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A FRAMEWORK TO ASSESS THE TRADE-OFFS BETWEEN TIMELINESS AND ACCURACY AND RELIABILITY OF SHORT-TERM ECONOMIC STATISTICS

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A. INTRODUCTION

The trade-off between timeliness on the one hand, and accuracy and reliability on the other is a well known dilemma for the agencies responsible for the production of statistics. The consideration of this trade-off by the compiling agencies is accounted as a required element of quality of the statistics and as such is included in the data quality assessment framework (DQAF) of the IMF used for the quality assessment of member countries' data. However, in practice it has proven difficult to balance these two quality aspects of data.

This trade-off is very relevant for short-term economic statistics, which are required as timely as possible. This is needed for monitoring economic behavior as close to the events, and for timely policy making.

Timeliness can be clearly defined, however, there is no clear measurement on accuracy and reliability. Precise accuracy measures are usually not possible for short-term economic data as the true values are not known. Although statistical methods are available to provide indicators of accuracy for sampling surveys results, there are no quantitative accuracy indicators available for short-term economic statistics based on non-random sampling methods of data collection. Moreover, no quantitative measures of accuracy and reliability are possible for short-term macroeconomic statistics (e.g. quarterly national accounts) which are based on a wide variety of different data sources. For the two latter kinds of statistics the closeness of a given early estimate to the final estimate seems to be the more acceptable indicator of accuracy and reliability.

B. Timeliness of statistics

Timeliness is defined as the time lag between the end of the reference period of a given indicator and the point of time at which it becomes available for users¹. Timeliness is a relative issue that depends on the perception of the users, the kind of statistics and the intended uses of the statistics. The international quality standards as required by the IMF's DQAF establish that a good standard for quarterly data is in general two months after the end of the reference period. For monthly data, such as monthly industrial production indices or the consumer price index, the standard timeliness requirement is 30 days after the end of the reference period. These are standards met by most countries, and depending on the nature of the data, without detriment to its accuracy. A case in point is consumer price indices, which are usually not revised after publication. On the other hand, statistics on production or trade turnover that are based on returns from respondents are more susceptible to delays due, inter-alia, to the need for the respondent to rely on accounting reports that may take time to compile. To meet the standards of timeliness, the statistics offices need in those cases to resort to statistical techniques to fill the gap of information to provide a preliminary estimate until more complete data are collected.

¹ A definition of timeliness is given by Werner Bier and Henning Ahnert in an article published in Dutch in "Economisch Statistische Berichten (EBS)", 15 March 2001, No. 4299. This definition reads: "Timeliness represents the time taken to compile and publish any statistical indicator, measured from the end of the reporting period".

In the aforementioned case, a valid question is what is the minimum accuracy requirement for these statistics to be produced and disseminated in accordance with the good practice of timeliness?

The perception of timelines may be different among users and between them and the compiling agencies. On the extreme, some users would actually prefer to have forecasts, that is, estimates of the data before the events actually happen. However, such estimates are generally not within the responsibilities of statistical agencies. For many users, especially those engaged in daily operations in the financial markets, a one month lag between an event and its measurement can be considered too long. It is thought that some users, mainly in the business community, are usually less concerned with accuracy and what they need is fast data in order to have an “idea” of how things are going and not an exact measure, which is more the tendency followed by compilers.

The availability of the statistics on a specific economic variable close to the time that it occurs is also a function of the production of statistics process. That is, it depends on the efficiency of the collection and processing procedures as well as the institutional and legal environment. In other words, timeliness subject to a given level of accuracy may be improved by improving the efficiency of the statistic production process.

The introduction of new communication and data processing technologies may have significantly contributed to obtaining more timely data. It may have also contributed to a higher degree of accuracy by eliminating some sources of errors in data transmission, transcription and processing. However, one should not assume that these kinds of improvements will continuously result in improvement of timeliness, especially in countries with very well developed statistical systems and efficient statistical processes in place. Thus, the trade-off between timeliness and accuracy is still a very valid question that cannot be solved simply by increasing the efficiency of production.

C. Accuracy and reliability

The concepts of accuracy and reliability are closely related and have frequently been used as indistinguishable concepts. The terms “non-accurate statistics” and “non-reliable statistics” are both associated with errors in the data. In the context of this paper, accuracy means the discrepancy (error) of the data with respect to the “true” and generally unknown value of the target variable. On the other hand, reliability refers to the discrepancy between any preceding estimate and the final estimate of the target variable.

The “Encyclopedia of Statistical Sciences” states that accuracy concerns the agreement between statistics and target characteristics. Statistics do not provide exact values of the target variables as they are subject to sampling as well as non-sampling errors (errors in response, transcription errors, non-response, etc.). So an agreement has to be made in respect of the discrepancy between the statistics and the true value of the target variable. The smaller the discrepancy, the more accurate are the statistics. The difficulty is to measure the discrepancy if the true value of the target variable is not known, which is the most typical situation. In sample based surveys the degree of accuracy is given by statistical indicators like the sampling error or confident intervals, which provide the probability that an estimate will fall between a given interval of possible values around the measured value.

The required accuracy usually will decrease with increasing details of the data, thus a higher accuracy is expected from the total production index than for its components (e.g., the index for a specific class of the industrial classification). A conventional practice from a statistical point of view to assess accuracy is to determine the acceptable margin of error for the statistics, such as determining that for statistics derived from sampling surveys a 5% sampling error for the total with a 95% degree of certainty is acceptable. The IMF’s DQAF does not assess accuracy in these terms but rather in terms of coverage of the data, the

affinity of the concepts, whether actions are taken to improve the samples when the errors become large (without defining what is to be considered large) and whether or not the data are assessed for possible discrepancies arising from comparisons with alternative sources.

It is more difficult to measure accuracy for statistics derived from non-sampling surveys (cut-off samples and convenience samples). Some economic statistics, such as production indices, are likely to be within this category as products and industries are, in many cases, selected using non-random procedures. Similarly, products included in price indices baskets, are frequently selected on a judgmental basis.

For the purpose of this discussion it is assumed that accuracy in the terms of the discrepancy with the true value of the target variable has been properly dealt by the statistical agencies and the question is to what extent the agreed degree of accuracy can be compromised to improve timeliness. In other words, it is assumed that each statistical agency has made its choice of the degree of accuracy that satisfies its users and the statistics are produced accordingly (with compatible coverage, sample sizes, etc.) within a given time framework. In that case, the benchmark for the statistics values are the final data produced after all the information is received and processed (the data corresponding to the final revision). A practical criterion to determine the extent to which preliminary estimates based on incomplete and less scrutinized data can be acceptable in terms of accuracy is to determine the degree of discrepancy to be accepted between these earlier estimates and the final estimates of the target variable^{2,3}. As the final estimates are assumed to be more close to the true value of the target variable, a reliability indicator (discrepancy between earliest estimates and the final one) can give a quantification of the error. Thus, higher reliability of the earliest estimates implies higher accuracy as well.

D. The trade-off

Any estimate before the reference period is completed is considered in this paper as a forecast and as such not a subject of this discussion. The trade-off as defined here plays a role when the purpose is to improve timeliness by shortening the period between the end of the reference period of the statistics (end of the month or end of the quarter) and the time at which the statistics are published. The amount of accuracy traded with each improvement in timeliness is understood, as explained previously, by an expected increasing discrepancy between the more timely estimate and the final estimate.

A criterion can be determined as the margin of the discrepancy between the earliest estimates and the final estimates that is acceptable. This margin could be established as the percentage difference of the absolute values (whether of indices or money values) or a percentage difference between growth rates derived from the statistics. The latter seems to be more relevant for short-term economic indicators which are aimed to monitor developments of the economic variables. A measurement of the discrepancy can actually be obtained by simulating the estimations at different points in time which likely implies the use of incomplete data and imputations as well as possibly a more simple production processes for the earliest estimates. In that way, learning from the simulation, a measurement of the trade-off between the accuracy and the timeliness of the estimates might be obtained.

² This criteria is the same as proposed by Bier and Ahnert in the article mentioned in foot note 1 of this paper.

³ Measurement of revisions as indicators of data quality of macroeconomic statistics (national accounts and balance of payments) are reviewed in the IMF Working Paper "Assessing Accuracy and Reliability: A Note Based on Approaches Used in National Accounts and Balance of Payment Statistics", by Carol S. Carson and Lucie Laliberté. IMF working paper WP/02/24, February 2002.