BALANCE OF PAYMENTS STATISTICS

AND EXTERNAL RESERVES DIVISION

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PROPOSAL FOR MEASUREMENT OF STABILITY AS A QUALITY INDICATOR

For information of the IMF BOP Committee

1.   In the context of the ongoing discussion on the future of the balance of payments (b.o.p.) and international investment position (i.i.p.) collection systems, the Working Group on Balance of Payments and External Reserves Statistics (WG-BP&ER) supported the development and definition of standards to provide, whenever possible, quantitative measure of statistics quality.

2.   This note proposes a standardised approach to measure the <u>stability</u> of b.o.p. data. Stability is one of the quality dimensions and it refers to the application of revisions to the first assessment of published/released data. Statistics are defined as stable when the first assessments are not significantly revised in later assessments. This note also takes on board the comments received from Member States. The calculation of the proposed standard measure of stability (SMS) can be summarised in three steps: i) calculation of the volatility of the series, ii) calculation of the average magnitude of applied revisions, iii) calculation of the SMS as a ratio, revisions versus volatility.

3.   The first step aims at providing a measure of the information content of the statistical series. The assumption being that the more volatile (erratic) the series is, the higher is the information content of the single (monthly or quarterly) observation[1]. This measure is necessary to compare the magnitude of the revisions applied to the information content provided by the series.

4.   The key principles of the measure of the volatility can be defined as follows:

a) the measurement should be applied in the most recent release of the data, under the assumption that the latter are more accurate than the previous release;

b) the measure should aim at calculating the magnitude of the erratic component of the series only, without taking into account trends, cyclical and seasonal components and any other systematic components of the series.

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[1]   A statistical series very volatile in its erratic component is more difficult to forecast, hence the information provided by each observation is extremely valuable because widely unexpected. On the contrary, a "stable" series cointains less information in its single observations as they are more predictable.

5.   Let us assume that the series under study contains N observations $x_i^{(f)}$, where f is a time indicator (for instance expressed in days) that define the lag elapsed between the end of the reference period and the release of the observation[2]. It is proposed to represent the systematic component of the series with the median of the series $\tilde{x}^{(f)} = median(x_1^{(f)},...,x_i^{(f)},...,x_N^{(f)})$, which is the value representing the center of the distribution of the observations (50% of the observations are smaller than the median and 50% are bigger). Under these assumptions a measure of the volatility might be given also by the median of the absolute value distances from the above described median.

$$V(f) = median\left(\left|x_1^{(f)} - \tilde{x}^{(f)}\right|,...,\left|x_i^{(f)} - \tilde{x}^{(f)}\right|,...,\left|x_N^{(f)} - \tilde{x}^{(f)}\right|\right). \quad (1)$$

6.   The second step aims at providing a measure of the average magnitude of the revisions applied. The key principles of the latter measure can be defined as follows:

a) revisions are defined as the difference between a subsequent and a previous assessment of the observations;

b) the measure should assess how much the first information released has been modified, therefore the sign should be neutralised under the assumption that the direction of the revision does not matter.

7.   Let us assume that for each of the N observations the revision is defined as the difference between the subsequent and the previous observation $r_i^{(f,k)} = x_i^{(f)} - x_i^{(k)}$, where k (with $k<f$) is again a time indicators that define the lag elapsed between the end of the reference period and the release of the previous observation. The magnitude of the revisions might be given by the median of the absolute values of the revisions

$$R(f,k) = median\left(\left|r_1^{(f,k)}\right|,...,\left|r_i^{(f,k)}\right|,...,\left|r_N^{(f,k)}\right|\right).$$

8.   The last step consists in building a ratio which compares the average revision with the volatility, providing an indicator which does not depend on the size of the flows of the b.o.p. series. The indicator can therefore be used to compare the stability of different items of the same b.o.p. statement or to compare the stability of different countries' b.o.p. The SMS is given by the formula

$$SMS(f,k) = R(f,k)/V(f),$$

indicating that a high stability is achieved when the indicator is close to zero.

9.   The parameters f and k serve the purpose of better characterise the indicator in order to allow more consistent comparisons between different measure of stability. As an example a SMS (180,60), with the first observation after 60 days and the second after 180, it is expected to indicate a higher stability than a SMS(180,30) in which the first observation was released within a far shorter time lag. In addition, the time parameters allow the calculation of several SMSs for the same time series. For example if the same data are published in three releases, after 30, 90 and 360 days respectively, one could calculate three different indicators: SMS (360,30), SMS (360,90) and SMS (90,30).

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[2] It is important that the indicator f is the same for all observations, in order to work on data observed in a consistent time lag.

10. It should be noted that, depending on the series, the systematic components present in the series (trend, cycle, seasonal, etc.) might be quite complex. In these cases the implicit assumption that they could be adequately represented by the median might result to be too weak. For these reasons the proposed SMS is appropriate when the series do not show clear trends, cyclical or seasonal components, as it is often the case for many financial account items of the b.o.p. For other items (i.e. goods), which present more complex systematic components the application of the formula (1) to calculate the volatility is not deemed appropriate. **It is therefore considered to apply the SMS only on financial account items of the b.o.p.**

11. One way to overcome the presence of systematic components in the series is the use of the MAPE (mean average percentage error) as stability indicator. The MAPE is expressed by the formula

$$MAPE(f,k) = \frac{1}{N} \sum_{i=1}^{N} \left| \frac{r_i^{(f,k)}}{x_i^{(f)}} \right|$$

12. However, as the MAPE works on percentage changes, it can be used only for gross series (series which do not contain negative values). As a consequence, **it is proposed to use the MAPE for credits and debits of the current and capital account**, while the SMS could be used for the financial account items.

13. For an interim period, the stability indicators will be calculated by the ECB every quarter on real b.o.p. data. No publication is envisaged for the time being.