1. INTRODUCTION

In the context of macroeconomic policy and analysis, National Accounts play an extremely important role, offering an overview of economic activity. Their timely, complete and accurate publication is crucial for a large number of users and purposes. They are particularly important for the definition of the fiscal policy by governments, of monetary policy by central banks, and for investment decisions by entrepreneurs; thus, they generally influence the behaviour of the various economic agents.

For reasons of timeliness, statistical data are first released as preliminary, being subsequently revised when new base information becomes available. In addition, part of the revisions is due to methodological changes aimed at following more appropriate technical procedures. As a consequence, revisions are, to a certain extent, inevitable, when trying to produce National Accounts that bring a more accurate understanding of the underlying reality\(^{(1)}\). However, the existence of a systematic pattern in revisions, or a rather high dispersion of the average of these revisions, can be a sign of methodological problems or of basic statistical sources that undermine the usefulness of certain variables.

This paper presents a set of statistics illustrating revisions to the Quarterly National Accounts published by the National Statistical Institute of Portugal (**INE**), which allow for a better assessment of the quality of these accounts.

The study is organised as follows. Section 2 briefly describes the series used and their sample period. Section 3 shows the methodology used to assess revisions. Section 4 discusses the most relevant aspects of the main aggregates of the Quarterly National Accounts as regards the characteristics of revisions to year-on-year rates of change. Finally, Section 5 concludes.

2. DATA

The series used in this study correspond to the main variables of the Quarterly National Accounts published by **INE**. Thus, representative series of the various expenditure and value added components were collected in real time at both constant and current prices.

In an attempt to simulate a real-time database, as had already been done in other countries, by for instance Croushore and Stark (2001) for the US, all publications of the Quarterly National Accounts have been gathered since the beginning of their release in the fourth quarter of 1991. Early publications were in accordance with the European System of Accounts (ESA) 79, and from the second...
quarter of 2000 onwards, they started to be in ac-
cordance with ESA 95. It should be noted that the
number of observations for the ESA 79 format is
low due to a number of interval periods in INE’s
publications. Moreover, the periodicity of publica-
tion of the Quarterly National Accounts decreased
in the fourth quarter of 2002 from 120 to 70 days,
thereby increasing the precarious nature of the ba-
sic information used to calculate the first esti-
mates. Throughout the sample period there were
also minor methodological changes, namely in ex-
ternal trade variables. For the purposes of this
study, the sample period ends in the first quarter
of 2004. These aspects make it difficult to obtain
homogeneous and sufficiently long statistical se-
ries that allow drawing firm conclusions on the re-
visions to Quarterly National Accounts. Thus, the
results shown in this study must be analysed with
greater caution.

3. METHODOLOGY

This paper examines revisions to both
year-on-year rates of change and quarter-on-
quarter rates of change\(^2\), albeit with a greater fo-
cus on the analysis of the results for the former.

Revisions are defined as the difference between
the latest available estimate and the preliminary
estimate for the corresponding rate of change in
each quarter. Thus, the first revision is defined as
the difference between the second and the first es-
timates, the second revision is the difference be-
tween the third and the second estimates and so
on, up to the fourth revision. For example, the first
estimate for the first quarter of 2001 is released for
the first time in the publication for this quarter. In
the second quarter of 2001 a new estimate is pub-
lished for the first quarter – which has already un-
dergone revision – corresponding to the second es-
timate. The first revision corresponds to the differ-
ence between these two estimates. The difference
between the fifth and the first estimate was classi-
fied as year-end revision, as a proxy of the total re-
vision\(^3\). It is thus assumed that the year-end esti-
mate already includes sufficient information to be
rather close to the final estimate. Positive revisions
imply an underestimation of estimates, with pre-
liminary estimates above the latest estimates avail-
able, while negative revisions indicate an overesti-
mation.

The analysis consists of a set of measures aimed
at quantifying the scope and dispersion of revi-
sions as well as other features. To this end, the fol-
loowing measures were calculated: average, aver-
age of absolute values (m(ABS)), modal class, stan-
dard deviation, Noise-Signal ratio, the frequency
of positive revisions and the maximum (Max) and
minimum value (Min) of the revisions observed.

The average is a simple arithmetic mean of the
values observed for revisions. An alternative mea-
sure is the m(ABS), i.e. the average of revisions in
absolute terms. By comparing the average with
m(ABS) it is possible to see whether revisions can-
cel each other out in the case of some variables, i.e.
whether positive revisions are later offset by nega-
tive revisions or vice versa, or if, on the contrary,
they are always revised in the same direction. Still
within the scope of central trend measures, the
modal class was also calculated by considering in-
tervals with an amplitude of one percentage point
that allows ascertaining in which interval revisions
occur more frequently. The standard deviation was
also calculated, so as to allow a better perception
of the dispersion of revisions. However, it does not
denote whether this dispersion is truly significant,
i.e. it does not take into account the dispersion of
the variable itself. The Noise-Signal ratio solves
this question and corresponds to the ratio of the
standard deviation of revisions to the standard de-
viation of the rate of change in the respective vari-
able. The frequency of positive and negative revi-
sions, quantifies the number of times that prelimi-
nary estimates are underestimated or overesti-
mated. The maximum and minimum values help
to assess the dispersion of revisions to the differ-
ent variables, highlighting the higher and lower
historical value recorded in the sample period un-
der consideration.

It would also be interesting to investigate
whether the rate of change influences the revisions
to the respective variables, given that a number of
empirical studies have shown that for some vari-
ables there is pro-cyclicality between revisions and
the respective variable growth, underestimated in

\(^2\) Excluding changes in inventories, which are expressed as a
percentage of GDP.

\(^3\) For the year-end revision, it was possible to consider 19 obser-
vations.
the upward phase and overestimated in the downward phase. In particular, the assumption that there is no correlation between revisions and the business cycle is being tested.

It is also possible to test if the average of revisions is statistically different from zero. With this purpose, use is made of two statistics, depending on whether or not there is an autocorrelation in revisions\(^{(4)}\).

4. RESULTS

The results obtained for revisions to year-on-year rates of change at constant prices of Quarterly National Accounts are shown in Table 1. It is also relevant to analyse revisions to the chain rates of change, since these are subject to greater attention at international level. However, we focused more intensely on year-on-year rates of change, given that in Portugal it is usual to favour the observation of these rates due to the irregular nature of chain rates of change (Charts 1 and 2). This irregularity is strongly influenced by the external component, which has a significant weight on the economy\(^{(5)}\).

i) Frequency of revisions

With regard to the frequency of revisions, reference should be made to external trade items and GFCF, in particular GFCF in metal products and equipment in the group comprising the most revised variables. Preliminary estimates for these variables are subject to a higher number of revisions, judging by the average of absolute values of revisions, similarly to other countries: see, for example, Akritidis (2003) for the United Kingdom and Öller and Hansson (2002) for Sweden. Therefore, since Portugal is a small open economy, the high number of revisions to the external trade components is largely reflected in GDP estimates, given their weight in the latter.

ii) Sign of revisions

The great majority of variables are generally revised upwards, with the exception of GVA in industry and financial intermediation services indirectly measured (FISIM), which indicates an underestimation of preliminary estimates for most items. As for expenditure components, stress should be laid on GFCF in construction and exports, with 79% positive revisions, and on GVA in agriculture, forestry and fishing and GVA in construction, with 84% and 79% respectively.

\(^{(4)}\) According to Symons (2001) and Priestley (1981), if revisions are strongly correlated with the rate of change in the variable, an autocorrelation is to be expected in revisions.

\(^{(5)}\) This excessive volatility associated with the external component does not occur exclusively in the Portuguese case, it is also evident in other quite open European economies, as in the Netherlands, which shows a standard deviation in the chain rate of change in GDP of 0.6 and 11.7 for net external demand, compared with 0.8 and 12.4 in Portugal respectively.
### Table 1
TOTAL YEAR-END REVISION TO THE YEAR-ON-YEAR RATE OF CHANGE (AT CONSTANT PRICES)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>t</th>
<th>t adjusted(a)</th>
<th>m(ABS)</th>
<th>Max</th>
<th>Min</th>
<th>Mode</th>
<th>Standard Deviation</th>
<th>Noise-Signal Ratio</th>
<th>% Positive Revisions</th>
<th>Correlation Coefficient(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-0.08</td>
<td>-0.346</td>
<td>-0.381</td>
<td>0.62</td>
<td>2.60</td>
<td>-2.10</td>
<td>[0.50,0.50]</td>
<td>0.99</td>
<td>0.49</td>
<td>0.53</td>
<td>0.25</td>
</tr>
<tr>
<td>PRIVATE CONSUMPTION</td>
<td>0.06</td>
<td>0.283</td>
<td>0.196</td>
<td>0.51</td>
<td>1.70</td>
<td>-3.10</td>
<td>[0.50,0.50]</td>
<td>0.89</td>
<td>0.43</td>
<td>0.63</td>
<td>0.46**</td>
</tr>
<tr>
<td>COLLECTIVE CONSUMPTION</td>
<td>0.38</td>
<td>1.717</td>
<td>1.291</td>
<td>0.76</td>
<td>2.30</td>
<td>-1.70</td>
<td>[0.50,0.50]</td>
<td>0.96</td>
<td>0.54</td>
<td>0.74</td>
<td>0.32</td>
</tr>
<tr>
<td>GROSS CAPITAL FORMATION</td>
<td>0.39</td>
<td>1.163</td>
<td>1.712</td>
<td>1.11</td>
<td>3.40</td>
<td>-1.80</td>
<td>[0.50,0.50]</td>
<td>1.46</td>
<td>0.21</td>
<td>0.58</td>
<td>0.41*</td>
</tr>
<tr>
<td>GCFC CONSTRUCTION</td>
<td>0.60</td>
<td>2.161**</td>
<td>1.644</td>
<td>0.79</td>
<td>3.90</td>
<td>-1.10</td>
<td>[0.50,0.50]</td>
<td>1.21</td>
<td>0.18</td>
<td>0.79</td>
<td>0.505**</td>
</tr>
<tr>
<td>GCFC METAL P. AND EQUIPMENT</td>
<td>0.15</td>
<td>0.333</td>
<td>0.400</td>
<td>1.20</td>
<td>4.30</td>
<td>-4.50</td>
<td>[0.50,0.50]</td>
<td>1.93</td>
<td>0.21</td>
<td>0.63</td>
<td>0.232</td>
</tr>
<tr>
<td>EXPORTS</td>
<td>0.96</td>
<td>1.623</td>
<td>1.207</td>
<td>1.86</td>
<td>7.00</td>
<td>-4.30</td>
<td>[0.50,1.50]</td>
<td>2.57</td>
<td>0.56</td>
<td>0.79</td>
<td>0.38</td>
</tr>
<tr>
<td>IMPORTS</td>
<td>0.69</td>
<td>1.666</td>
<td>1.700</td>
<td>1.43</td>
<td>4.20</td>
<td>-2.80</td>
<td>[-1.50,-0.50]</td>
<td>1.92</td>
<td>0.29</td>
<td>0.68</td>
<td>0.38</td>
</tr>
<tr>
<td>CHANGE IN INVENTORYs(c)</td>
<td>0.12</td>
<td>0.873</td>
<td>0.693</td>
<td>0.36</td>
<td>1.50</td>
<td>-1.30</td>
<td>[0.50,0.50]</td>
<td>0.59</td>
<td>0.73</td>
<td>0.71</td>
<td>-0.40*</td>
</tr>
<tr>
<td>SUPPLY (GVA)</td>
<td>-0.04</td>
<td>0.426</td>
<td>-0.446</td>
<td>-0.27</td>
<td>0.80</td>
<td>-1.20</td>
<td>[0.50,0.50]</td>
<td>0.43</td>
<td>0.26</td>
<td>0.58</td>
<td>0.074</td>
</tr>
<tr>
<td>AGRIC.FORESTRY FISHING</td>
<td>1.17</td>
<td>1.877*</td>
<td>3.268**</td>
<td>2.19</td>
<td>6.20</td>
<td>-4.80</td>
<td>[1.50,2.50]</td>
<td>2.71</td>
<td>0.43</td>
<td>0.79</td>
<td>0.257</td>
</tr>
<tr>
<td>ELECT., GAS, WATER</td>
<td>0.49</td>
<td>1.123</td>
<td>0.959</td>
<td>0.89</td>
<td>7.10</td>
<td>-3.00</td>
<td>[0.50,0.50]</td>
<td>1.92</td>
<td>0.62</td>
<td>0.68</td>
<td>0.325</td>
</tr>
<tr>
<td>INDUSTRY</td>
<td>-0.30</td>
<td>-1.023</td>
<td>-1.708</td>
<td>0.71</td>
<td>1.30</td>
<td>-3.70</td>
<td>[0.50,0.50]</td>
<td>1.28</td>
<td>0.38</td>
<td>0.47</td>
<td>0.047</td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>0.76</td>
<td>1.947*</td>
<td>1.954*</td>
<td>1.03</td>
<td>5.50</td>
<td>-2.20</td>
<td>[0.50,0.50]</td>
<td>1.71</td>
<td>0.24</td>
<td>0.84</td>
<td>0.571**</td>
</tr>
<tr>
<td>MARKET AND NON-MARKET SERVICES</td>
<td>-0.16</td>
<td>-0.714</td>
<td>-0.552</td>
<td>0.75</td>
<td>1.20</td>
<td>-1.80</td>
<td>[0.50,1.50]</td>
<td>0.96</td>
<td>0.41</td>
<td>0.58</td>
<td>-0.244</td>
</tr>
<tr>
<td>FISIM</td>
<td>-1.34</td>
<td>-0.855</td>
<td>-0.725</td>
<td>5.31</td>
<td>12.30</td>
<td>-11.00</td>
<td>[-11.5,-10.50],[-10.50,0.50]</td>
<td>6.82</td>
<td>0.45</td>
<td>0.41</td>
<td>0.257</td>
</tr>
<tr>
<td>TAXES+DISCREPANCIES</td>
<td>-1.79</td>
<td>-0.941</td>
<td>-0.623</td>
<td>4.53</td>
<td>8.30</td>
<td>-28.20</td>
<td>-1.00</td>
<td>8.28</td>
<td>0.83</td>
<td>0.53</td>
<td>-0.20</td>
</tr>
</tbody>
</table>

(a) t adjusted given by:

\[ t = \frac{t}{S_{t}} \]

where, \( S_{t} = \frac{s_{t}}{\sqrt{1 - r_{e}^2}} \) and \( r_{e} \) is the first-round correlation coefficient.

(b) Correlation coefficient between revisions and the rate of change.

(c) Variable expressed as a percentage of GDP.

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### Table 2
TOTAL YEAR-END REVISION TO THE YEAR-ON-YEAR RATE OF CHANGE (AT CURRENT PRICES)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>t</th>
<th>t adjusted(a)</th>
<th>m(ABS)</th>
<th>Max</th>
<th>Min</th>
<th>Mode</th>
<th>Standard Deviation</th>
<th>Noise-Signal Ratio</th>
<th>% Positive Revisions</th>
<th>Correlation Coefficient(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.11</td>
<td>0.411</td>
<td>0.256</td>
<td>0.74</td>
<td>3.00</td>
<td>-2.30</td>
<td>[0.50,0.50]</td>
<td>1.14</td>
<td>0.35</td>
<td>0.60</td>
<td>0.389*</td>
</tr>
<tr>
<td>PRIVATE CONSUMPTION</td>
<td>0.01</td>
<td>0.020</td>
<td>0.017</td>
<td>0.55</td>
<td>1.90</td>
<td>-4.30</td>
<td>[0.50,0.50]</td>
<td>1.12</td>
<td>0.35</td>
<td>0.70</td>
<td>0.041</td>
</tr>
<tr>
<td>COLLECTIVE CONSUMPTION</td>
<td>0.54</td>
<td>1.628</td>
<td>1.193</td>
<td>1.17</td>
<td>3.30</td>
<td>-2.40</td>
<td>[0.50,0.50]</td>
<td>1.47</td>
<td>0.25</td>
<td>0.65</td>
<td>0.246</td>
</tr>
<tr>
<td>GROSS CAPITAL FORMATION</td>
<td>0.66</td>
<td>1.869*</td>
<td>2.356**</td>
<td>1.21</td>
<td>4.70</td>
<td>-2.00</td>
<td>[0.50,0.50]</td>
<td>1.58</td>
<td>0.21</td>
<td>0.65</td>
<td>0.354</td>
</tr>
<tr>
<td>GCFC CONSTRUCTION</td>
<td>0.62</td>
<td>1.665</td>
<td>0.870*</td>
<td>1.26</td>
<td>4.40</td>
<td>-2.30</td>
<td>[0.50,0.50]</td>
<td>1.66</td>
<td>0.23</td>
<td>0.75</td>
<td>0.438*</td>
</tr>
<tr>
<td>GCFC METAL P. AND EQUIPMENT</td>
<td>0.55</td>
<td>0.934</td>
<td>0.746</td>
<td>1.86</td>
<td>6.10</td>
<td>-5.40</td>
<td>[-1.50,-0.50],[-0.50,0.50]</td>
<td>2.61</td>
<td>0.26</td>
<td>0.60</td>
<td>0.433*</td>
</tr>
<tr>
<td>EXPORTS</td>
<td>0.56</td>
<td>1.345</td>
<td>0.724</td>
<td>1.55</td>
<td>3.60</td>
<td>-3.90</td>
<td>[1.50,2.50]</td>
<td>1.85</td>
<td>0.28</td>
<td>0.70</td>
<td>0.605**</td>
</tr>
<tr>
<td>IMPORTS</td>
<td>0.31</td>
<td>0.764</td>
<td>0.751</td>
<td>1.49</td>
<td>3.50</td>
<td>-3.40</td>
<td>[-1.50,-0.50],[-0.50,2.50]</td>
<td>1.91</td>
<td>0.26</td>
<td>0.55</td>
<td>0.300</td>
</tr>
<tr>
<td>CHANGE IN INVENTORIES(c)</td>
<td>-0.12</td>
<td>-0.086</td>
<td>-0.039</td>
<td>2.97</td>
<td>23.10</td>
<td>-24.80</td>
<td>[0.50,0.50]</td>
<td>8.24</td>
<td>24.25</td>
<td>0.67</td>
<td>0.068</td>
</tr>
</tbody>
</table>

(a) t adjusted given by:

\[ t = \frac{t}{S_{t}} \]

where, \( S_{t} = \frac{s_{t}}{\sqrt{1 - r_{e}^2}} \) and \( r_{e} \) is the first-round correlation coefficient.

(b) Correlation coefficient between revisions and the rate of change.

(c) Variable expressed as a percentage of GDP.

* The null hypotheses for a significance level of 10% is rejected.

** The null hypotheses for a significance level of 5% is rejected.
iii) Magnitude of revisions

The results obtained for the “t-ratio” illustrate that the average revision to the great majority of variables is not statistically significant. The exceptions for revisions to both year-on-year rates of change and chain rates of change are GFCF in construction, GVA in construction and for revisions to year-on-year rates of change, GVA in agriculture, forestry and fishing. These results are basically confirmed by the “t-ratio” adjusted for a possible autocorrelation.

The modal class for most variables is centred at around zero. However, there are clear exceptions, such as the external trade components for revisions to both rates, GVA in agriculture, forestry and fishing for revisions to year-on-year rates of change and GVA in construction for revisions to chain rates of change(6).

Revisions to FISIM, exports and GVA in agriculture, forestry and fishing are highly volatile. However, the Noise-Signal ratio suggests that this volatility may be largely due to the high volatility of the variables themselves. For revisions to chain rates of change, GFCF, in particular in metal products and equipment, is highly volatile, as seen in the case of the United Kingdom. Also notice that with regard to GDP, the standard deviation of revisions is higher than the standard deviation of the rate of change in GDP.

The average of revisions to most expenditure components is higher than the average of GDP revisions, suggesting that some revisions tend to cancel each other out across the components, as had been observed by Barklem (2000) in the case of the United Kingdom.

iv) Correlation of revisions

For most variables, the nil hypothesis of the correlation of revisions with the rate of change in the variable being equal to zero is not rejected. However, there are exceptions, such as private consumption, GFCF, GFCF in construction and GVA in construction. In the case of revisions to chain rates of change, only GFCF in construction is statistically significant.

Over time, a few possible reasons have been brought forward as to the possibility of correlation between revisions to National Accounts and economic activity. According to Richardson (2002), this correlation can be explained if growth in the economy is mainly driven by small and emerging companies, whose results are not initially included in the National Accounts. Thus, their contribution to growth is only revealed at the end of the year. Still according to this author, methodological changes can also be of a cyclical nature, given that there is an interval between structural changes in the economy that occur with the cycle and the development of statistical instruments to measure them. However, it is important to stress that the correlation coefficient as a measure of cyclicity is rather sensitive to the sample period chosen. Given the rather low number of observations between the fourth quarter of 1991 and the second quarter of 2000, i.e. in ESA 79 format, these results must be interpreted with some caution.

Mork (1987) puts forward another interpretation: “Suppose for example that the available observations and other information indicate 9% growth. By releasing an estimate of, say 6%, the BEA(7) can both signal strong growth and hedge against a potential embarrassment should the current signals turn out to be misleading.”

In an attempt to identify the main reason for the existence of revisions, it becomes important to identify when most of them take place. Charts 3 and 4 show the importance of different revisions for the total year-end revision(8) for the revisions to year-on-year rates of change and to chain rates of change respectively. The bars above the axis represent positive revisions and those below the axis represent negative revisions. The chart clearly illustrates that revisions tend to partially cancel each other out over time. For example, in Chart 4, GDP was revised upwards in the first quarter of 2002 by 0.1 percentage point in the 1st Revision, then it was subject to a downward revision of 0.6 percentage point in the 2nd Revision, and it was further revised upwards by 0.6 percentage point in the 3rd Revision. Finally, it was revised downwards by 0.01 percentage point in the 4th Revision.

(6) The same results are obtained in qualitative terms if the magnitude of the intervals considered is halved.

(7) Bureau of Economic Analysis, responsible for the publication of National Accounts in the United States.

(8) The sample period shown refers to that available in ESA 95.
Chart 3
REVISIONS TO THE YEAR-ON-YEAR RATE OF CHANGE
(At constant prices)
Chart 4
REVISIONS TO THE CHAIN RATE OF CHANGE
(at constant prices)

- **GDP**
- **Private consumption**
- **Collective consumption**
- **Gross capital formation**
- **Exports**
- **Imports**
- **Total GVA**
sion, and ultimately subject to a year-end revision of only -0.03 percentage point vis-à-vis the first estimate.

It would be plausible to expect a downward trend in the magnitude of the revisions over time, given the increasingly less provisional nature of estimates. Chart 5 shows the average of the absolute values of revisions referring to the four revisions implied in the total year-end revision for a number of expenditure and supply variables. In fact, there is some evidence that the magnitude of revisions to both GDP and GVA follows a downward trend, in line with some of their components, namely imports, GVA in construction, industry and FISIM. However, for private and public consumption, the magnitude of average absolute revisions does not seem to have declined. It may even be observed that the 4th Revision is higher in average absolute terms for GFCF, exports, GVA in agriculture, forestry and fishing and GVA in electricity, gas and water. The magnitude of revisions to both GDP and GVA is generally lower than that of their components, indicating that they cancel each other out. On the other hand, for revisions to year-on-year rates of change and chain rates of change, the magnitude of average absolute revisions to both GVA in agriculture and GVA in FISIM is rather significant, compared with total GVA and the remaining components (Chart 6). Only imports show evidence of a downward trend, as regards revisions to chain rates of change.

For some countries, such as Sweden, revisions have been declining over time, while for other countries they have remained unchanged. In the Portuguese case, it is not yet possible to ascertain whether the quality of quarterly statistics has been improving, due to the reduced sample period.
However, there seems to be faint evidence of a better quality of estimates which can be due partly to methodological changes introduced when the adoption of the ESA 95.

In qualitative terms, the same results are obtained for revisions to both year-on-year rates of change and chain rates of change at current prices. The main results are shown in Tables 2 and 4. However, there are some exceptions. Similarly to the case at constant prices, the average revision of most variables is not statistically different from zero, except for GFCF in the case of revisions to year-on-year rates of change and imports for revisions to chain rates of change. Also at current prices, for most variables the modal class is centred at around zero, with the exception of external trade components and GFCF in metal products and equipment, possibly explained by the high import content of this item. At current prices, most variables are generally revised upwards, showing an underestimation of estimates, seen at constant prices, with the exception of imports for revisions to chain rates of change. Likewise, most variables do not show a significant correlation coefficient, except for revisions to year-on-year rates of change in GDP, GFCF in construction, GFCF in metal products and equipment and exports. For revisions to chain rates of change only for GFCF is there a statistically correlation coefficient. In contrast to the situation at constant prices, the magnitude of revisions to private consumption and public consumption at current prices has been following a downward trend over time.

5. CONCLUSIONS

The aim of this study is to characterise revisions to Quarterly National Accounts, which are
### Table 3
TOTAL YEAR-ON-YEAR REVISION TO THE CHAIN RATE OF CHANGE (AT CONSTANT PRICES)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>t</th>
<th>t adjusted&lt;sup&gt;a&lt;/sup&gt;</th>
<th>m(ABS)</th>
<th>Max</th>
<th>Min</th>
<th>Mode</th>
<th>Standard Deviation</th>
<th>Noise-Signal Ratio</th>
<th>% Positive Revisions</th>
<th>% Positive Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GDP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.03</td>
<td>-0.088</td>
<td>-0.097</td>
<td>0.59</td>
<td>2.20</td>
<td>-4.80</td>
<td>[0.50,0.50]</td>
<td>1.31</td>
<td>1.13</td>
<td>0.63</td>
<td>0.050</td>
</tr>
<tr>
<td><strong>PRIVATE CONSUMPTION</strong></td>
<td>0.05</td>
<td>0.352</td>
<td>0.374</td>
<td>0.35</td>
<td>0.90</td>
<td>-2.00</td>
<td>[0.50,0.50]</td>
<td>0.59</td>
<td>0.64</td>
<td>0.74</td>
<td>-0.104</td>
</tr>
<tr>
<td><strong>COLLECTIVE CONSUMPTION</strong></td>
<td>0.09</td>
<td>0.777</td>
<td>0.704</td>
<td>0.10</td>
<td>1.00</td>
<td>-0.90</td>
<td>[0.50,0.50]</td>
<td>0.53</td>
<td>1.42</td>
<td>0.53</td>
<td>0.034</td>
</tr>
<tr>
<td><strong>GROSS CAPITAL FORMATION</strong></td>
<td>0.69</td>
<td>0.984</td>
<td>1.397</td>
<td>1.97</td>
<td>7.30</td>
<td>-6.00</td>
<td>[0.50,0.50]</td>
<td>3.06</td>
<td>0.83</td>
<td>0.74</td>
<td>0.084</td>
</tr>
<tr>
<td><strong>GFCF CONSTRUCTION</strong></td>
<td>0.64</td>
<td>2.229**</td>
<td>2.833**</td>
<td>0.86</td>
<td>3.80</td>
<td>-1.30</td>
<td>[0.50,0.50]</td>
<td>1.25</td>
<td>0.41</td>
<td>0.74</td>
<td>0.496**</td>
</tr>
<tr>
<td><strong>GFCF METAL P. AND EQUIPMENT.</strong></td>
<td>1.04</td>
<td>0.549</td>
<td>1.056</td>
<td>4.41</td>
<td>17.00</td>
<td>-24.20</td>
<td>[0.50,0.50]</td>
<td>8.27</td>
<td>1.09</td>
<td>0.63</td>
<td>0.150</td>
</tr>
<tr>
<td><strong>EXPORTS</strong></td>
<td>0.28</td>
<td>0.636</td>
<td>0.999</td>
<td>1.46</td>
<td>3.80</td>
<td>-4.00</td>
<td>[0.50,1.50]</td>
<td>1.91</td>
<td>0.64</td>
<td>0.58</td>
<td>-0.018</td>
</tr>
<tr>
<td><strong>IMPORTS</strong></td>
<td>0.20</td>
<td>0.511</td>
<td>0.686</td>
<td>1.30</td>
<td>3.00</td>
<td>-2.40</td>
<td>[0.50,1.50]</td>
<td>0.73</td>
<td>2.15</td>
<td>0.65</td>
<td>0.391</td>
</tr>
<tr>
<td><strong>CHANGES IN INVENTORIES.</strong></td>
<td>-0.11</td>
<td>-0.629</td>
<td>-0.500</td>
<td>0.40</td>
<td>0.90</td>
<td>-2.30</td>
<td>[0.50,1.50]</td>
<td>0.59</td>
<td>0.74</td>
<td>0.63</td>
<td>-0.057</td>
</tr>
<tr>
<td><strong>SUPPLY (GVA)</strong></td>
<td>0.01</td>
<td>0.025</td>
<td>0.056</td>
<td>0.94</td>
<td>5.90</td>
<td>-4.40</td>
<td>[0.50,0.50]</td>
<td>0.83</td>
<td>2.00</td>
<td>0.53</td>
<td>-0.213</td>
</tr>
<tr>
<td><strong>AGRIC, FORESTY, FISHING</strong></td>
<td>-0.42</td>
<td>-0.696</td>
<td>-0.882</td>
<td>1.78</td>
<td>4.90</td>
<td>-5.40</td>
<td>[0.50,0.50]</td>
<td>2.60</td>
<td>1.25</td>
<td>0.58</td>
<td>0.173</td>
</tr>
<tr>
<td><strong>ELECT, GAS, WATER</strong></td>
<td>0.39</td>
<td>0.478</td>
<td>0.611</td>
<td>1.75</td>
<td>3.10</td>
<td>-3.20</td>
<td>[0.50,0.50]</td>
<td>1.40</td>
<td>0.97</td>
<td>0.63</td>
<td>0.062</td>
</tr>
<tr>
<td><strong>INDUSTRY</strong></td>
<td>0.12</td>
<td>0.328</td>
<td>0.643</td>
<td>0.99</td>
<td>3.10</td>
<td>-5.90</td>
<td>[0.50,0.50]</td>
<td>1.54</td>
<td>0.97</td>
<td>0.79</td>
<td>-0.057</td>
</tr>
<tr>
<td><strong>CONSTRUCTION</strong></td>
<td>0.68</td>
<td>1.923*</td>
<td>4.672**</td>
<td>1.24</td>
<td>3.50</td>
<td>-2.00</td>
<td>[0.50,1.50]</td>
<td>1.55</td>
<td>0.35</td>
<td>0.74</td>
<td>0.197</td>
</tr>
<tr>
<td><strong>MARKET AND NON-MARKET SERVICES.</strong></td>
<td>0.21</td>
<td>0.795</td>
<td>0.925</td>
<td>0.79</td>
<td>3.30</td>
<td>-1.60</td>
<td>[0.50,0.50]</td>
<td>1.13</td>
<td>1.28</td>
<td>0.68</td>
<td>0.211</td>
</tr>
<tr>
<td><strong>FISIM</strong></td>
<td>1.73</td>
<td>1.376</td>
<td>1.180</td>
<td>3.93</td>
<td>16.10</td>
<td>-7.90</td>
<td>[0.50,0.50]</td>
<td>5.46</td>
<td>0.81</td>
<td>0.68</td>
<td>0.328</td>
</tr>
<tr>
<td><strong>TAXES-DISCREPANCIES</strong></td>
<td>-2.71</td>
<td>-0.652</td>
<td>-0.647</td>
<td>7.84</td>
<td>14.90</td>
<td>-69.40</td>
<td>[1.50,2.50]</td>
<td>18.14</td>
<td>0.94</td>
<td>0.65</td>
<td>-0.764**</td>
</tr>
</tbody>
</table>

* The nil hypotheses for a significance level of 10% is rejected.

** The nil hypotheses for a significance level of 5% is rejected.

(a) t adjusted given by:

\[ t_{adj} = \frac{t}{\sqrt{S_\varphi}} \]

where, \( S_\varphi = \sigma^2 (1 + \omega) / (1 - \omega) \) and \( \omega \) is the first-round correlation coefficient.

(b) Correlation coefficient between revisions and the rate of change.

(c) Variable expressed as a percentage of GDP.

### Table 4
TOTAL YEAR-ON-YEAR REVISION TO THE CHAIN RATE OF CHANGE (AT CURRENT PRICES)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>t</th>
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<th>Max</th>
<th>Min</th>
<th>Mode</th>
<th>Standard Deviation</th>
<th>Noise-Signal Ratio</th>
<th>% Positive Revisions</th>
<th>% Positive Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GDP</strong></td>
<td>0.11</td>
<td>1.480</td>
<td>1.542</td>
<td>0.28</td>
<td>0.60</td>
<td>-0.90</td>
<td>[0.50,0.50]</td>
<td>0.35</td>
<td>0.30</td>
<td>0.76</td>
<td>-0.057</td>
</tr>
<tr>
<td><strong>PRIVATE CONSUMPTION</strong></td>
<td>0.00</td>
<td>0.103</td>
<td>0.111</td>
<td>0.14</td>
<td>0.50</td>
<td>-0.50</td>
<td>[0.50,0.50]</td>
<td>0.21</td>
<td>0.20</td>
<td>0.71</td>
<td>0.131</td>
</tr>
<tr>
<td><strong>COLLECTIVE CONSUMPTION</strong></td>
<td>0.00</td>
<td>-0.044</td>
<td>-0.056</td>
<td>0.34</td>
<td>1.00</td>
<td>-1.10</td>
<td>[0.50,0.50]</td>
<td>0.49</td>
<td>0.60</td>
<td>0.62</td>
<td>0.067</td>
</tr>
<tr>
<td><strong>GROSS CAPITAL FORMATION</strong></td>
<td>0.15</td>
<td>0.690</td>
<td>0.687</td>
<td>0.71</td>
<td>2.10</td>
<td>-1.80</td>
<td>[0.50,0.50]</td>
<td>1.01</td>
<td>0.27</td>
<td>0.62</td>
<td>-0.414**</td>
</tr>
<tr>
<td><strong>GFCF CONSTRUCTION</strong></td>
<td>0.06</td>
<td>0.456</td>
<td>0.465</td>
<td>0.37</td>
<td>1.50</td>
<td>-1.10</td>
<td>[0.50,0.50]</td>
<td>0.57</td>
<td>0.19</td>
<td>0.67</td>
<td>-0.100</td>
</tr>
<tr>
<td><strong>GFCF METAL P. AND EQUIPMENT.</strong></td>
<td>0.10</td>
<td>0.212</td>
<td>0.372</td>
<td>1.66</td>
<td>4.70</td>
<td>-4.00</td>
<td>[2.50,1.50]</td>
<td>2.27</td>
<td>0.29</td>
<td>0.67</td>
<td>0.256</td>
</tr>
<tr>
<td><strong>EXPORTS</strong></td>
<td>-0.15</td>
<td>-0.892</td>
<td>-0.778</td>
<td>0.54</td>
<td>1.60</td>
<td>-1.40</td>
<td>[1.50,1.50]</td>
<td>0.76</td>
<td>0.25</td>
<td>0.52</td>
<td>-0.030</td>
</tr>
<tr>
<td><strong>IMPORTS</strong></td>
<td>-0.54</td>
<td>-2.111**</td>
<td>-1.398</td>
<td>0.87</td>
<td>1.50</td>
<td>-2.90</td>
<td>[0.50,1.50]</td>
<td>1.17</td>
<td>0.40</td>
<td>0.43</td>
<td>-0.310</td>
</tr>
<tr>
<td><strong>CHANGES IN INVENTORIES.</strong></td>
<td>0.02</td>
<td>0.463</td>
<td>0.579</td>
<td>0.12</td>
<td>0.80</td>
<td>-0.30</td>
<td>[0.50,0.50]</td>
<td>0.24</td>
<td>0.69</td>
<td>0.76</td>
<td>-0.070</td>
</tr>
</tbody>
</table>

* The nil hypotheses for a significance level of 10% is rejected.

** The nil hypotheses for a significance level of 5% is rejected.

(a) t adjusted given by:

\[ t_{adj} = \frac{t}{\sqrt{S_\varphi}} \]

where, \( S_\varphi = \sigma^2 (1 + \omega) / (1 - \omega) \) and \( \omega \) is the first-round correlation coefficient.

(b) Correlation coefficient between revisions and the rate of change.

(c) Variable expressed as a percentage of GDP.
particularly important in monitoring developments in economic activity. To this end, an analysis was conducted to the revisions made to several items on both the expenditure and the supply side, and a real-time database was constructed.

Thus, the analysis of the features of these revisions enabled to conclude that:

a) The most revised variables are exports, imports and GFCF, namely in metal products and equipment. The study thus suggests that relying on the improvement of preliminary estimates for external trade variables would translate into a significant reduction of revisions to GDP;

b) For most variables the average of revisions can be considered nil, although variables are mostly revised upwards, suggesting an underestimation of preliminary estimates;

c) There seems to be evidence that revisions between the components of GDP and GVA tend to cancel each other out;

d) In most cases, no correlation was found between revisions and developments in the respective variable;

e) There seems to be some evidence of a downward trend of the magnitude of the successive revisions to year-on-year rates of change in GDP and some of their components, although this is not the case for revisions to chain rates of change which can be due partly to methodological changes introduced when the adoption of the ESA 95;

f) In general, the results obtained are in line with those for other countries.

REFERENCES


