Calculation of the benchmark allotment amount in main refinancing operations

This box explains how the ECB calculates the benchmark allotment amount for its regular main refinancing operations (MROs). The benchmark allotment is defined as the MRO allotment that will allow counterparties to smoothly fulfil their reserve requirements taking into account i) the future liquidity needs from reserve requirements, autonomous factors and excess reserves, ii) the future liquidity supply through other refinancing operations and other monetary policy instruments, iii) the accumulated liquidity imbalance recorded in the course of the maintenance period, and iv) an assumption that, on a forward looking basis, there will be zero net use of standing facilities (marginal lending and deposit facility). For any given MRO, the first calculation of the benchmark is published on the announcement day of the operation, while a second revised calculation is published on the allotment day. The Eurosystem's indicative tender calendar makes the MRO dates available in advance.

In what follows, the benchmark allotment calculated on the basis of information on day t is denoted by M_t^{bench}, where t denotes either the announcement day or the allotment day of the particular MRO for which the benchmark is calculated.

$$M_t^{bench} = \frac{1}{H_t - X_t}\left[\underbrace{D_t \cdot (RR + ER - \overline{CA_t})}_{\text{Accumulated liquidity imbalance}} + \underbrace{H_t \cdot (\overline{AF}_t + RR + ER)}_{\text{Future liquidity needs}} - \underbrace{H_t \cdot (L + P + F) - X_t \cdot M^{mat}}_{\text{Liquidity already provided}} \right]$$

where

H_t = number of days from (and including) day t to (and including) the day before the maturity day of the MRO for which the benchmark is calculated. In the case of a "regular" tender schedule, H_t is equal to 9 when the benchmark is calculated on the MRO announcement day, and it is equal to 8 on the MRO allotment day.

X_t = number of days from (and including) day t to (and including) the day before the settlement of the MRO for which the benchmark is calculated. According to the "regular" tender schedule, X_t is equal to 2 on the MRO announcement day and equal to 1 on the MRO allotment day[1].

D_t = number of days from (and including) the first day of the reserve maintenance period to (and including) day t-1.

RR = daily average required reserves of the relevant reserve maintenance period.

ER = forecasted daily average excess reserves for the relevant reserve maintenance period.

$\overline{CA}_t$ = average current account holdings since the beginning of the reserve maintenance period until day t-1, covering the effect of liquidity supplied via the monetary policy portfolios[2] until t-1 for the calculation on the MRO announcement day and assuming an unchanged size of monetary policy portfolios for the calculation on the MRO allotment day.

$\overline{AF}_t$ = estimate of average autonomous factors for the period covered by H_t .[3]

On the MRO announcement day this estimate is simply given as the one published by the ECB, $\overline{AF}^{publ}$, which always covers the period from (and including) the MRO announcement day to (and including) the day before the maturity day of the MRO for which the benchmark is calculated.

However, on the MRO allotment day, the updated forecast published by the ECB, $\overline{AF}^{rev}$, covers one day (the MRO announcement day) on which the ex post autonomous factors are known (i.e, AF_{t-1}). These ex post autonomous factors need to be subtracted from $\overline{AF}^{rev}$, so that the revised estimate $\overline{AF}_t$ only covers days on which

---

[1] *N.B. When the MRO settlement date marks the beginning of a new maintenance period, X_t and H_t do not take into account the remaining days of the maintenance period ending (i.e. in a regular case, on both announcement and allotment day $X_t=0$ and $H_t=7$).*

[2] *Monetary policy portfolios refer to the CBPP, SMP, CBPP2, CBPP3, ABSPP, PSPP and CSPP.*

[3] *While the liquidity effect of settled monetary policy purchases is published on a daily basis together with autonomous factors (under "Net liquidity effect from autonomous factors and MP portfolios"), the weekly AF estimates reflect pure autonomous factor forecast values.*

the autonomous factors are not yet known.

In summary,

$$\overline{AF}_t = \begin{cases} \overline{AF}^{publ} & \text{for } t = \text{MRO announcement day} \\ (H_{t-1}\overline{AF}^{rev} - |X_t - X_{t-1}| AF_{t-1})/H_t & \text{for } t = \text{MRO allotment day} \end{cases}$$

where on the allotment day, t-1 refers to the announcement day.

L = expected daily average liquidity supplied by the longer-term refinancing operations in the period covered by H_t.

P = expected daily average liquidity supplied by the monetary policy portfolios up to (excluding) the MRO announcement day, assuming an unchanged monetary policy portfolio size between the MRO announcement and the MRO allotment day).

F = expected daily average liquidity provided/absorbed by other operations (e.g. fine-tuning operations) in the period covered by H_t.

M^{mat} = size of the maturing MRO.

The following **example**[4] shows the computation of the benchmark allotment amount for the MRO announced and allotted on 13 October 2014 and 14 October 2014, respectively.

MRO announcement day (13 October 2014)
By using information made available by the ECB on newswire services on 13 October, the MRO announcement day, including the forecast for the average daily autonomous factors for the period 13 to 21 October of €467.3 billion, and applying a forecast of daily average excess reserves of €87.3 billion, the following benchmark allotment results:

$$M^{bench}_{\text{announcement day}} = \frac{1}{9-2}\left[\underbrace{5\cdot(105.7+87.3-202.3)}_{\text{Accumulated liquidity imbalance}} + \underbrace{9\cdot(467.3+105.7+87.3)}_{\text{Future liquidity needs}} - \underbrace{9\cdot(417.3+194.0-0)-2\cdot84.2}_{\textit{Liquidity} \text{ already provided}} \right] = 30.8$$

On that day, the benchmark allotment corresponds to the rounded amount of €30.8 billion. In this case, the benchmark indicates that in order to arrive to balanced liquidity conditions at the end of the coming MRO week (21 October), €30.8 billion would need to be made available (by means of the MRO allotment) to the euro area banking system[5].

MRO allotment day (14 October 2014)
The estimated average autonomous factors for the period 13 to 21 October were revised upwards to €478.2 billion and the realised autonomous factors on 13 October amounted to €473.6 billion. Therefore, on the MRO allotment day, the relevant autonomous factor forecast was:

$$\overline{AF}_{\text{allotment day}} = (9\cdot478.2 - (2-1)\cdot473.6)/8 = 478.8$$

and, hence, the calculation of the benchmark is as follows:

$$M^{bench}_{\text{allotment day}} = \frac{1}{8-1}\left[\underbrace{6\cdot(105.7+87.3-202.2)}_{\text{Accumulated liquidity imbalance}} + \underbrace{8\cdot(478.8+105.7+87.3)}_{\text{Future liquidity needs}} - \underbrace{8\cdot(417.3+194.0-0)-1\cdot84.2}_{\text{liquidity already provided}} \right] = 49.2$$

In this example, the benchmark allotment is €18.4 billion higher on the MRO allotment day than on the announcement day, mainly as a result of the recourse to the deposit facility observed on 13 October, of €23.1 billion, and also a result of upward revised autonomous factors to the amount of €10.9 billion. The change in the benchmark indicates that counterparties would now need to be allotted in total €18.4 billion more over the course of the MRO in order to smoothly

---

[4] *All items required to calculate the benchmark allotment are provided by the ECB via newswire services, apart from (the forecast of) excess reserves, for which realised data are provided after the end of the maintenance period. The benchmark allotment amount published by the ECB is rounded to €500 million.*

[5] *Accordingly, a negative MRO benchmark amount would indicate the excess liquidity that would need to be absorbed on a daily basis, in order to achieve balanced liquidity conditions at the end of the MRO week.*

fulfil their reserve requirements. The publication of the updated autonomous factors figures on the allotment day and the publication of liquidity data of the previous day allow market participants to reconcile changes in the benchmark amount from the announcement to the allotment day.