Revisions to South Africa's Gross Domestic Product

OVERVIEW

Even though data revisions are a normal feature of any statistical compilation process, such revisions are seldom taken into account or understood by users of statistics. This results in an over reliance on initially published preliminary estimates that are subject to change. Gross domestic product (GDP) estimates, for instance, are needed for the Monetary Policy Committee to set interest rates and the National Treasury to set budget limits, but because of the need for timely data, policy decisions are often based on preliminary estimates which are later revised as more comprehensive data become available. At the same time, changes to the initially published estimates may lead to adjustment measures being made to the assessment of the performance of the economy. This brief focuses on revisions to South Africa's quarterly GDP estimates for the period 1999 to 2013. Based on the study of revisions to the South African quarterly GDP growth rates the following conclusions are made. First, the initially announced estimates are most likely to be revised upward. This is because initial announcements of the quarterly GDP growth rates are on average underestimated. Second, a bias exists in the estimation of the initially announced quarterly GDP growth rates. This suggests that the estimates contain measurement errors that can be eliminated to become better estimates of the final or true value. The brief looks at why data revisions happen and highlights how the study of revisions can be used to evaluate the reliability of initially published estimates. It then provides an analysis of revisions to the South African quarterly GDP growth rates followed by recommendations.

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Policy Brief
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REVISIONS TO PRELIMINARY ESTIMATES

Revisions are a normal feature of any statistical compilation process that estimates values for variables, whose source data gradually changes over time and where the definition of the variable is subject to change, or where methodological changes occur (Ahmad, Bournot and Koechlin 2007). Revisions are defined as any change in the value of an estimate initially published by a statistical agency (Carson, Khawaja and Morrison, 2004).

Carson et al (2004), Sleeman (2005), and Sim, De Castro and Pascau (2009) indicate that revisions may arise from:

• Incorporation of more comprehensive data, and/or re-estimation of the seasonal factors for seasonally-adjusted series. These are routine revisions in the weeks or months shortly after the initial announcement. For example, when imputed values are replaced by actual values or seasonal factors are updated following later observations.

• Reconciliation of quarterly and annual measures. These constitute annual revisions, for example, when monthly, and/or quarterly data are modified with more accurately based annual data.

• Rebasing and reweighting of the constant price series, and the introduction of definitional or methodological changes. These major revisions are referred to as comprehensive, or benchmark revisions. These include changes in statistical methods and/or changes in concepts, definitions, and classifications.

The different categories of revisions can be further classified as either informative or uninformative. Informative revisions carry informational content by reflecting the incorporation of new information which

was not previously available to the statistical agency (Aruoba 2005:8). An example of this is routine revisions that occur when imputed values are being replaced by actual values or seasonal factors being updated following later observations, and/or annual revisions when monthly or quarterly data are modified with more accurately based annual data. Uninformative revisions are those revisions that result from changes in the definition of the variable, or statistical changes such as the change of base year or reweighting (Aruoba 2005:8). For example, benchmark or comprehensive revisions when there are major changes in statistical methods and/or changes in concepts, definitions, and classifications.

Revisions in the statistical compilation processes suggest that the aim is to improve the overall quality of statistics by incorporating information that was not available at the time of the initial publication. Thus estimates that are not revised should not necessarily be regarded as of high quality or more reliable. The lack of revisions could be a reflection that better information was not available to revise the initial estimate computed using partial information, suggesting formidable measurement challenges (Sim, De Castro and Pascua, 2009).

At the same time the change to initially published estimates may lead to adjustment measures being made to the assessment of the performance of the economy. Each revision will cause users to revise existing interpretations of the course of the statistics series and possibly change economic forecasts and policy implications. McKenzie (2007) explains that this may occur through a changed interpretation based on the revised data itself or the impact the revision may have on econometric models which may incorporate several statistics, each subject to revision.

Major revisions in their nature have an extensive and larger effect. Their effects might even be disruptive, especially when associated with changes in statistical methods, concepts, definitions or classifications. In this case users may have to undertake extensive modifications of their databases or models. This also suggests that revisions may modify the perception of the economy retrospectively as initial views of economic performance at a particular time can differ from what will became the historical views of that period. Brümmerhoff and Grömling (2012) say that this results from the disappearance of stylised facts as well as the emergence of new scientific findings and conclusions relevant for policymaking. Thus when trying to understand recent economic history and the policy response it is necessary to be careful about which data are used.

Due to the need for timely data by users, policy decisions are often based on preliminary announcements or initially published estimates by statistical agencies. All of this raises the question of how much confidence users should have in initially published estimates. Information on the statistical properties of revisions can be used to evaluate the reliability of the initially published estimates (Carson and Laliberte 2002; Mazzi and Cannata 2008; McKenzie, Tossetto and Fixler 2008). In other words, the statistical properties of the revisions may be examined to qualify the degree of confidence users may have in the initially published estimates. This information may also be used by the statistical agencies to monitor and better understand the characteristics of the statistical compilation process to enable potential problems to be identified and improvements made.

The study of revisions involves comparing an estimate available at a given point in time with the one which will be available afterwards for the same reference period. Most revisions studies are led by a descriptive analysis of the revisions statistical indices. A test of the statistical significance of the revisions may also be performed. For information about the nature of revisions, correlation and regression methods are used.[1] Revisions to initially published GDP estimates have been widely examined, especially for Organisation for Economic Co-operation and Development (OECD) member countries. However, such analysis has not been done in significant magnitudes for South Africa.
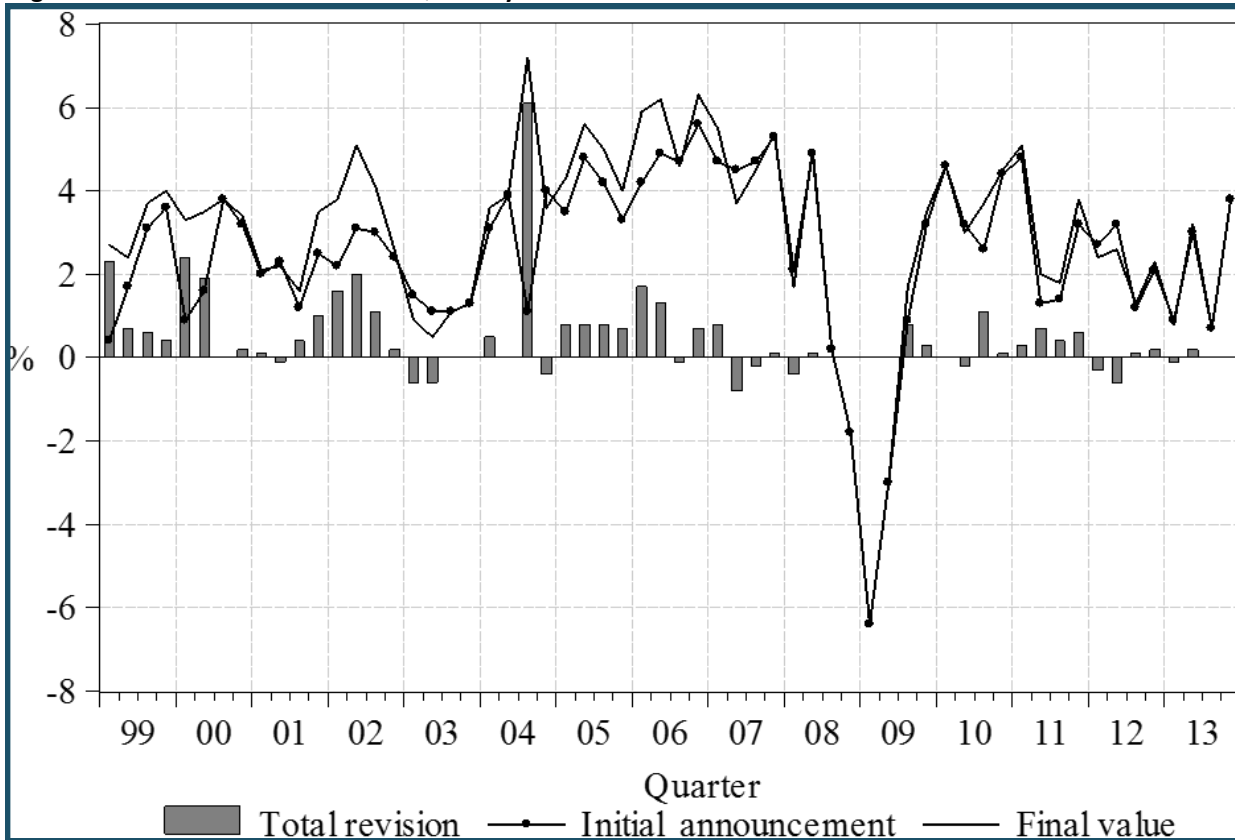
REVISIONS TO THE QUARTERLY GROSS DOMESTIC PRODUCT

Statistics South Africa (Stats SA) estimates the GDP figures for South Africa. For quarterly GDP estimates, Stats SA makes the initial announcement and publication release about 50 to 60 days after the end of that quarter. To incorporate the availability of more comprehensive data, revisions are made of estimates for the latest quarters and, once a year for annual estimates.

Major revisions to the estimates, in conjunction with the rebasing of the estimates at constant prices, are made every five years.

Figure 1 (page 3) presents the seasonally adjusted and annualised GDP growth rates at constant prices. This is the South African quarterly headline GDP figure usually announced in the form of a press conference. The data trends in Figure 1 are the initial announcements, total revisions, and final values for the quarterly GDP growth rates for the period 1999 to 2013.[2]

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[1] *For a detailed explanation of the approaches to analysing revisions see Fotoyi. 2016.*

Figure 1: Revisions to South African Quarterly Gross Domestic Product

Source: Fotoyi, 2016

A descriptive analysis of revisions to the South African quarterly GDP for the period 1999 to 2013 was done by examining the statistical properties of the total revision data trends.[3]

The results are summarised as follows:

- Mean absolute total revision of 0,64. Expressed in absolute percentage points the measure indicates the average size of total revisions to the initial announcements.
- Mean total revision of 0,5. The key interest of this measure is in its sign to determine the average direction of revisions. The positive sign of the mean total revision indicates that on average the initial announcements have been underestimated.
- T-statistics of 3,4874 with a p-value of 0,0009. The estimated t-stat and p-value provide the probability that the revisions are statistically different from zero. The test is performed to determine whether the observed mean total revision is statistically different from zero which gives insight of whether a bias exists in the initial announcements.[4]
- Standard deviation of 0,1419.[5] This measures the spread of total revisions around their mean, thus giving an indication of the volatility of revisions.
- The minimum total revision of -0,8. This is the value of the lowest total revision to the initial announcements.
- Maximum total revision of 6,1. This is the value of the highest total revision to the initial announcements.

Based on the descriptive statistics results, the following conclusions can be made about the South African quarterly GDP growth rates.

First, the initially announced estimates are most likely to be revised upward. This is because the initial announcements of the quarterly GDP growth rates are on average underestimated.

Second, a bias exits in the estimation of the initially announced quarterly GDP growth rates. This suggests that the estimates contain measurement errors that can be eliminated to become better estimates of the final or true value.

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[2] *The data was gathered as follows: the initial announcement is derived as the initially published preliminary estimate for the relevant quarter; the later final value is derived to include as many informative revisions as possible, but avoids the inclusion of uninformative revisions; and, the total revision is derived by subtracting from the later final value the initially announced estimate for the relevant quarter.*

[3] *For the results of the correlations and regression estimation methods applied in the analysis of revisions to the South African quarterly GDP for the period 1999 to 2013, see Fotoyi, 2016.*

[4] *The t-test is adjusted for the existence of a serial correlation between quarters. And the level of significance chosen for the statistical test is the value of 0,05.*

[5] *To take into account serial correlation, the study used a heteroscedasticity and autocorrelation consistent (HAC) standard deviation of the mean revision.*

RECOMMENDATIONS

From the users' perspective, it is recommended that not too much confidence be attributed to interpretations of the initially published estimates. Due to a lack of alternatives, for short-term analysis users are encouraged to focus on different measures when making decisions established on the performance of the economy. However, when looking at quarterly GDP data, users are encouraged to focus on the trends rather than the actual growth rate figures. It is recommended that users be knowledgeable, by engaging the producers, about how to best make use of preliminary estimates in their decision- and policy-making processes.

Users further need to be informed of the revisions processes through a revisions policy adopted by the statistical agency. It is further recommended that the statistical agency conduct periodic analysis of the revisions and make these available to users.

From the statistical agency perspective, it is important that the quality of initially published estimates be emphasised. For the initial announcements to become a better estimate of the final or true value, it is recommended that Stats SA improve data sources and methodology. The statistical agency is encouraged to look at improving the sample size and reporting systems to improve response rates. The agency is also encouraged to look at the representation and coverage of data sources. There is a need to look at imputation methods for missing data.

There also needs to be an on-going conversation between the statistical agencies and users focused on improving the statistical compilation processes and the use of the statistics for the purpose of decision- and policy-making.

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