13th Meeting of the Advisory Expert Group on National Accounts,
1-3 October 2019, Washington D.C., USA

Agenda item: 4.2

A framework for recording and communicating revisions

<u>Introduction</u>

This paper has three objectives. First it looks to establish a **common language** that NSOs and IAs can use to communicate revisions to their users. Second, it articulates a **taxonomy** that NSOs and IAs can use to describe and present revisions to key macroeconomic indicators to their users. Finally, it proposes a **framework** NSOs and IAs can use to assess a country's alignment to an international standard post implementation of a revised set of international macroeconomic accounting standards.

A paper on: A framework for recording and communicating revisions

<u>Main issues to be discussed</u>

The AEG is invited to:
- Discuss whether there should be a common set of recommended terms and definitions to present and communicate revisions to data users?

- Discuss whether there should be a common classification for revisions that would enhance cross-country and temporal comparisons?

- Discuss whether there should be a "Standards" implementation measurement framework that countries and agencies can use to "score" and "quantify" their alignment to the standards.

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Towards a Revisions Framework

I. INTRODUCTION

Macroeconomic accountants must constantly balance the need users have for timely, high frequency economic data with their need for highly accurate economic data highlighting the structure and level of economic activity. In addition to balancing this timeliness-accuracy trade-off macroeconomic accountants must also balance the expectations (and requirement) users have for long consistent time-series with their desire for agile economic accounting standards that ensure an exhaustive coverage of the economy of the day.

To manage these two important features of the macroeconomic accounting systems macroeconomic accountants and their users have developed an implicit social contract. Simply put, this social contract states that the macroeconomic accountant will provide timely, high frequency data reflecting current economic conditions provided users are willing to accept revisions to those same estimates as some point in the future.

It has been over 10 years since the most recent versions of the *System of National Accounts* (*2008 SNA*) and *Balance of Payments and International Investment Position Manual* (*BPM6*) have been released. Globalization, digitalization and the desire of users to better account for well-being and the environment in economic data are raising questions as to whether these standards continue to reflect current economic activity. The macroeconomic accounting community is looking towards a new round of updates of the macroeconomic accounting manuals such as the *2008 SNA* and *BPM6*. This will inevitably result in a new round of revisions to existing measures of gross domestic product (GDP), national income, national wealth, productivity, and international trade to name a few. These revisions will need to be explained and communicated to users so that they can reframe their analysis and interpretation of economic data and economic history.

Most countries manage this 'revision process' using a well-developed revision policy. These revisions policies outline the timing of revisions and the conditions under which revisions are undertaken. While the development and use of a revision policy is quite common among most countries, a quick review of a cross section of countries shows a wide range of language and methods used to communicate the results of revisions to users of macroeconomic data. This is because there does not exist an internationally recognized standardized framework that National Statistical Organizations (NSOs) and International Agencies (IAs) have adopted that can be used to communicate and present revisions to users of macroeconomic data.

This paper has three objectives. First it looks to establish a **common language** that NSOs and IAs can use to communicate revisions to their users. Second, it articulates a **taxonomy** that NSOs and IAs can use to describe and present revisions to key macroeconomic indicators to their users. Finally, it proposes a **framework** NSOs and IAs can use to assess a country's alignment to an international standard post implementation of a revised set of international macroeconomic accounting standards.

A. Importance of a revision policy

While revisions often frustrate users, they are a normal part of the macroeconomic accounting process. Because revisions are a normal part of the process, a revision policy becomes an indispensable tool that data consumers use to help them interpret the overall quality of a given estimate. It is generally the case that the closer the release date a macroeconomic indicator is to its reference period the lower the accuracy[1]. This is because, in general, the timelier the estimate the less complete the information available to compile the estimate. A revision policy is therefore, an important tool that users consult to understand the accuracy of the vintage of data being analyzed.

For example, assume that a statistical agency publishes estimates of quarterly GDP 60 days following the reference period. Assume that in the first quarter of 2019 the estimated rate of quarterly growth is 0.5 percent. The country's revision policy states that over the course of the year the current year quarters are subject to revision. A sophisticated user, will understand, from past analysis that under normal conditions the quarterly estimates are revised by +/- 0.1 percent by the time of the fourth quarter release. Therefore, when interpreting the 0.5 percent increase as first published by the statistical agency, they most likely will assume that the final growth rate could fall anywhere between 0.4 and 0.6 percent. This is one of the reasons why a revision policy along with a regular tracking of revisions is essential to properly assess the accuracy of the most current release of data.

The International Monetary Fund (IMF), as part of its surveillance activities, collects a wealth of information related to its member's national accounts programs. An important piece of information collected by the IMF is whether its members publish a revision policy and make this available to their users. This information is contained in the IMF's Dissemination Standards Bulletin Board (DSBB).

While the publication of a revision policy is considered a best practice, the language used and level of detailed information each country uses to describe their revision process is quite different. While this may not be a problem when looking at data for a given country in isolation it becomes an issue when attempting to make cross country comparisons.

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[1] This is not implying that the accuracy is unacceptable but rather that if the macroeconomic accountant has more time and more complete data the estimate will be more robust.

For example, a user may be comparing the recent annual growth rates of country A (increase of 2.5 percent) and country B (increase of 2.5 percent) for 2018. The obvious interpretation is that both countries are growing at a similar pace. Assume that country A had just recently revised their estimate (from 2.0 to 2.5 percent) while country B has yet to make any revisions. In six months, country B releases revised estimates for 2018 and revises the growth down to 2.0 percent. The "story" of similar growth is now one where the growth in country A is outpacing country B. A seasoned user, if they were aware of the difference in timing of the estimates for A and B would have been able to factor this information into their analysis when country A released their revised estimates. If A and B's revision policies were not known – or worse – did not exist in any formalized way then an accurate cross country comparison would be very difficult to make.

For users to make these cross-country comparisons it would be useful, if not essential that countries use a common language and set of definitions when communicating their revision policy.

At the very basic level the development, maintenance and use of a revision policy by a NSO is key to ensuring their data are interpretable and usable. Unfortunately, the lack of an agreed upon international set of definitions and framework for presentation and analysis of revisions has let to and uneven development of these policies across countries. This uneven implementation has reduced the interpretability and usability of the data. A common language with a clear set of definitions is required.

II. TOWARDS A COMMON LANGUAGE

While it may seem trivial, adherence to a standardized set of definitions used to describe and present revisions will improve the use and the quality of the analysis of macroeconomic data. The following represent a set of definitions that NSOs and IAs could standardize around when designing (or re-designing) their revision policies and reporting on revisions to users.

Revision - A revision is defined as the numerical difference between two vintages of the same data point. For example, if the first vintage of estimated real GDP in 2019 was 0.5 percent and the second vintage of estimated real GDP in 2019 was 0.4 percent then the revision is 0.1 percentage points.

Benchmark estimate - A benchmark estimate is defined as the final vintage of a data point. It is the data point that was compiled using the highest quality source data and the most advanced methods. Benchmark estimates generally do not get revised and therefore are often also referred to as the "final" estimate. For example, a country may release an estimate of GDP in 2020 for the year 2019. This estimate is based on a series of indicators and incomplete data. Three years later, in 2022, the country has access to the

results of the 2019 economic census and a fully process set of government administrative records. The country does not expect to receive any additional information for 2019. The country decides to re-compile its 2019 estimates based on this new information. The revised estimates for 2019 become the benchmark estimate of GDP since the country does not expect to subsequently revise the data and the estimates are produced using the highest quality source data.

Processing Cycle - National accounts are compiled within the context of a processing cycle. Processing cycles have two distinguishing features. First, each processing cycle includes a reference period. The reference period represents the sequence of reference period dates (years, quarters, months) which are either open for revision or for which new estimates are desired. For example, if the quarterly national accounts are being processed for the fourth quarter of 2018 and the first, second and third quarter are open for revision then the reference period for the processing cycle is 2018Q1-2018Q4. Second, each processing cycle has a production period. The production period represents the calendar start date and end date between which the estimates are produced. For example, assume that on May 15th, 2019 a national accounts program begins the process of compiling estimates of first quarter GDP for country X. The estimates are finalized on May 30th, 2019. In this case the production period is May 15th to May 30th. The actual production period itself is not important except for the fact that it marks a processing cycle and results in the generation of a new vintage of estimates. Often the released date can be used to record the processing cycle. In this case it would be May 30th, 2019.

Routine revisions - Routine revisions generally refer to revisions to sub-annual series within the current reference year. For example, assume a country produces quarterly estimates of GDP. At the time the fourth quarter estimates are produced the country may chose to revise the estimates for the first, second and third quarter. These are referred to as routine revisions and are sometimes referred to as quarterly revisions since these revisions are generally restricted to the current reference year quarters. In some cases, countries will choose to revise sub-annual estimates back further then the start of the current year accounting period. These are still referred to as routine revisions.

Annual revisions - Annual revisions generally refer to revisions affecting data for the current calendar year along with the most recent calendar year(s) and generally incorporate the latest (but not necessarily final) information available from respondents or administrative data sources. In this case the latest information is still partial and does not contain what are believed to be the final most complete set of source data. These estimates are therefore considered transitory and are not yet final.

Benchmark revisions - Benchmark revisions are a special case of annual revisions and are used to incorporate final vintages of source data. When undertaking a benchmark revision, a macroeconomic account program does not expect to receive any additional information it can

use to improve the overall quality of the national account estimates. For example, assume that a national accounts program uses the follow 5 key data sources to compile their national accounts.

- Household Budget Survey
- International Merchandise Trade Statistics
- Results from an economic census
- Payroll Data form the revenue authorities
- Final Audited Government Accounts

The benchmark estimates can only be constructed once a final version of each of these data sources is available.

Comprehensive revisions - Comprehensive revisions (or possibly referred to as periodic major revisions) are special cases of benchmark revisions where the macroeconomic account program not only incorporates the final vintages of source data but also integrates new or updated concepts, accounting treatment, classifications or improved methods. These generally occur when there are major changes to the accounting standards that are used to compile the data. These types of revisions often result in a break in the time series and a need for the national accounts program to backcast these changes through time.

Benchmarking – Benchmarking is a process by which an existing series is calibrated to a new higher quality series of the same or different frequency. Once benchmark estimates have been generated it will be necessary to undertake a benchmarking activity to ensure the existing time-series of information (annual or sub-annual) are coherence with the new benchmark estimates.

Rebasing – Rebasing refers to the process by which constant price aggregates are updated using the prices of a more recent period**.** Rebasing is often confused with benchmarking. When national accounts programs undertake a comprehensive revision, it is often referred to as a rebasing exercise. Part of the confusion arises because national account programs often undertake a comprehensive revision and then subsequently use the benchmark estimates to rebase their constant price series.

Time-series - A time-series is a set of regular time-ordered observations of a quantitative characteristic of an individual or collective phenomenon taken at successive, in most cases equidistant, periods / points of time.

Time-series break - A break in a time-series can occur when there is a change in the standards for defining, observing or measuring the variable over time, such that estimates are no longer comparable from one period to another. Changes may be the result of a single change or the combination of multiple changes at any one point in time of observation of the variable. The comparability that is lost can be in terms of the level of the estimates, patterns such as seasonal patterns, or the amount of variability, among others. The specific causes of

breaks in a statistical time series include changes in: classifications used, definitions of the variable, coverage, etc. The impact of a time series break can often be tested statistically for its significance but may also be a matter of judgement on the part of the user and depends on the use(s) to which the data are put.

Backcasting - Backcasting is a reverse-forecasting technique which starts with a specific phenomenon and then works that phenomenon backward through time. Backcasting is often required following a major revision. The introduction of a conceptual change or significantly improved data source can result in a break in a time-series. Macroeconomic accountants are also asked to address these breaks by backcasting or reverse forecasting these changes back through time.

III. A TAXONOMY FOR ANALYZING REVISIONS

Producers of macroeconomic data do not only need to adopt a common language when communicating revisions to users, they also need to adopt a common taxonomy to properly describe the impact of the revisions. Often, when a country revises its key macroeconomic indicators such as GDP or the Balance of Payments they disseminate a revision report that communicates the size of the revision to data users. For example, assume the initial estimate of GDP for country A was $100 billion and the revised estimate is $110 billion. Most countries would publish a report indicating that there was a $10 billion upward revision to GDP. Beyond reporting on the size of the revision there is very little uniform guidance provided to countries with respect to how they should 'break down' the revision into its component parts to better inform users about the rational for the revision and the subsequent quality of the revised estimate.

A suitable communication becomes especially important when the size of the revision is relevant. Figure 1 presents the average size of revisions for a sample of 56 countries surveyed by the IMF. The figure shows that in some countries a benchmark revision might have a substantial impact on the GDP level, often associated with the update of methodologies and accounting concepts, as well as the use of new data sources and price structures of a more recent period.

Figure 1 - Recent GDP revisions from benchmarking exercises (selected countries)
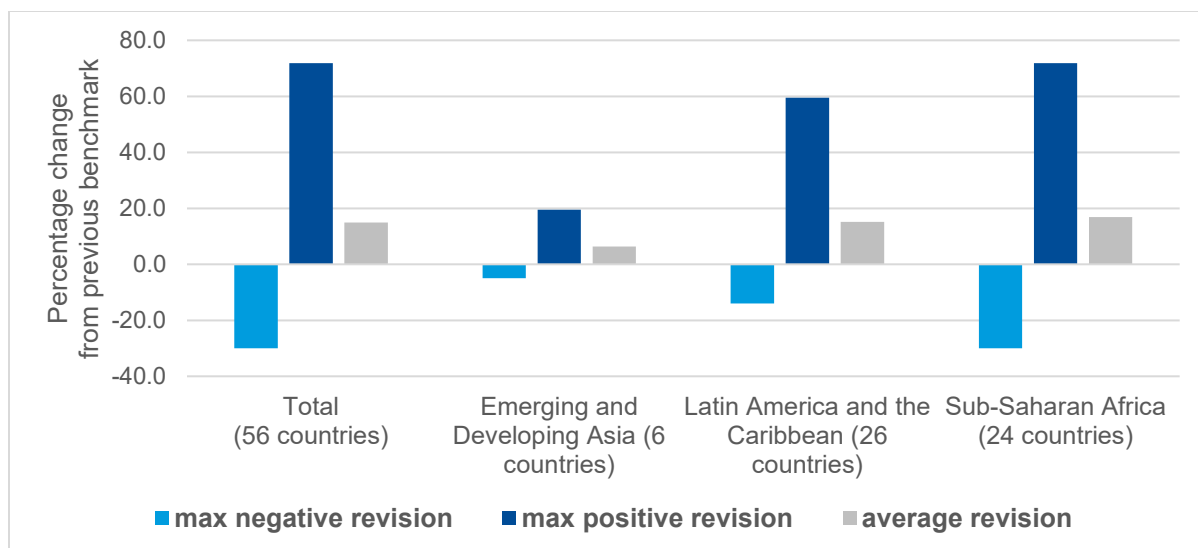
Source: IMF staff.

To better communicate revisions and allow users to assess the quality of the revised estimate it seems appropriate that a taxonomy be developed that compilers can use to decompose the revision into its component parts. One approach towards developing a revision taxonomy is by identifying those factors that could cause a data point to be revised. One way to identify these factors or categories is to identify the key building blocks macroeconomic accountants use to produce macroeconomic accounts.

One of the key building blocks for any set of macroeconomic accounts are the concepts, definitions and accounting rules that underpin their compilation. For example, the *2008 SNA* defines itself as a "set of concepts, definitions, classifications and accounting rules…" (*2008 SNA* p1.1) that allows "economic data to be compiled and presented in a format that is designed for purposes of economic analysis, decision-making and policymaking." (*2008 SNA* p1.1). This framework permits economists to account for the myriad of economic transaction each day and summarize the information into a meaningful set of economic statements or accounts. This set of concepts, definitions, classifications and accounting rules ensure the resulting economic statements are consistent, comprehensive, integrated and comparable both across time and jurisdictions.

These concepts, definitions, classifications and accounting rules are therefore key building blocks that are used to develop macroeconomic accounts. It therefore seems to reason that any change in these concepts, definitions, classifications, and accounting rules can result in a revision and that these should form part of the overall taxonomy.

Another common reason that macroeconomic accounts are revised is due to the availability of new, more complete source data such as new or updated administrative files or results of population or economic censuses. Macroeconomic accounts can also be revised because of

human or processing errors. Changes in systems, data structures and staff can all lead to compilation errors which, when addressed, can lead to substantial revisions.

Finally, macroeconomic accountants use a variety of statistical methods when they compile a set of macroeconomic accounts. These methods can include anything from techniques to account for seasonal variation (e.g., seasonal adjustment) to methods used deflate nominal estimates into real terms. Periodically, macroeconomic accountants will update the methods that they use which in turn can lead to revisions.

The above constitute the vast majority of reasons why macroeconomic data can be revised. The following is a proposed taxonomy that compilers can use to help explain and present revisions to data users.

Conceptual (coverage) revisions - At a very high-level the concepts and definitions associated with a macroeconomic accounting system determine what gets measured. The concepts and definitions put a boundary around what is measured and what is excluded. Consider the concept/definition of production in the *2008 SNA*. The *2008 SNA* states that production

"a physical process, carried out under the responsibility, control and management of an institutional unit, in which labour and assets are used to transform inputs of goods and services into outputs of other goods and services. All goods and services produced as outputs must be such that they can be sold on markets or at least be capable of being provided by one unit to another, with or without charge. The SNA includes within the production boundary all production actually destined for the market, whether for sale or barter. It also includes all goods or services provided free to individual households or collectively to the community by government units or NPISHs." (p1.40)."

There are several important elements to this definition. First it refers to a physical process (included) meaning that natural processes are not part of production (excluded). Second, the production boundary includes goods and services provided for free to households by governments and Non-Profit Institutions Serving Households (NPISHs) but not goods and services provided for free by households to households. The size or concept of production determines the size of output and gross domestic product. By excluding those goods that are produced by a natural process, GDP is smaller than if the concept included these goods.

Accounting Revisions – Accounting revisions reflect changes in the accounting rules or application of the accounting rules when compiling macroeconomic accounts. The accounting rules embedded in a macroeconomic accounting framework determine how activities get measured. For example, a key accounting rule in the *2008 SNA* is the rule that stocks or positions are measured at market values. This rule ensures that all stocks have a consistent valuation. Another *2008 SNA* (and *BPM6* and *GFSM2014*) accounting rules is "recording on an accrual basis throughout." (*2008 SNA* p3.163). When a country adopts an accounting rule it will lead to a revision in their estimates.

Methodological Revisions – Methodological revisions reflect changes in the methods used to compile the macroeconomic accounts. Methodological revisions are closely associated with accounting rules. One way to interpret a method is to view it as the way a macroeconomic accountant implements an accounting rule. For example, one compiler may decide to use a series of price indices to derive an estimate of the market value for a stock of assets while another compiler may decide to obtain observed values recorded on the balance sheets of enterprises. Both are following the same rule, but both have used different methods to apply the rule. Any change to these techniques or the development of new techniques would revise previously published estimates and would be considered a methodological revision. For example, assume that as part of its imputed rent calculations country A assumed that the quality of owner-occupied dwellings was twice the quality of rented dwellings. Assume that, based on a recent assessment, it is determined that starting roughly five years ago the quality of owner-occupied dwellings are three times the quality of rented dwellings. In this case the model (method) used to estimate imputed rent would need to be adjusted and the estimates of output would be revised. Assume that this increased country A's output by $2 billion. This would be classified as a methodological revision.

Presentational Revisions – Presentation revisions reflect changes in how the accounts and related information is presented. As discussed earlier the concept of production in the *2008 SNA* determines what gets measured. At the limit this could result in the economic account presenting one (albeit very large) number to users. Presenting a single estimate of production would not be very useful and would only lead to a series of additional questions from users such as which firms contributed the most to production? or which regions contributed the greatest share? Presentational revisions do not necessarily result in revisions to the underlying data but rather how the data are presented, including the associated detail presented to users.

Statistical Revisions - Statistical revisions occur when new (generally higher quality more comprehensive) source data are integrated into the macroeconomic accounts. Statistical revisions are probably the most common type of revision reported by macroeconomic accountants. Macroeconomic accountants often need to rely on incomplete information when preparing timely, high frequency indicators of economic activity. As new data become available and the macroeconomic accountant integrates this new data into the macroeconomic accounts, revisions will materialize. Often these revisions help to refine the estimates or add additional detail. In general, these revisions do not tend to alter the trend or change the overall 'story' that is presented to the data users.

Compilation revisions - Compilation revisions occur when the national accounts program discovers an error in their business process or source data and adjust the process or source data to correct for the error. These types of revision are less common and are generally isolated to less prominent components of the account. The errors are generally associated with some form of change being implemented and can even be the result of a change in staff.

This above taxonomy provides a useful way for macroeconomic accountants to communicate revisions to their users. Rather than being presented with one number, users are presented with a complete breakdown of the revision which helps assess the quality and interpretability of the revised data. Consider the following table which builds on the example presented earlier where country A reported a $10 billion revision in its benchmark estimate of GDP. Decomposing the $10 billion according to the taxonomy presented above provides important information to users regarding the rational for the revision and the overall quality of the new data:

Category	Revision	Notes
Conceptual Revision	$5	Incorporated estimates of Financial Intermediation Services Indirectly Measured
Accounting Revision	$1	Recording consumption of fixed capital at replacement cost
Methodological Revision	$2	Improved method used to calculate imputed rental income
Statistical Revision	$2	Incorporated new estimates from the latest household budget survey.
Computational Revision		No computational changes were made
Presentational Revision		Presentational changes were made but they did not result in any revisions.
	$10	

From the above the user can determine that half of the revision is due to a change in coverage and 20 percent of the overall revision is due to the incorporation of new more complete data. This greatly improves the interpretation of the revision. The user now understands that most of the increase is due to a change in the production boundary – i.e., what is being measured. Even more relevant would be an indication as to whether this change brings the country closer to international recommendations and therefore improves international comparability or whether the estimation practices still deviate from international standards and may be subsequently revised. The idea of alignment with international standards will be addressed in the last section of the paper.

Revisions Analysis

The preceding sections provide NSOs and IAs with a common language and taxonomy that they can use when managing and communicating revisions to their macroeconomic accounts. An important feature of any macroeconomic accounts program includes a regular look at revisions and more importantly revision patterns. This regular type of analysis can highlight the introduction of bias into computation methods or data sources. Undertaking a regular

analysis of revision patterns allows the macroeconomic accountant to detect changes or biases in the underlying source data early in the process and take corrective action in more or less real time. While the exact set of tools that a macroeconomic account program uses depends on the overall design of the given program there are several common features that should be included in the design.

The first thing a macroeconomic accounts program needs to do to embed regular revisions analysis into their macroeconomic accounts program is to set up a revisions database. A revisions database is an information management practice where the program archives vintages of their database following each public release and structures the data in a way that each vintage is comparable with the other. This is analogies to taking a picture of the database after each release and time-stamping the photo. Revisions databases are often referred to as real-time databases or revisions triangles and are used to both analysis revision patterns as well as predict/anticipate or model revisions to high frequency indicators.

A revisions database can take many different structures but in all cases the database requires a vintage variable that marks the date the data were released and the vintage (e.g., initial estimate, second estimate, third estimate). Along with the vintage the program should signal the type of revision that was made. This is where the common language noted above becomes critical. Signaling the type of revision is critical for future analysis. For example, assume that a macroeconomic accounts program wanted to understand the size of its routine revisions but only had a database that has recorded the vintages of data but not the scope of revision associated with each vintage. Using these data, it would not be possible to isolate routine revisions from annual revisions from benchmark revisions. If the program marks the type of revision in its database, then they can filter for routine revisions and focus their analysis on these particular types of revisions.

There are several countries that have established revisions databases. The following is an example of a table Statistics Canada disseminates to its users to help them better understand revisions related to their key economic indicators. The variable "release" represents the vintage of data and is characterized by the actual release date of the data. From the figure below, it is observable that seven vintages of real GDP (all industries) have been released for the reference period November 2018. The key component that is missing from this table is a characterization of the type of revision that occurred over these seven vintages of data. Where they all routine revisions, was one an annual revision, was one a benchmark revision. The addition of this information would increase the analytical usefulness of the table.

| Seasonal adjustment | North American Industry Classification System (NAICS) | Release | Canada (map) | | | | | | |
| | | | Chained (2012) dollars [4] | | | | | | |
			November 2018	December 2018	January 2019	February 2019	March 2019	April 2019	May 2019
	All industries [T001][5]	July 31, 2019	1,947,644	1,945,213	1,949,454	1,944,100	1,954,595	1,960,964	1,965,486
		June 28, 2019	1,946,771	1,944,816	1,948,695	1,943,886	1,954,117	1,959,160	..
		May 31, 2019	1,947,348	1,945,064	1,950,067	1,945,658	1,955,388	..	..
		April 30, 2019	1,943,772	1,942,503	1,949,224	1,946,379	..	..	..
		March 29, 2019	1,944,346	1,943,080	1,949,855	..	..	..	..
		March 01, 2019	1,944,801	1,943,639	..	..	..	..	..
		January 31, 2019	1,944,042	..	..	..	..	..	..
		December 21, 2018	..	..	..	..	..	..	..
		November 30, 2018	..	..	..	..	..	..	..
		October 31, 2018	..	..	..	..	..	..	..
		September 28, 2018	..	..	..	..	..	..	..
		August 30, 2018	..	..	..	..	..	..	..
		July 31, 2018	..	..	..	..	..	..	..

In addition to developing a revisions database, macroeconomic account programs should develop a standard set of measures/indicators they use to summarize and communicate information related to the revisions to their users and for their own quality assessment. Below are some of the more common summary measures used by various countries over the last number of years.

Range of Revision – is defined as the difference between the highest upward revision and lowest downward revision and is intended to help measure the dispersion of revisions. For example, assume that a user is interested in analyzing revisions to the growth in real gross domestic product. Assume that the largest upward revision is 0.5 per centage points and the largest downward revision is -0.6 percentage points. The revision range would be 0.5 to -0.6. All revisions fall within this range.

Mean Revision – is defined as the mean value of a range of revisions. For example, assume that the revisions to the first quarter growth in real gross domestic product over the last four quarters were 0.1, 0.2, -0.3 and 0 per centage points. The mean revision would be 0 per centage points (0.1+0.2+-0.3+0)/4.

Mean Absolute Revision – is defined as the mean of the absolute values of a range of revisions. For example, assume that the absolute revision to the first quarter growth in real gross domestic product over the last four quarters was 0.1, 0.2, 0.3 and 0 per centage points than the mean absolute revision is 0.15 per centage points. This is generally more analytically

useful as it avoids offsetting revisions and therefore provides more information than the mean revision.

Acceleration / Deceleration – is defined as the percentage of times the revised estimate signals the same acceleration / deceleration as a prior vintage. For example, consider the initial and revised estimates of growth in real quarterly gross domestic product in the following table. In this case the revised estimate provided the same signal 66 percent of the time.

Date	Initial Estimate	Revised Estimate	Same Signal
Q1	0.2	0.3	
Q2	0.3	0.3	No
Q3	0.5	0.4	Yes
Q4	0.2	0.3	Yes
			66% (2/3)

Median Revision – is defined as the median value in a range of revisions. The median is not impacted by outliers.

Median Absolute Revision – is defined as the median absolute value in a range of revisions. The median absolute revision is not impacted by outliers nor the cancelling out effect of negative revisions on positive revisions.

Percentage of Upward Revisions – is defined as the percentage of times over a range of revisions that revised estimate is higher than the prior vintage.

Percentage of Downward Revisions – is defined as the percentage of times over a range of revisions that the revised estimate is lower than the prior vintage.

In addition to these summary measures, macroeconomic account programs are encouraged to compute measures of standard deviation, variance, and t-tests to further identify any bias or anomalies in the data. For example, the compiler can conduct a t-test on the mean to see if it is statistically significantly different from zero to test for bias.

The above is a small set of summary statistics that programs can calculate on a regular basis as a way of monitoring their program. The final toolkit that a program selects should be designed around their particular program and the needs of their users.

IV. ALIGNMENT TO THE STANDARD

It could be argued that international macroeconomic accounting systems have two main objectives. The first is to inform users about the performance and structure of the national economy and its interaction with the rest of the world and increasingly the environment. The second, and equally important, is to inform the user about the performance and structure of the national economy **relative to all other economies**. For this cross-country comparison to be made there needs to be a common measuring stick that countries can use that reflects the degree to which they align to the international standard. For example, assume that country A declares that it complies with the *2008 SNA* but does not recorded cultivated biological assets in its national accounts. Assume that country B, who is also *2008 SNA* compliant does record cultivated biological assets in its national accounts. While both comply with the latest standard, the asset boundary in each country is slightly different. When comparing the investment data, balance sheets and productivity data of the two countries it is important for the user to understand these differences. It could be that country A does not record cultivated biological assets because they are a negligible part of the economy. If this is the case then this information should also be provided to the user so that they do not attempt to compensate for the different treatment when undertaking the cross country comparisons.

This leads to a third obligation that macroeconomic accountants have to their users regarding revisions. Consumers of macroeconomic statistics should not only expect and require statistical agencies to speak a common 'revision' language and provide a detailed explanation of the revision they should also expect a statistical agency to let the user know if the revision brought them into closer alignment to the international accounting standard and if so, by how much. This information sends two very important signals to users. First, it informs them about the quality of cross-country comparisons. Second, it lets the user know whether they can expect subsequent major revisions in cases where a country remains distance from the international standard.

It should be noted that the choice of the word alignment is purposeful. It is not realistic to expect a country to 'fully' comply to a standard because each country is different and needs to weigh the needs of its users, who may require a country specific accounting treatment, with the need to ensure the resulting data are internationally comparable. Countries therefore strive to align to the international standard but for practical and pragmatic reasons cannot fully comply.

Currently these does not appear to be a generally accepted way to measure a country's alignment to an international accounting standard. The quality of a country's macroeconomic statistics is often judged on whether they have declared that they have implemented the latest accounting standards. Countries stating that they have implemented *2008 SNA*, *GFSM 2014*, *BPM6* all appear to be statistically better off then countries that may still be using *1993 SNA*, *GFSM 1996* or *BPM5*. But what does this mean? How is it defined?

Currently, alignment to an international standard is a very binary definition. If you declare you adhere it is interpreted as if you are 100 percent compliant and if you declare you do not adhere it is assumed that you are not (0 percent) compliant. It is important that, as we anticipate another round of revisions to the international macroeconomic accounting manuals, that we move way from this binary – all or nothing definition. One way to address this issue is to develop an internationally adopted and accepted framework which measures a country's alignment to a standard.

A second reason an 'alignment' framework would be useful is that it will aid users in understanding the potential impact of subsequent revisions. For example, assume that a country undertakes a comprehensive revision where they introduce several conceptual and accounting changes in the compilation of their macroeconomic accounts. Further assume that this revision results in a 20 percent increase in the level of GDP. As a user of this country's data, a logical question is whether there is any work left to be done. Statistical agencies have limited resources and during a comprehensive revision often need to make choices regarding which changes are implemented and which are left on the table. The user needs to know what has been left on the table and could be adopted in the future resulting in a further change in GDP. Building on the earlier example, while the current revision revised GDP by 20 percent, it could be that if the country was not able to implement all the changes they wanted to implement. If they were able to implement all their desired changes GDP would have increased by 30 percent.

An internationally accepted framework that measures a country's alignment to a statistical standard is therefore critical in both helping users assess the quality of the revised data, the international comparability of the revised data and whether future major revisions should be anticipated. So what does this tool look like?

Measuring alignment

The IMF collects country level metadata related to the national accounts program of each member country. This information is useful in helping the IMF provide technical assistance as well as for surveillance purposes. One of the items the IMF collects is whether the country is *2008 SNA* compliant. The determination of compliance is somewhat subjective and as noted above is based on whether the country has implemented some of the key *2008 SNA* update features and is able to supply a minimum set of data to its users.

A recent IMF survey (2018-19) shows that around 50 percent of the 189 countries included in the sample have not implemented yet the 2008 SNA (see Figure 2).

Figure 2 – Share of countries that have indicated alignment with the *2008 SNA* standard
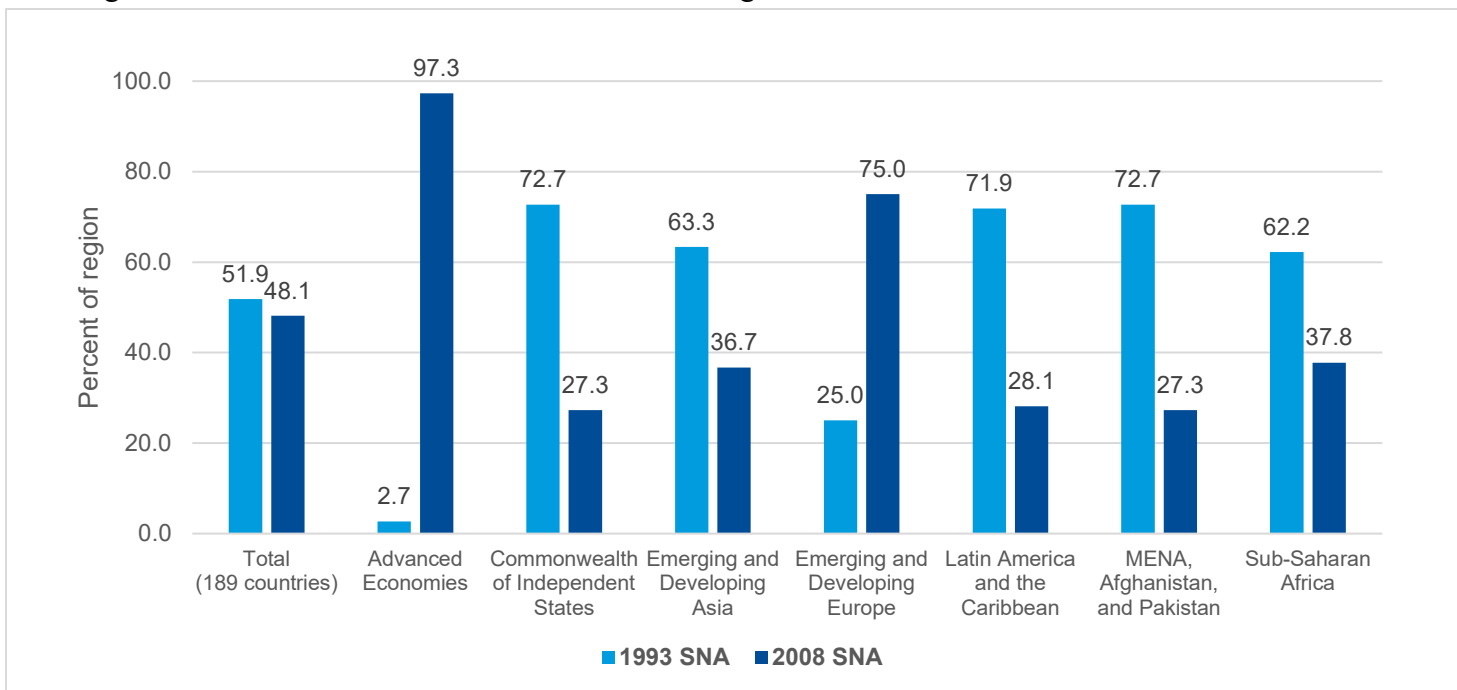
Source: IMF staff.

As discussed early, at a very high level the basic components of an international macroeconomic accounting standard include a set of (1) concepts/definitions, (2) accounting rules and (3) classification systems. One way to assess the degree of alignment with the latest international standard would be to establish a grid that a country could use to gauge its level of alignment to the latest standard. The grid can be developed around the key components of the framework. namely: the concepts/definitions, the accounting rules and the classifications. Each of these categories can be further broken down into a set of sub-categories that encompass the main features of the system. The countries would then indicate their level of alignment (fully, partially, not aligned or not applicable) with each category. The result is a dashboard that can be provided to users so that they can assess the overall level of alignment as well has how the alignment changed following a major revision. They can also compare one country's alignment with that of another country to determine, at a high level, the quality of any cross- country comparisons that are made.

Category	Sub-Category	Fully Aligned	Partially Aligned	Not Aligned	N/A	Weight
Concepts						
	Production					
	Observed market output					
	Non-observed market output.					

		Non-market output				
		Output for own final use.				
		Imputed Services				
	Assets					
		Dwellings				
		Other buildings and structures				
		Machinery and Equipment				
		Weapons Systems				
		Cultivated biological resources				
		Intellectual Property Products				
		Valuables				
	Economic Territory					
		Domestic Territory				
		Enclaves				
Accounting Rules / Methods						
	Valuation					
	Time of Recording					
	Aggregation, Netting, Consolidation					
	Seasonal Adjustment					
	Deflation					
	Index Aggregation					
Classifications						
	Institutional Sectors					
		Households				
		Non-profit institutions				

	serving households					
	General Government					
	Non-financial corporations					
	Financial corporations					
	Non-residents					
	Stocks, Transactions and Other Flows					
	Products					
	Industries					
Products / Accounts						
	Production Account					
	Generation of Income Account					
	Allocation of Primary Income Account					
	Distribution of secondary income account					
	Use of disposable income account					
	Capital Account					
	Financial Account					
	Other Change in Asset Account					
	Balance Sheet Account					
	Supply and Use Tables					

While an alignment dashboard would be useful, as with most macroeconomic accounting frameworks, the utility increases if the dashboard can be summarized into a single robust aggregate measure or score that can be consistently measured across countries and through time. While there are several ways to do this, at the very basic level it involves weighting each of the cells in the dashboard and aggregating the weighted scores to arrive at a summary measure. Unfortunately, the introduction of this weighting scheme will introduce subjectivity into the process, something the alignment framework is attempting to eliminate in the first

place. One way to address this issue is to select the weights in such a way that they can be universally applied (and accepted).

Ideally the weights would be assigned by taking into consideration international experience and judgement with respect to the relative importance the concept, definition, accounting rule or classification has on the degree of alignment with the intended goal of the standard (that being a comprehensive, consistent measure of economic activity). For example, in most cases market output is generally the largest component of an economy. In this case, market output would receive a slightly higher weight than non-market output. While this may be true generally, it is not true in all cases since certain economies are non-market oriented. In fact, while it may be possible to develop average weights, a given economy is anything but average.

Given this, it may be best to let the country chose the weights based on their assessment of the structure of their economy. Clearly, this opens the possibility that countries can use the framework to present the 'degree' to which they want to be aligned. Provided countries are required to publish the weights users will be able to make their own assessment of the reasonableness of the score.

Since the main purpose of the grid is to assess the comprehensiveness with which the country measures economic activity it is probably only appropriate to apply the weighting scheme to the key concepts. The concepts embedded in an international accounting framework determine what gets measured and therefore signals the comprehensive nature of the estimate. For example, assume that the international standard states that the concept of production includes the production of market purchased child-care services (daycare) and own-account child care services (the service of looking after your own children). If a country only measures market purchased child-care services, then its total output (and GDP) will be lower than a country that measures both market and own-account child-care services.

Using the weights and the scoring related to each component of the framework allows an NSO and IA to develop an aggregate alignment score for a given country. Because the same framework is used across countries the NSOs and IAs can reasonably compare the scores from one country to the next. Provided precision is not demanded and users are only looking for general trends or orders of magnitude the resulting scores can provide important information about a country's alignment. This information could be consulted when comparing one country's data with another or identifying whether future revisions may be necessary.

To illustrate how a given score could be determined for a given country consider the following example using the proposed alignment framework. As a first step each category under production and assets are provided a weight. The weight represents what the compiler feels is the true weight (the share if everyone was completely and accurately measured) of

output for each category in their economy. Further, if the compiler feels they are fully aligned they provide themselves a score of 10. If they are partially aligned the get a score of 5 and if they are not aligned the get a score of 0. If the category is not applicable, then the score should be set to 10 (fully aligned). The weighted score is simply the original weight*(score/10). In the following example, the production coverage is 70 and the asset coverage is 80.

Sub-Category	Fully Aligned	Partially Aligned	Not Aligned	Weight	Weighted Score
Production				100	
Observed market output	10			50	50
Non-observed market output.			0	10	0
Non-market output		5		20	10
Output for own final use.		5		5	2.5
Imputed Services		5		15	7.5
				100	**70**
Assets					
Dwellings	10			30	30
Other buildings and structures	10			20	20
Machinery and Equipment	10			20	20
Weapons Systems			0	5	0
Cultivated biological resources			0	10	0
Intellectual Property Products	10			10	10
Valuables			0	5	0
				100	**80**

It is clear that these measures are imprecise at best, but they do provide an order of magnitude with respect to a country's alignment as well as how much a country's output or total wealth would increase if the country moved to fully alignment with the standard. While these are based on the NSOs self-assessment, a user could quickly adjust the weights using different assumptions and re-calculate the score.

Not only can the grid be used ex-post to measure a country's degree of alignment with an international standard the grid could also be used a priori to help IAs and NSOs understand

and present proposed updates to international accounting manuals. For example, if a proposed change is going to alter a concept or definition then it can be assumed that the level of GDP will change. If the proposed change is related to the way information is presented, then it can be assumed that the level of GDP will not change.

Finally, the use of an implementation measurement framework will change how users perceive the quality of macroeconomic accounts when revised standards are introduced. Currently, when a new manual or standard is introduced the first reaction of users is that it means the data produced under the old standard are no longer relevant and the quality is suspect. For example, when the United Nations Statistical Commission (UNSC) endorsed the *2008 SNA* there was a sense among national account compilers and users that the data produced by national accountants were no longer relevant. In many ways the key changes between the *1993 SNA* and *2008 SNA* had very little bearing on most economies. Their implementation was therefore more or less automatic because there was nothing left to implement. If a country maintained an implementation framework as described above data users would clearly see the impact the revised standard could have on a country's key macroeconomic aggregates before the new standard is adopted. It becomes a pre-implementation assessment tool.

The above tool is an illustration of what needs to be developed to better manage the updating and implementation of international macroeconomic accounting manuals. The exact assessment tool needs to be developed through discussion and dialogue with NSOs and IA.

V. CONCLUSION

IAs and NSOs are considering revising international macroeconomic accounting standards such as the BPM and SNA. If revised, these new standards will trigger a round of substantive updates to macroeconomic accounts and indicators. These revisions will need to be communicated to users along with some indication about how closely aligned a country is with the revised international standard. Prior to undertaking these updates and subsequent revisions it would be wise for the international community to adopt a 'revisions framework' that would allow NSOs and IA to properly communicate this information to each other and to their data users. This framework will ensure that NSOs and IAs speak the same language, present sufficient detail so that users can understand and assess the quality of the revision and have an indication of how the new estimates align with international standards and if more revisions can be expected.

This paper has presented a proposed framework as a means to engage NSOs and IAs in an active discussion on the subject and as a form of encouragement for these organizations to come together and develop such a framework that will benefit both the producers and consumers of macroeconomic data.

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