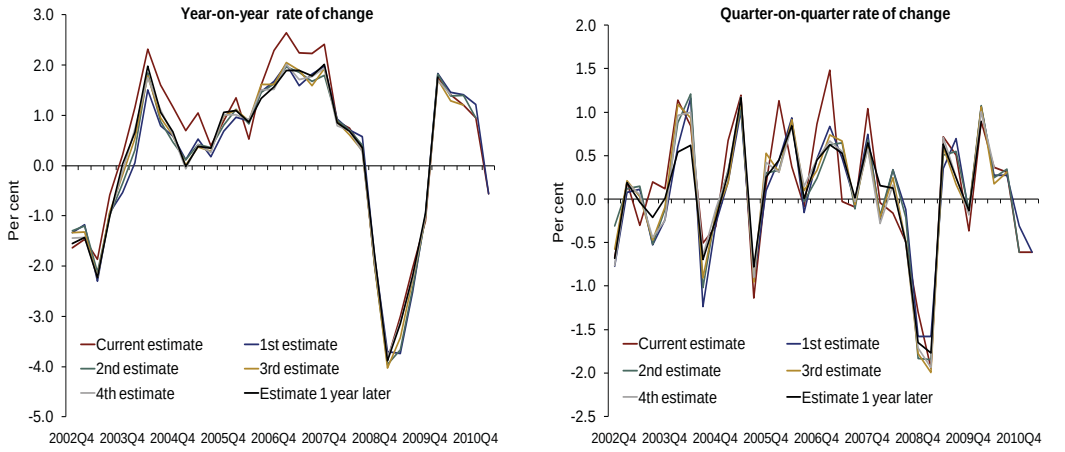
Chart 1 shows the yoy and qoq rates of change of GDP, in volume terms, implicit in the first estimate of each quarter as well as in the following estimates up to one year after the first estimate. The chart also includes the rates of change according to the latest release, that is, the last vintage used in this study. One can see that the various estimates show a very similar evolution, which translates into a high correlation coefficient between them. When comparing the latest version (current estimate) with the estimates released up to one year after the first estimate, there are some noteworthy differences, particularly for the period prior to 2007. However, it should be remembered that, as mentioned above, the differences between the latest version and the first estimate reflect a revision time frame which is not comparable across different quarters. In particular, the *INE* has conducted base changes[3] accompanied by revisions of the entire series which may have had greater impact in more remote quarters, whereas the quarterly estimates for the period after 2008 are still not subject to any annual constraint, as the latest year for which there are ANA is 2008. Given the different nature of the revisions and in order to analyze relatively comparable revisions, we have chosen to focus the analysis on the revisions up to one year. However, GDP revisions due to the inclusion of the ANA will also be briefly discussed in subsection 3.1.3.

Table 1 presents the main measures concerning the revisions to the rates of change in volume (up to one year after the first estimate) *vis-à-vis* the estimate released in the previous quarter, as well as the accumulated revision after one year.

The mean revision to the first estimate of the yoy growth rate is zero and only marginally positive (0.02 p.p.) in the case of the qoq growth rate. In the remaining revisions, the averages are also close to zero, being after one year 0.08 p.p. in the case of the yoy rate of change and 0.01 p.p. in the case of the qoq rate of change. None of the values obtained for the mean revision is statistically different from zero,

Chart 1

ESTIMATES OF QUARTERLY GDP, IN VOLUME



Source: *INE*.

3 The change to the 2000 base occurred with the release of the 2nd quarter of 2005 and the change to the 2006 base took place with the release of 1st quarter of 2010.

Table 1

DESCRIPTIVE STATISTICS OF REVISIONS TO QUARTELY GDP, IN VOLUME

	Year-on-year rates of change					Quarter-on-quarter rates of change				
	Revisions to 1st estimate	Revisions to 2nd estimate	Revisions to 3rd estimate	Revisions to 4th estimate	Revisions one year later	Revisions to 1st estimate	Revisions to 2nd estimate	Revisions to 3rd estimate	Revisions to 4th estimate	Revisions one year later
Mean	0.00	0.01	0.02	0.02	0.08	0.02	-0.02	0.01	0.00	0.01
Mean absolute revision	0.11	0.10	0.08	0.07	0.20	0.13	0.11	0.08	0.11	0.18
Relative mean absolute revision	0.09	0.07	0.06	0.05	0.15	0.23	0.19	0.14	0.22	0.36
Minimum	-0.26	-0.19	-0.18	-0.17	-0.25	-0.30	-0.37	-0.19	-0.42	-0.55
1st quartile	-0.08	-0.09	-0.07	-0.04	-0.12	-0.08	-0.09	-0.07	-0.07	-0.14
Median	-0.01	-0.01	0.01	0.05	0.00	0.03	-0.01	0.02	-0.01	0.04
3rd quartile	0.08	0.10	0.07	0.07	0.24	0.13	0.09	0.06	0.07	0.15
Maximum	0.33	0.24	0.32	0.23	0.61	0.46	0.22	0.26	0.44	0.54
Standard deviation	0.15	0.12	0.11	0.09	0.25	0.17	0.14	0.10	0.17	0.24
Noise-to-signal ratio	0.09	0.07	0.06	0.05	0.15	0.22	0.18	0.13	0.21	0.30
1st order autocorrelation coefficient	0.28*	0.17	0.17	-0.31*	0.41***	0.11	-0.31*	0.22	0.10	-0.24
Proportion of positive revisions	0.39	0.44	0.55	0.57	0.50	0.61	0.47	0.52	0.43	0.53
Sign concordance	1.00	1.00	0.97	0.97	0.93	1.00	0.97	1.00	0.87	0.83
Direction concordance	1.00	0.97	0.97	0.93	0.97	0.91	0.91	0.87	0.90	0.87
Mean squared revision	0.02	0.01	0.01	0.01	0.07	0.03	0.02	0.01	0.03	0.06
UM	0.05	1.21	2.48	6.79	8.38	1.10	2.43	0.41	0.00	0.12
UR	0.02	1.90	14.94	2.78	1.56	0.01	0.14	7.61	26.64	16.10
UD	99.93	96.88	82.57	90.43	90.06	98.89	97.43	91.98	73.36	83.78
Root mean squared revision	0.15	0.12	0.11	0.09	0.26	0.17	0.14	0.10	0.16	0.24

Notes: Revisions to 1st estimate correspond to the revisions between the 1st estimate and the 2nd estimate, revisions to the 2nd are the revisions from the 2nd estimate to the 3rd estimate and so on. Revisions 1 year later correspond to the revisions from the 1st estimate to the 5th estimate (that is, after 1 year). ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

which indicates that there is no bias in the different estimates. In absolute terms, the mean revision is higher in the first revision than in the following revisions, being about 0.2 p.p. after one year for both the yoy and qoq rates of change. The percentage of positive revisions after one year is around 50 percent for both rates, so there is no predominance in terms of the sign of the revisions. Both in terms of sign and acceleration/deceleration, the concordance between the various estimates is quite high, indicating that the evolution is not significantly changed after each revision. From the results obtained for both the standard deviation and the noise-to-signal ratio, one can conclude that the volatility of GDP revisions is relatively low. Furthermore, the various revisions are, in general, weakly autocorrelated. The mean squared revision is low in both cases and the revisions are "well behaved" given the high weight of the UD component, indicating no systematic pattern. In summary, the revisions to the GDP quarterly growth rates are not significant and do not present any undesirable properties based on the results obtained with the measures commonly used in this type of analysis.

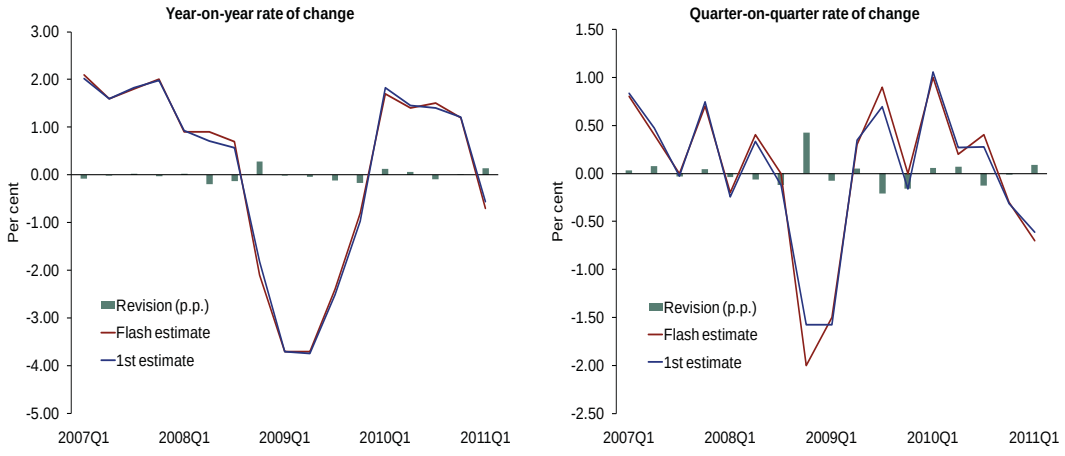
3.1.2 Flash estimate

In this section, we analyze the revisions to the flash estimate after the release of the first estimate of the QNA. Note that the results presented for the flash estimate revisions are not strictly comparable with those presented in the previous section, given the lower number of observations available for evaluation. Moreover, since the sample period is relatively short, these results should be interpreted with additional caution.

Chart 2 shows the GDP yoy and qoq rates of change, in volume, implicit in the flash estimate for each quarter, and the subsequent estimate, *i.e.*, the first estimate. There is a high correlation between the two estimates, recording a correlation coefficient close to 1 both for the yoy and qoq rates of change. The largest revision in both cases occurred in the 4th quarter of 2008 (around 0.3 and 0.4 p.p. for the yoy and qoq rates of change, respectively) at the time of the revision of several short-term indicators as result of a base change and the adoption of the new classification of economic activities (NACE rev. 3). The mean revision is approximately zero in both cases and the absolute mean is about 0.1 p.p. (Table 2). The revisions to the flash estimate present a standard deviation and a noise-to-signal ratio relatively low. Overall, the results point to a high information content of the flash estimate concerning the first estimate.

Chart 2

FLASH ESTIMATE OF QUARTELY GDP, IN VOLUME



Source: *INE*.

Table 2

DESCRIPTIVE STATISTICS OF REVISIONS TO THE FLASH ESTIMATE		
	Year-on-year rate of change	Quarter-on-quarter rate of change
Mean	-0.01	0.00
Mean absolute revision	0.09	0.10
Relative mean absolute revision	0.05	0.17
Minimum	-0.19	-0.21
1st quartile	-0.09	-0.08
Median	-0.01	-0.01
3rd quartile	0.03	0.06
Maximum	0.28	0.42
Standard deviation	0.12	0.14
Noise-to-signal	0.06	0.16
1st order autocorrelation coefficient	-0.07	-0.22
Proportion of positive revisions	0.41	0.47
Sign concordance	1.00	0.82
Direction concordance	0.82	1.00
Mean squared revision	0.01	0.02
UM	0.87	0.00
UR	0.77	22.75
UD	98.36	77.25
Root mean squared revision	0.12	0.14

3.1.3 Revisions due to the inclusion of the ANA

When *INE* releases the first estimate for the last quarter of each year, it is implicitly provided the first estimate for the annual GDP of the corresponding year (the annual preliminary estimate which results from the aggregation of the quarterly values). With the publication of the ANA, the QNA are revised so as to reflect these annual values. These revisions have a different nature from those resulting from the mere update of the associated indicators because they reflect an information set substantially wider, resorting to statistical sources only available on an annual frequency. We analyze the impact of the inclusion of the ANA on the QNA estimates. The ANA for the period from 2002 up to 2008, which is the latest year available at the time this article was done, were released with a lag of 4 to 10 quarters (Table 3) after the release of the fourth quarter of the respective year (and corresponding annual preliminary estimate).

In Chart 3, we present the revisions to the yoy rate of change of the 4 quarters of each year due to the inclusion of the ANA.[4] We analyze two types of revisions: i) *vis-à-vis* the immediately preceding publication and ii) *vis-à-vis* the first estimate of the last quarter of the respective year (and corresponding annual preliminary estimate).

In general, the inclusion of the ANA implies larger revisions than those observed up to one year after the first estimate. In the case of GDP, the years 2004, 2005 and 2007 were characterized by a substantial revision of the rates of change of the QNA after the release of the respective annual accounts. It should be noted that 2004 and 2007 correspond to years of base change, with several methodological changes in the annual accounts, which may explain the larger impact in terms of revisions. For the average of the quarters of 2007, the GDP growth rate was revised by around 0.5 p.p. with the inclusion of the ANA, *vis-à-vis* both the previous release and the release by the first time of the fourth quarter of that year. For 2004 and 2005, the average revisions were about 0.5 and 0.6 p.p. respectively, when compared with the yoy rates of change implicit in the annual preliminary estimate of the respective year and 0.2 p.p. in both years *vis-à-vis* the release of the QNA immediately preceding the disclosure of the ANA. In general, the revisions *vis-à-vis* the immediately preceding release are smaller than those recorded *vis-à-vis* the annual preliminary estimate, which suggests a convergence of the QNA over time to the annual values to be released under the ANA.

4 For the years 2002 and 2003, the ANA were published with a provisional nature due to the expected change to the 2000 base.

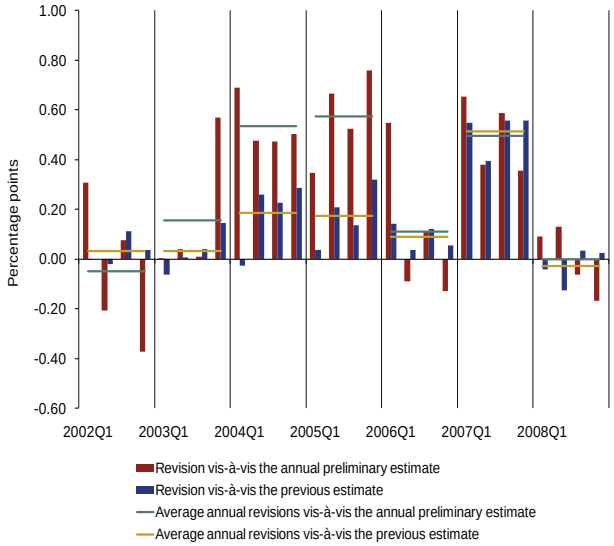
Table 3

RELEASE CALENDAR OF ANNUAL NATIONAL ACCOUNTS (ANA)

Reference year	First release of QNA after ANA release	Lag *vis-à-vis* the release of the 4th quarter of the corresponding year (in quarters)
2002	Q3 2004	7
2003	Q4 2004	4
2004	Q2 2007	10
2005	Q4 2007	8
2006	Q2 2008	6
2007	Q1 2010	9
2008	Q1 2011	9

Chart 3

REVISIONS DUE TO THE INCLUSION OF ANNUAL NATIONAL ACCOUNTS



3.2 Expenditure components

For the sake of the exposition that follows and because the findings are qualitatively similar for the qoq rates of change, the discussion of the results concerning revisions will focus on the yoy rates of change, most commonly used in the short-term economic analysis in Portugal. The results for the yoy and qoq rates of change, in volume, are shown in Tables 4 and 5, respectively. In these tables, we report the statistical measures for the revisions to the first estimate, *i.e.*, the first revision which the values of GDP components are subject to and for the revisions accumulated after one year. It should be noted that the findings are also similar for these two types of revision so no distinction will be done when analyzing the results.

In general, GDP components present a positive mean revision although not statistically different from zero.[5] However, the mean revision after one year is higher than that observed in the case of the first revision indicating that the revisions do not cancel out over time. In terms of mean absolute revision, most components record a higher value than that of GDP. Only private consumption and the contribution of changes in inventories to GDP growth have a slightly lower value. Among the components which

5 The case of the revisions accumulated after one year regarding imports is an exception, with a significance level of 5 per cent.

Table 4

REVISIONS TO THE YEAR-ON-YEAR RATES OF CHANGE, IN VOLUME

	Mean	Mean absolute revision	Relative mean absolute revision	Standard deviation	Noise-to-signal ratio	Proportion of positive revisions	Sign concordance	Direction concordance	Mean squared revision	UM	UR	UD	Root mean squared revision
Revisions to the 1st estimate													
GDP	0.00	0.11	0.09	0.15	0.09	0.39	1.00	1.00	0.02	0.05	0.02	99.93	0.15
Private consumption	0.03	0.09	0.06	0.11	0.08	0.61	1.00	1.00	0.01	6.25	1.53	92.23	0.11
Public consumption	0.06	0.56	0.45	0.92	0.51	0.64	0.94	0.94	0.83	0.43	15.96	83.60	0.91
GFCF	0.15	0.61	0.12	0.98	0.20	0.52	0.94	0.94	0.95	2.28	3.22	94.50	0.97
GFCF machinery	0.25	1.13	0.20	1.40	0.17	0.52	0.94	0.94	1.95	3.24	0.00	96.76	1.40
GFCF transport equipment	1.07	2.17	0.16	6.36	0.48	0.55	0.94	0.91	40.41	2.81	0.63	96.56	6.36
GFCF construction	-0.02	0.44	0.07	0.70	0.17	0.39	1.00	0.94	0.47	0.07	14.78	85.15	0.69
GFCF other	0.04	0.85	0.23	1.10	0.32	0.58	0.91	0.85	1.17	0.11	6.14	93.74	1.08
Change in inventories[(a)]	-0.01	0.08	0.22	0.14	0.29	0.55	0.91	0.91	0.02	0.28	10.66	89.06	0.14
Exports	0.18	0.67	0.11	0.88	0.12	0.67	0.91	0.97	0.79	3.91	7.19	88.91	0.89
Imports	0.37	1.00	0.20	1.38	0.22	0.61	0.94	1.00	1.99	6.94	29.85	63.22	1.41
GVA	0.05*	0.14	0.12	0.18	0.10	0.55	0.94	0.91	0.03	8.91	7.08	84.01	0.18
Agriculture, forestry and fishing	-0.09	1.39	0.37	1.73	0.44	0.48	0.94	0.97	2.90	0.26	3.62	96.13	1.70
Industry	0.01	0.26	0.10	0.43	0.11	0.58	1.00	0.94	0.18	0.03	4.54	95.43	0.43
Energy, water supply and sewerage	0.13	0.54	0.16	0.95	0.22	0.52	1.00	0.97	0.90	1.81	1.61	96.58	0.95
Construction	0.00	0.41	0.07	0.65	0.15	0.36	1.00	0.91	0.41	0.01	12.90	87.09	0.64
Trade, hotels and restaurants	-0.04	0.12	0.07	0.18	0.08	0.30	1.00	0.94	0.03	5.60	13.83	80.57	0.18
Transportations and communications	-0.03	0.41	0.17	0.66	0.17	0.52	1.00	0.91	0.42	0.21	7.51	92.28	0.65
Financial, insurance and real estate	0.10	0.85	0.31	1.29	0.76	0.58	0.91	0.88	1.63	0.61	27.37	72.02	1.28
Other services	0.08	0.31	0.33	0.49	0.43	0.61	0.88	0.88	0.24	2.64	10.00	87.36	0.49
Revisions one year later													
GDP	0.08	0.20	0.15	0.25	0.15	0.50	0.93	0.97	0.07	8.38	1.56	90.06	0.26
Private consumption	0.07	0.19	0.12	0.23	0.15	0.57	1.00	0.93	0.06	8.99	0.56	90.45	0.24
Public consumption	0.49*	0.91	0.63	1.01	0.61	0.70	0.90	0.87	1.24	19.72	3.25	77.03	1.11
GFCF	0.22	0.94	0.19	1.36	0.27	0.47	1.00	0.93	1.83	2.70	5.31	91.99	1.35
GFCF machinery	0.47	1.61	0.31	1.87	0.25	0.53	0.97	0.80	3.60	6.01	0.76	93.23	1.90
GFCF transport material	0.85	3.51	0.25	7.94	0.59	0.53	0.93	0.97	61.62	1.18	0.34	98.48	7.85
GFCF construction	0.07	0.64	0.10	0.97	0.23	0.43	1.00	0.93	0.91	0.49	11.80	87.71	0.95
GFCF other	0.74	1.87	0.53	2.93	0.83	0.57	0.83	0.87	8.83	6.27	10.29	83.44	2.97
Change in inventories[(a)]	0.01	0.17	0.43	0.27	0.54	0.53	0.90	0.90	0.07	0.15	15.03	84.82	0.27
Exports	0.41	0.94	0.16	1.16	0.15	0.83	0.90	1.00	1.47	11.38	2.23	86.40	1.21
Imports	0.72**	1.28	0.25	1.49	0.23	0.67	0.97	0.97	2.66	19.69	15.61	64.70	1.63
GVA	0.17**	0.27	0.20	0.33	0.19	0.70	0.87	0.97	0.14	21.28	5.09	73.62	0.37
Agriculture, forestry and fishing	-0.13	2.71	0.61	3.24	0.79	0.53	0.80	0.90	10.16	0.15	1.51	98.34	3.19
Industry	-0.36	0.68	0.22	1.08	0.26	0.37	0.97	0.97	1.25	10.38	53.83	35.79	1.12
Energy, water supply and sewerage	1.25**	1.78	0.46	2.04	0.45	0.77	0.97	0.77	5.61	28.08	15.79	56.13	2.37
Construction	0.25	0.79	0.13	1.20	0.26	0.50	1.00	0.90	1.45	4.21	8.26	87.53	1.21
Trade, hotels and restaurants	-0.10	0.37	0.25	0.55	0.26	0.37	0.93	0.93	0.31	3.55	12.43	84.01	0.56
Transportations and communications	0.11	0.63	0.25	0.87	0.21	0.60	0.97	0.80	0.74	1.67	0.00	98.33	0.86
Financial, insurance and real estate	-0.15	1.66	0.60	2.41	1.39	0.53	0.80	0.63	5.64	0.39	36.67	62.94	2.37
Other services	0.41*	0.61	0.61	0.90	0.80	0.73	0.77	0.67	0.96	17.52	30.63	51.85	0.98

Notes: (a) Contribution to GDP rate of change. ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

Table 5

REVISIONS TO THE QUARTER-ON-QUARTER RATES OF CHANGE, IN VOLUME

	Mean	Mean absolute revision	Relative mean absolute revision	Standard deviation	Noise-to-signal ratio	Proportion of positive revisions	Sign concordance	Direction concordance	Mean squared revision	UM	UR	UD	Root mean squared revision
Revisions to the 1st estimate													
GDP	0.02	0.13	0.23	0.17	0.22	0.61	1.00	0.91	0.03	1.10	0.01	98.89	0.17
Private consumption	-0.03	0.13	0.23	0.18	0.25	0.48	0.85	0.85	0.03	2.35	13.06	84.59	0.18
Public consumption	0.05	0.28	0.37	0.49	0.35	0.64	0.82	0.91	0.23	0.94	8.24	90.81	0.48
GFCF	0.20	0.61	0.26	0.93	0.38	0.52	0.94	0.91	0.88	4.46	14.87	80.67	0.94
GFCF machinery	0.09	1.22	0.36	1.80	0.37	0.52	0.88	0.94	3.13	0.25	0.70	99.06	1.77
GFCF transport equipment	1.23	3.37	0.37	6.87	0.80	0.67	0.88	0.94	47.24	3.20	2.99	93.80	6.87
GFCF construction	0.07	0.45	0.16	0.69	0.27	0.52	0.94	0.97	0.46	1.16	18.41	80.42	0.68
GFCF other	0.07	0.62	0.38	0.81	0.84	0.55	0.82	0.91	0.65	0.79	6.81	92.39	0.80
Change in inventories[(a)]	0.05	0.13	0.36	0.21	0.55	0.67	0.97	0.88	0.05	4.83	16.32	78.85	0.21
Exports	0.21*	0.57	0.25	0.72	0.21	0.64	0.91	0.94	0.55	7.81	8.53	83.66	0.74
Imports	0.30	0.74	0.29	1.15	0.33	0.67	0.94	0.94	1.38	6.63	36.73	56.64	1.17
GVA	-0.04	0.16	0.33	0.21	0.29	0.42	0.88	0.91	0.04	3.22	1.91	94.87	0.21
Agriculture, forestry and fishing	-0.01	0.59	0.48	0.81	0.57	0.45	0.85	0.94	0.64	0.01	9.25	90.74	0.80
Industry	-0.10	0.38	0.30	0.49	0.25	0.45	0.94	0.91	0.24	4.28	3.89	91.83	0.49
Energy, water supply and sewerage	0.00	0.25	0.23	0.44	0.28	0.45	0.85	0.91	0.18	0.00	0.21	99.78	0.43
Construction	-0.05	0.54	0.20	0.82	0.31	0.48	0.94	0.91	0.66	0.44	15.17	84.39	0.81
Trade, hotels and restaurants	-0.07	0.20	0.26	0.26	0.26	0.45	0.88	0.91	0.07	6.09	18.84	75.08	0.27
Transportations and communications	-0.07	0.42	0.32	0.55	0.37	0.48	0.88	0.85	0.30	1.67	2.52	95.81	0.55
Financial, insurance and real estate	-0.25*	0.73	0.61	1.02	1.05	0.52	0.82	0.88	1.08	5.75	21.40	72.85	1.04
Other services	0.01	0.23	0.85	0.32	0.68	0.58	0.79	0.76	0.10	0.09	25.35	74.55	0.32
Revisions one year later													
GDP	0.01	0.18	0.36	0.24	0.30	0.53	0.83	0.87	0.06	0.12	16.10	83.78	0.24
Private consumption	0.04	0.21	0.31	0.24	0.32	0.57	1.00	0.83	0.06	2.09	17.60	80.31	0.24
Public consumption	0.18	0.39	0.98	0.50	0.74	0.67	0.70	0.63	0.27	11.59	29.95	58.46	0.52
GFCF	0.11	0.84	0.38	1.17	0.47	0.53	0.93	0.97	1.35	0.91	39.19	59.90	1.16
GFCF machinery	0.18	1.76	0.55	2.23	0.47	0.47	0.80	0.83	4.86	0.65	6.13	93.22	2.20
GFCF transport material	0.53	4.65	0.51	8.03	0.92	0.57	0.83	0.90	62.59	0.44	12.90	86.66	7.91
GFCF construction	0.00	0.79	0.29	1.07	0.43	0.43	0.90	0.87	1.11	0.00	39.11	60.89	1.05
GFCF other	0.06	0.99	0.63	1.31	1.31	0.43	0.90	0.83	1.67	0.25	24.09	75.66	1.29
Change in inventories[(a)]	0.04	0.18	0.56	0.28	0.71	0.47	0.90	0.87	0.08	2.59	27.42	69.99	0.27
Exports	0.25	0.62	0.27	0.75	0.22	0.70	0.80	0.93	0.60	10.17	0.00	89.83	0.77
Imports	0.48*	0.92	0.38	1.15	0.32	0.70	0.90	0.93	1.51	15.02	27.71	57.27	1.23
GVA	0.07	0.24	0.46	0.29	0.40	0.67	0.97	0.90	0.09	4.98	11.04	83.98	0.29
Agriculture, forestry and fishing	-0.09	1.16	0.85	1.45	0.97	0.47	0.77	0.83	2.03	0.41	9.29	90.30	1.43
Industry	-0.08	0.54	0.42	0.66	0.33	0.33	0.87	0.83	0.43	1.60	7.79	90.61	0.66
Energy, water supply and sewerage	0.06	0.68	0.67	0.94	0.59	0.47	0.73	0.77	0.86	0.48	35.91	63.61	0.93
Construction	-0.07	0.96	0.35	1.28	0.48	0.43	0.93	0.80	1.60	0.28	16.05	83.67	1.26
Trade, hotels and restaurants	-0.04	0.37	0.48	0.48	0.46	0.47	0.87	0.83	0.22	0.89	28.68	70.43	0.47
Transportations and communications	0.05	0.98	0.74	1.17	0.76	0.53	0.73	0.77	1.33	0.18	12.80	87.02	1.15
Financial, insurance and real estate	0.10	1.42	1.12	1.88	1.92	0.50	0.73	0.63	3.43	0.31	58.29	41.40	1.85
Other services	0.14*	0.32	1.00	0.42	0.97	0.67	0.67	0.60	0.19	9.91	42.64	47.45	0.43

Notes: (a) Contribution to GDP rate of change. ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

have a higher mean absolute revision, one should highlight the items related to external trade, with imports being more revised than exports.[6] It should be noted that in terms of GFCF, the most revised item is GFCF in transport equipment, probably reflecting the difficulty in estimating the GFCF non-auto transport equipment (*i.e.*, ships, railways and aircrafts), with the external trade statistics as the main source of information.

In terms of the proportion of positive revisions, it should be mentioned the cases of both private and public consumption as well as exports and imports with values clearly above 50 percent. For example, the percentage of times that exports is revised upwards after a quarter is 67 per cent and rises to 83 per cent after one year. All expenditure components present a rather high concordance (usually above 90 per cent) both in sign and direction (acceleration/deceleration).

Regarding the volatility of the revisions, the components that register the highest values in terms of standard deviation are GFCF (especially transport equipment), exports and imports. However, considering the noise-to-signal ratio, which takes into account the variability of the variables, these components register relatively low values. It should be noted that in terms of the main aggregates, public consumption is the variable that has a higher noise-to-signal ratio.

Concerning the decomposition of the MSR, this indicator suggests that revisions have a "good" behaviour, in terms of mean and correlation between the estimates, in most GDP components. The residual component UD is clearly predominant, suggesting that the revisions do not present a systematic pattern. In particular, imports have the lowest UD, that is, the "worst" performance.

Given that GDP is generally less revised than its components, it becomes interesting to analyze whether the revisions between the various components are correlated or not. In fact, the existence of a significant correlation between revisions may indicate common sources of revision. Table 6 presents the correlations between the revisions to the first estimate of the main expenditure components, for both the yoy and qoq rates of change. We find the presence of significant and positive correlations (with a significance level of 5 per cent) between the revisions of imports and those of the other expenditure components. In fact, it is natural that a revision of imports is also reflected in other variables of the expenditure particularly in those whose estimation is done using imports based indicators. For example, in the case of the revi-

Table 6

CORRELATION MATRIX BETWEEN REVISIONS TO FIRST ESTIMATES OF GDP COMPONENTS

YEAR-ON-YEAR RATES OF CHANGE, IN VOLUME						
	Private consumption	Public consumption	GFCF	Change in inventories	Exports	Imports
Private consumption	1.00					
Public consumption	0.03	1.00				
GFCF	0.20	0.27	1.00			
Change in inventories[(a)]	0.17	0.33*	0.36*	1.00		
Exports	0.32*	0.33*	0.22	0.13	1.00	
Imports	0.45**	0.56***	0.71***	0.34*	0.66***	1.00
QUARTER-ON-QUARTER RATES OF CHANGE, IN VOLUME						
	Private consumption	Public consumption	GFCF	Change in inventories	Exports	Imports
Private consumption	1.00					
Public consumption	0.30	1.00				
GFCF	-0.09	0.28	1.00			
Change in inventories[(a)]	0.04	0.09	-0.22	1.00		
Exports	0.11	0.40**	0.00	0.30	1.00	
Imports	0.37**	0.69***	0.48	0.42**	0.62***	1.00

Notes: (a) Contribution to GDP rate of change. ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

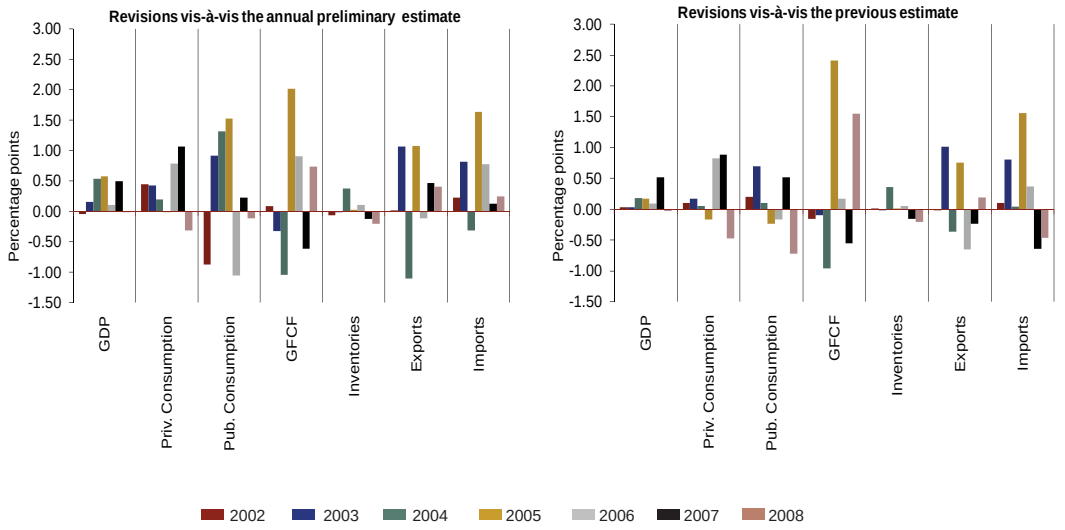
6 Cardoso and Duarte (2009) studied the revisions to nominal exports and imports of goods on a monthly basis, concluding that imports are more revised than exports, being positive and statistically significant in both cases.

sions to the yoy rate of change, the GFCF is the component most highly correlated with imports (0.71). Thus, in spite of imports being significantly revised this does not translate into substantial revisions of GDP since part of these revisions is accommodated by revising the remaining expenditure components.

With regard to revisions arising from the inclusion of the ANA, one can conclude that the mean revision for each expenditure component is positive, similar to what happens to GDP, *vis-à-vis* both the annual preliminary estimate and the immediately preceding released estimate (Chart 4). In general, the mean revision *vis-à-vis* the annual preliminary estimate is higher than that recorded over the preceding estimate. In absolute average terms, the component that has the highest value *vis-à-vis* the annual preliminary estimate is public consumption while GFCF is the most revised item *vis-à-vis* the immediately preceding estimate.

Chart 4

REVISIONS TO GDP COMPONENTS DUE TO THE INCLUSION OF ANNUAL NATIONAL ACCOUNTS | IN ANNUAL TERMS AND IN VOLUME



3.3. GVA by branches of activity

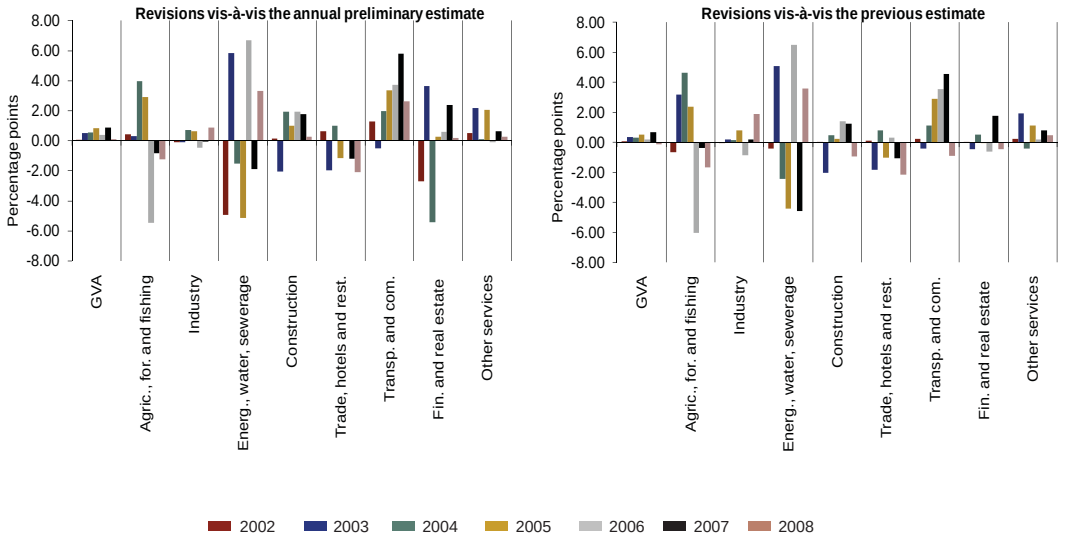
In what concerns the GVA and its breakdown, the analysis of revisions is affected by some additional problems. On the one hand, from the release of the 4th quarter of 2005 onwards, intermediate consumption of FISIM is broken down by the different branches of activity, rather than being imputed to a single fictitious branch (and being deducted from the sum of the value added of all sectors of activity). Naturally, this change may have resulted in larger revisions in the quarter of the methodological change, potentially affecting the results. However, it should be noted that this only influences one observation in each series of revisions. On the other hand, the change to the 2006 base occurred simultaneously with the adoption of the new classification of economic activities (CAE Rev. 3) which led to a reformulation of the breakdown of the GVA by branch of activity in the QNA from the 1st quarter of 2010 onwards. Although the designations do not always coincide exactly with those of previous series (the designations herein presented refer to the current ones), we tried to ensure intertemporal comparability. As in the previous case, this change only affects the value of the revisions for one quarter so the impact should be relatively limited.

Regarding GVA as a whole, it is more revised than GDP, both in terms of mean and absolute mean revisions (Table 4). In addition, the GVA also presents a worse behaviour according to most of the other measures. In terms of breakdown of GVA, the components subject to larger revisions include the branches "agriculture, forestry and fishing," "energy, water supply and sewerage" and "financial and

real estate activities". Concerning the inclusion of the ANA, in terms of mean absolute revisions, the magnitude of the revisions *vis-à-vis* the annual preliminary estimate is similar to that recorded *vis-à-vis* the immediately preceding estimate which indicates that there is not a convergence to the ANA over time, unlike the observed for the expenditure components (Chart 5). It should also be noted that the size of the revisions is substantially larger for the supply side components than for expenditure items. Overall, the results suggest that the statistics for the supply side are more fragile, in terms of revisions, than those for the expenditure side.

Chart 5

REVISIONS TO GVA BY BRANCHES OF ACTIVITY DUE TO INCLUSION OF ANNUAL NATIONAL ACCOUNTS | IN ANNUAL TERMS AND IN VOLUME



3.4. Deflators

Tables 7 and 8 present the main statistical measures concerning revisions to the yoy and qoq rates of change of the QNA implicit deflators, respectively. In general, the mean revisions for GDP and expenditure components are relatively small and not statistically different from zero. For GDP, the average of the first revision to the yoy rate of change of the deflator is nil and the average revision after one year is 0.07 p.p. In terms of absolute revisions, the less revised component is private consumption, which is related to the fact that CPI (which is the main source of information for calculating the private consumption deflator) is not revised. The most revised components are public consumption and gross fixed capital formation. In terms of GFCF components, the deflators of GFCF in machinery and transport equipment are substantially more revised than that of GFCF in construction. One should note that the rates of change of exports and imports deflators are less revised than the corresponding rates of change in volume, suggesting that revisions to nominal values of external trade are reflected more in volume than in prices. Concerning volatility, public consumption is the variable that has a larger noise-to-signal ratio. GFCF also presents a relatively high volatility, particularly in the components of machinery and transport equipment. In turn, the noise-to-signal ratio of exports and imports is very small (and even below the one for GDP), *i.e.*, taking into account the volatility of external trade deflators, the respective volatility of the revisions is relatively low. Considering the decomposition of the mean squared revision, the percentage of the residual component of the revisions is, in general, high, suggesting there is no systematic pattern of revisions. The high percentage of concordance in terms of sign and direction of rates of change suggest that the first estimate is informative about the evolution of the deflators.

By components of the GVA, "agriculture, forestry and fishing" is the one with the most significant revisions both in terms of size and volatility. In contrast, the branch of activity less subject to revisions is "trade, hotels and restaurants", which probably relates to the fact of the calculation of the deflator being very dependent on information associated to CPI.

4. Conclusions

In this article, we evaluated the real-time behavior of the QNA in Portugal over the last decade. In particular, we analyzed the different estimates for the rate of change in volume of GDP, including the flash estimate, as well as the impact of the inclusion of the ANA. It is possible to conclude that both the flash and the first estimates of GDP are not subject to significant revisions in subsequent estimates, although they may be subject to larger revisions when the ANA are released.

The analysis of the revisions to the rates of change in volume also comprises the main components of GDP as well as the GVA and the corresponding breakdown by branches of activity. In terms of expenditure components, we find that the items associated to external trade present larger revisions, with imports being more revised than exports. However, the existence of significant and positive correlations between imports and the remaining expenditure components mitigates the impact on GDP in terms of revisions. Regarding the supply side, the GVA is more revised than GDP and the data by branches of activity presents a more fragile nature than that of the expenditure side.

Table 7

REVISIONS TO THE YEAR-ON-YEAR RATES OF CHANGE OF DEFLATORS

	Mean	Mean absolute revision	Relative mean absolute revision	Standard deviation	Noise-to-signal ratio	Proportion of positive revisions	Sign concordance	Direction concordance	Mean squared revision	UM	UR	UD	Root mean squared revision
Revisions to the 1st estimate													
GDP	0.00	0.18	0.08	0.26	0.26	0.58	1.00	0.82	0.07	0.00	2.09	97.91	0.26
Private consumption	0.00	0.07	0.03	0.10	0.05	0.52	1.00	1.00	0.01	0.09	20.46	79.44	0.10
Public consumption	-0.10	0.58	0.24	0.88	0.60	0.45	0.97	0.88	0.76	1.44	7.72	90.84	0.87
GFCF	-0.01	0.49	0.23	0.62	0.32	0.42	0.97	0.85	0.37	0.04	0.43	99.53	0.61
GFCF machinery	0.07	1.17	0.37	1.57	0.57	0.55	0.94	0.79	2.41	0.23	1.87	97.90	1.55
GFCF transport equipment	0.01	0.96	0.50	1.29	0.79	0.52	0.88	0.91	1.62	0.00	11.94	88.06	1.27
GFCF construction	-0.03	0.27	0.07	0.42	0.18	0.42	1.00	0.94	0.17	0.60	0.75	98.65	0.42
GFCF other	0.22	0.33	0.11	1.00	1.13	0.64	1.00	0.88	1.02	4.73	0.36	94.92	1.01
Exports	0.06	0.29	0.09	0.39	0.13	0.52	0.97	0.94	0.15	2.44	0.69	96.87	0.39
Imports	0.06	0.44	0.11	0.56	0.12	0.55	0.97	0.91	0.31	1.05	9.78	89.17	0.56
GVA	-0.09	0.26	0.11	0.43	0.51	0.39	1.00	0.94	0.19	4.81	3.45	91.73	0.43
Agriculture, forestry and fishing	-0.53	2.08	0.63	2.84	1.08	0.48	0.73	0.82	8.11	3.44	3.45	93.11	2.85
Industry	-0.17*	0.40	0.15	0.48	0.30	0.39	0.97	0.85	0.25	11.57	11.30	77.12	0.50
Energy, water supply and sewerage	-0.21	0.52	0.19	1.23	0.23	0.45	0.94	0.82	1.50	2.93	1.28	95.79	1.22
Construction	-0.02	0.29	0.07	0.45	0.15	0.45	1.00	0.85	0.19	0.32	4.10	95.58	0.44
Trade, hotels and restaurants	0.03	0.13	0.05	0.21	0.19	0.64	1.00	0.88	0.04	2.43	25.88	71.69	0.21
Transportations and communications	-0.02	0.21	0.20	0.40	0.17	0.61	0.97	1.00	0.16	0.16	6.81	93.03	0.39
Financial, insurance and real estate	-0.03	0.64	0.29	0.98	0.38	0.61	0.88	0.88	0.93	0.08	3.39	96.52	0.97
Other services	-0.04	0.45	0.16	0.76	0.49	0.61	0.97	0.85	0.57	0.34	4.59	95.07	0.75
Revisions one year later													
GDP	0.07	0.32	0.14	0.38	0.39	0.63	0.93	0.80	0.14	3.20	5.06	91.75	0.38
Private consumption	-0.05	0.17	0.06	0.28	0.15	0.57	1.00	0.97	0.08	3.60	60.17	36.23	0.28
Public consumption	0.09	0.74	0.28	0.84	0.93	0.60	1.00	0.70	0.69	1.13	29.29	69.58	0.83
GFCF	0.23	0.67	0.30	0.79	0.40	0.63	0.93	0.80	0.66	7.68	0.60	91.72	0.81
GFCF machinery	0.57	1.84	0.65	2.22	0.79	0.53	0.90	0.77	5.08	6.50	8.34	85.16	2.25
GFCF transport material	-0.27	1.09	0.52	1.36	0.80	0.37	0.83	0.83	1.85	4.03	14.16	81.81	1.36
GFCF construction	0.06	0.33	0.09	0.47	0.20	0.60	1.00	0.87	0.22	1.74	2.97	95.30	0.47
GFCF other	1.03**	1.09	0.27	1.65	2.05	0.73	1.00	0.73	3.70	28.87	0.29	70.85	1.92
Exports	0.03	0.38	0.12	0.48	0.17	0.60	0.97	0.93	0.22	0.33	3.70	95.97	0.47
Imports	0.08	0.45	0.11	0.59	0.13	0.50	0.97	0.93	0.34	2.04	5.94	92.03	0.59
GVA	-0.11	0.29	0.12	0.37	0.52	0.43	1.00	0.70	0.14	8.94	29.05	62.00	0.38
Agriculture, forestry and fishing	-1.46	3.14	0.81	3.80	1.61	0.40	0.70	0.60	16.10	13.21	9.35	77.44	4.01
Industry	-0.37	1.04	0.42	1.24	0.74	0.30	0.97	0.77	1.62	8.56	16.55	74.90	1.27
Energy, water supply and sewerage	0.12	2.21	0.66	2.84	0.52	0.50	0.73	0.67	7.81	0.18	0.02	99.80	2.79
Construction	-0.03	0.40	0.11	0.59	0.20	0.47	1.00	0.77	0.34	0.27	1.15	98.59	0.58
Trade, hotels and restaurants	0.10	0.33	0.12	0.42	0.36	0.50	1.00	0.80	0.18	5.73	52.73	41.54	0.43
Transportations and communications	0.01	0.51	0.52	0.71	0.30	0.63	0.90	0.83	0.49	0.02	48.64	51.33	0.70
Financial, insurance and real estate	0.06	1.25	0.52	1.64	0.62	0.43	0.80	0.80	2.59	0.13	5.14	94.73	1.61
Other services	0.25	0.79	0.25	0.99	0.91	0.70	1.00	0.73	1.01	6.34	49.78	43.88	1.00

Note: ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

Table 8

REVISIONS TO THE QUARTER-ON-QUARTER RATES OF CHANGE OF DEFLATORS

	Mean	Mean absolute revision	Relative mean absolute revision	Standard deviation	Noise-to-signal ratio	Proportion of positive revisions	Sign concordance	Direction concordance	Mean squared revision	UM	UR	UD	Root mean squared revision
Revisions to the 1st estimate													
GDP	-0.04	0.20	0.27	0.29	0.63	0.48	0.91	0.97	0.08	1.84	20.56	77.60	0.29
Private consumption	0.02	0.09	0.14	0.15	0.26	0.61	0.94	0.88	0.02	1.84	3.18	94.97	0.15
Public consumption	-0.07	0.25	0.45	0.34	0.71	0.39	0.94	0.67	0.12	4.15	15.25	80.60	0.34
GFCF	-0.07	0.59	0.53	0.82	0.77	0.45	0.82	0.88	0.65	0.71	4.43	94.86	0.81
GFCF machinery	0.06	1.30	0.51	1.75	0.80	0.52	0.79	0.94	2.97	0.14	5.70	94.16	1.72
GFCF transport equipment	0.13	1.73	0.68	3.02	2.59	0.42	0.88	0.88	8.84	0.19	42.25	57.55	2.97
GFCF construction	-0.10	0.40	0.26	0.81	0.49	0.52	0.94	0.82	0.64	1.41	1.18	97.41	0.80
GFCF other	-0.05	0.31	0.28	0.55	1.80	0.64	0.91	0.85	0.30	0.85	21.44	77.71	0.55
Exports	-0.05	0.45	0.34	0.62	0.55	0.58	0.94	0.91	0.38	0.77	11.47	87.76	0.62
Imports	0.06	0.44	0.28	0.58	0.31	0.48	0.85	0.85	0.33	1.27	10.62	88.10	0.57
GVA	0.03	0.20	0.31	0.26	0.64	0.58	0.94	0.91	0.07	1.69	8.99	89.32	0.26
Agriculture, forestry and fishing	-0.25	0.84	0.88	1.32	1.51	0.45	0.67	0.70	1.74	3.54	50.30	46.16	1.32
Industry	0.21*	0.56	0.40	0.69	0.58	0.61	0.79	0.85	0.51	8.30	1.20	90.50	0.71
Energy, water supply and sewerage	-0.10	0.50	0.43	0.92	0.48	0.61	0.85	0.85	0.82	1.24	11.96	86.80	0.91
Construction	0.10	0.50	0.25	0.89	0.42	0.64	0.91	0.85	0.78	1.27	1.68	97.05	0.88
Trade, hotels and restaurants	0.01	0.23	0.29	0.44	0.65	0.58	0.85	0.97	0.19	0.04	27.36	72.59	0.43
Transportations and communications	0.09	0.27	0.31	0.40	0.28	0.61	0.91	0.97	0.16	5.04	4.15	90.80	0.41
Financial, insurance and real estate	0.15	0.68	0.55	1.06	1.32	0.67	0.79	0.85	1.12	2.06	14.53	83.41	1.06
Other services	-0.02	0.22	0.32	0.31	0.57	0.55	0.91	0.97	0.09	0.38	10.12	89.50	0.30
Revisions one year later													
GDP	0.05	0.34	0.44	0.42	0.99	0.50	0.83	0.90	0.17	1.72	27.15	71.13	0.41
Private consumption	0.00	0.22	0.31	0.32	0.52	0.47	0.93	0.73	0.10	0.00	1.64	98.36	0.31
Public consumption	-0.06	0.34	0.57	0.40	1.25	0.47	0.97	0.47	0.16	1.92	44.00	54.08	0.40
GFCF	0.15	0.75	0.67	1.04	0.94	0.50	0.83	0.77	1.06	2.25	15.34	82.41	1.03
GFCF machinery	0.14	2.06	0.91	2.62	1.20	0.47	0.67	0.93	6.66	0.28	36.34	63.38	2.58
GFCF transport material	0.30	2.88	1.09	4.16	3.64	0.47	0.70	0.77	16.81	0.54	48.06	51.40	4.10
GFCF construction	0.16	0.65	0.41	1.14	0.69	0.50	0.90	0.67	1.29	2.10	3.67	94.23	1.14
GFCF other	0.19	0.74	0.62	1.07	3.43	0.53	0.77	0.80	1.15	3.26	36.84	59.90	1.07
Exports	0.01	0.53	0.42	0.91	0.79	0.47	0.90	0.83	0.81	0.02	27.14	72.84	0.90
Imports	0.01	0.47	0.32	0.65	0.36	0.53	0.87	0.77	0.40	0.02	0.69	99.29	0.63
GVA	-0.01	0.19	0.33	0.25	0.59	0.43	0.93	0.83	0.06	0.31	27.41	72.27	0.24
Agriculture, forestry and fishing	-0.57*	1.30	1.10	1.69	1.94	0.27	0.50	0.47	3.10	10.55	39.38	50.08	1.76
Industry	-0.06	1.02	0.98	1.21	1.06	0.47	0.63	0.73	1.43	0.27	35.97	63.76	1.19
Energy, water supply and sewerage	0.04	1.23	1.02	1.63	0.83	0.57	0.60	0.60	2.57	0.08	43.74	56.18	1.60
Construction	0.11	0.90	0.49	1.39	0.64	0.67	0.77	0.73	1.88	0.62	3.10	96.28	1.37
Trade, hotels and restaurants	0.04	0.44	0.53	0.65	0.94	0.47	0.87	0.83	0.41	0.48	40.31	59.21	0.64
Transportations and communications	-0.07	0.57	0.74	0.68	0.48	0.50	0.73	0.67	0.45	1.13	17.83	81.04	0.67
Financial, insurance and real estate	0.19	0.87	0.77	1.10	1.35	0.60	0.70	0.67	1.21	2.92	18.78	78.30	1.10
Other services	0.02	0.33	0.46	0.43	0.96	0.53	0.87	0.83	0.18	0.31	43.90	55.78	0.42

Note: ***, **, * correspond to a value statistically different from zero with a significance level of 1%, 5% and 10%, respectively.

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