

Box 3

ESTIMATING EXPECTED LIQUIDITY CONDITIONS IN THE EURO AREA

The ECB provides information on liquidity conditions in the euro area on a daily basis. This box explains this information, which includes data on the Eurosystem refinancing operations, the recourse to standing facilities, the outstanding amounts of covered bond purchase programmes (CBPPs), current account holdings with the national central banks and the reserve requirements of the Eurosystem. With this information, counterparties can also assess the amount of excess liquidity in the euro area.

In addition, the ECB provides information on a weekly basis about the forecast of average daily autonomous factors and the benchmark allotment amount¹ for the main refinancing operations (MROs) – the allotment of which would lead to neutral liquidity conditions during the periods covered. This box will also explain how the forecast of autonomous factors can be useful to counterparties in terms of helping them to better calibrate their recourse to the refinancing operations and to estimate the excess liquidity in the euro area in a fixed rate full allotment policy context.

Daily liquidity figures published by the ECB

Every morning at around 9.10 a.m. CET, the ECB provides information on the key figures relating to the liquidity position of the euro area on the previous day via selected wire services, such as those of Thomson Reuters and Bloomberg². This information, which is extracted from the consolidated balance sheet of the Eurosystem, can be found on the “Outstanding open market operations” (Thomson Reuters ECB39; Bloomberg ECB/15/6/4) and “Information on liquidity conditions in the euro area” (Thomson Reuters ECB40; Bloomberg ECB/15/6/5) pages.

The first of the above-mentioned pages gives a breakdown of the outstanding open market operations (OMOs) and the CBPPs (i.e. the CBPP and CBPP2).³ Meanwhile, the second page displays the information listed below.

- The average reserve requirements (RR) for all credit institutions on the previous day – this figure is usually stable during the maintenance period.⁴
- The estimate of the average daily autonomous factors (AF) that are explained in detail in the next section.
- The outstanding amount of Eurosystem OMOs, excluding the Securities Markets Programme (SMP). This figure includes the outstanding amounts of all reverse transactions (refinancing operations and fine-tuning (liquidity-providing/absorbing) operations), as well as the two CBPPs. Note that information related to the SMP is published on a weekly basis on the ECB’s website⁵.

1 In the context of fixed rate tenders with full allotment, the benchmark allotment amount is currently less relevant from an operational point of view. Nevertheless, it still serves as an indicator of balanced liquidity conditions.

2 Other wire service providers also receive and publish the same information.

3 Additional information on liquidity conditions can be found on other Thomson Reuters and Bloomberg pages. The same information, including historical data, can be found on the ECB’s website: <http://www.ecb.europa.eu/mopo/liq/html/index.en.html>

4 Minor changes may occur from time to time, for example, when a bank is resolved or merged.

5 See <https://www.ecb.europa.eu/mopo/implement/omo/html/index.en.html>

- The recourse to the marginal lending facility (MLF) and the deposit facility (DF) on the previous business day.
- The aggregate current account (CA) holdings of credit institutions with the NCBs on the previous day. The following formula can thus be used to calculate the excess liquidity (EL) prevailing in the euro area on the previous day:

$$EL = CA + DF - MLF - RR$$

- The average current account holdings in the current maintenance period, which is useful for calculating the average excess liquidity from the first day of the maintenance period up to the previous day.
- The net liquidity effect (NLE) from autonomous factors and the SMP, which involves the value of autonomous factors on the previous day excluding the outstanding amount of the SMP. Even though the ECB does not publish information on changes in the SMP on a daily basis, it is still useful in terms of estimating the daily autonomous factors as follows:

$$AF = NLE + SMP$$

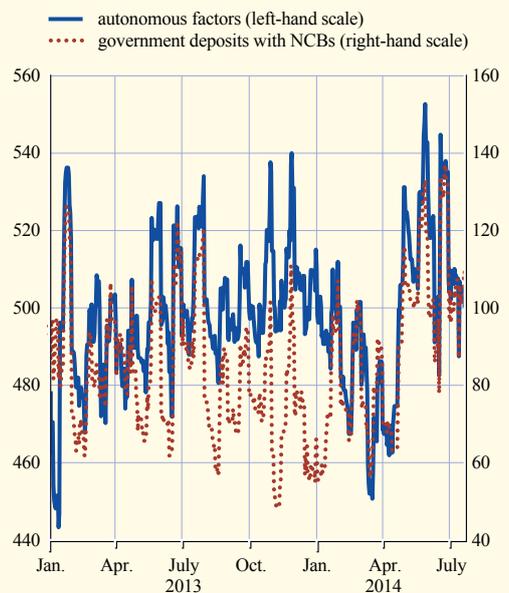
Autonomous factors

Autonomous factors are those items in the central bank balance sheet that do not reflect monetary policy operations or reserve holdings. They are called autonomous because they are not under the control of the central bank. As such, they are a key element in the assessment of liquidity conditions and represent the largest source of uncertainty with regard to estimating the future liquidity needs of the banking system. Autonomous factors can be classified as (i) net government deposits held with the Eurosystem NCBs, (ii) banknotes in circulation⁶, (iii) net foreign assets, (iv) net assets denominated in euro, and (v) other autonomous factors⁷.

Since 2013, the sum of all autonomous factors has fluctuated between €443 billion and €553 billion. However, as can be observed in Chart A, it has pursued a rather volatile path, similar to that observed for government deposits held with NCBs⁸. During a

Chart A Evolution of autonomous factors and government deposits with NCBs

(EUR billions)



Source: ECB.

6 As determined by the behaviour of the public. For further information on autonomous factors, see the article entitled “The liquidity management of the ECB”, *Monthly Bulletin*, ECB, May 2002.
7 These include other balance sheet items such as revaluation accounts, other claims and liabilities of euro area residents, and capital and reserves.
8 Government treasuries might keep their main deposit accounts with NCBs and commercial banks. In this context, liquidity conditions in the euro area are only affected when there are inflows or outflows as regards the accounts with NCBs.

maintenance period, government deposits account for most of the volatility vis-à-vis the share of autonomous factors with a significant cyclical component during a calendar month. Since 2012, the daily changes observed in autonomous factors have averaged around €4.4 billion, as compared with the corresponding figure of €3.7 billion for net government deposits.

Estimating expected weekly liquidity conditions

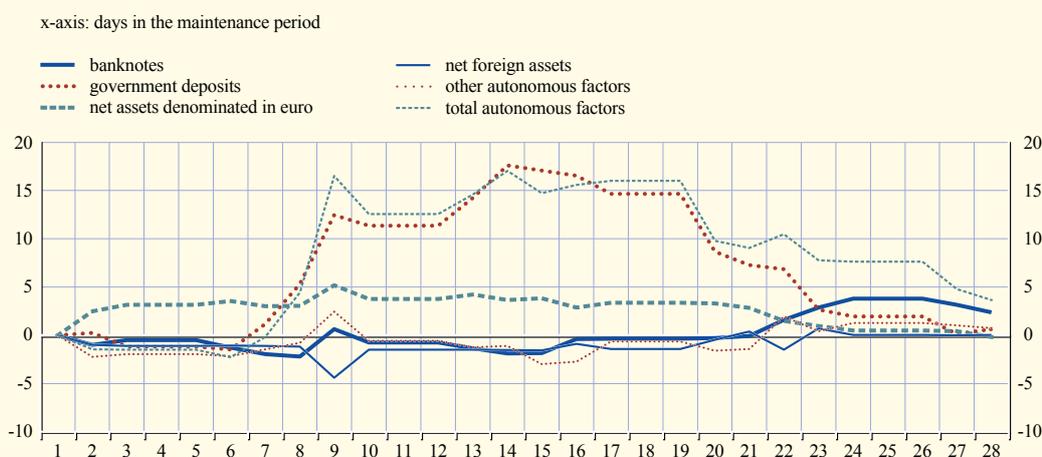
The ECB publishes every week, together with the announcement of the MRO and also with the allotment of the MRO, the forecast of the average daily autonomous factors for the period from the day of the announcement until the day before the maturity date of the MRO⁹. Counterparties can use this information to determine a baseline scenario (considering, for example, unchanged amounts in outstanding tender operations and securities purchased by the ECB) of expected liquidity conditions in the euro area during the MRO week, and also to calibrate their recourse to Eurosystem liquidity operations. The higher the autonomous factors, the lower the expected liquidity.

In order to estimate the average expected liquidity during an MRO week, on the announcement date (t), the realised liquidity on day t-1 needs to be adjusted by (i) the difference between the autonomous factors realised (AFR) on day t-1 and the forecast (as published by the ECB) of the average autonomous factors valid for the week thereafter, and (ii) the expected change in open market operations (including an estimation of early repayments of the three-year longer-term refinancing operations (LTROs)). This should be done as follows:

$$EL_t \text{ (average estimate for the MRO week)} = EL_{t-1} + AFR_{t-1} - AF \text{ forecast}_t - \text{expected LTRO repayments}^{10}.$$

Chart B Evolution of autonomous factors during a 28-day maintenance period

(average data; EUR billions)



Source: ECB.

Note: Maintenance period days do not correspond to calendar days.

⁹ In the first week of each maintenance period, the forecast only covers the period from the settlement date of the MRO until a day before the maturity date of the operation.

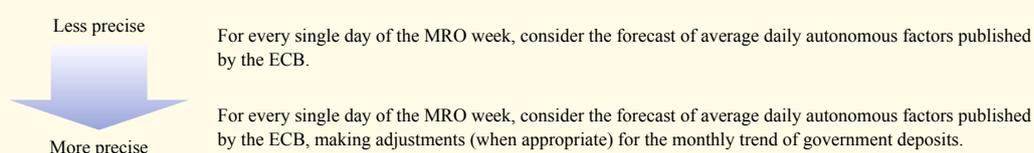
¹⁰ That is, assuming unchanged amounts of other outstanding OMOs during the week concerned.

Note that the fit of the estimate will depend on the difference between the published ECB forecast of the average daily autonomous factors and their realised value. The mean of this difference stands at around €5 billion, with 65% of observations below the mean, based on a two-year sample. In addition, the volatility of autonomous factors might lead to significant fluctuations in liquidity during the MRO week. The average difference between the maximum and the minimum value of autonomous factors during the maintenance period is €44 billion, being mainly driven by the evolution of government deposits (see Chart B). The latter tend to increase when taxes are collected and decline with the disbursement of salaries and pensions. While tax collection activities are concentrated around the last ten days of a calendar month, salaries and pensions are usually paid at the beginning of the month. Hence, when assessing liquidity conditions on a daily basis, a consideration of the likely developments in government deposits is essential in order to anticipate possible shortages of liquidity.

Example: estimating daily liquidity conditions

Counterparties can estimate excess liquidity on a daily basis with the information provided on the aforementioned ECB-related pages and the forecast of average daily autonomous factors. Two simple methods of estimation are presented below (see Chart C). Clearly, the precision of estimates can be increased by making use of more advanced information¹¹.

Chart C Two simple methods of estimating daily liquidity conditions



Source: ECB.

The table in this box uses two MRO weeks of the first maintenance period of 2014 to show how excess liquidity can be estimated on a daily basis. The green shaded area (columns I to IV) represents data made available to the market by the ECB, i.e. with a one-day lag and via the wire services. The data involve: the expected outstanding refinancing and fine-tuning operations¹² (column I), the outstanding amounts of securities purchased by the ECB (column II), reserve requirements (column III), and, finally, the realised autonomous factors as a sum of the NLE and outstanding SMP holdings (column IV).

Column V shows the calculation of realised excess liquidity, which is based on the data provided to the market that is displayed in the green area. If one recalls, these data are always provided for the previous day. Hence, the computation conducted under column V also refers to the day before.

In the blue shaded areas, liquidity conditions are estimated using the two methods described above, i.e. by only considering the forecast of average daily autonomous factors published by the ECB (light blue area) and by using the same forecast, but adjusting it to reflect an estimation of the monthly evolution of government deposits (dark blue area). The numbers for Tuesday,

¹¹ More refined models can be used for more accurate estimations.

¹² The outstanding value of refinancing and fine-tuning operations is always known a day in advance unless there are operations where settlement and allotment take place on the same day.

21 January are in bold and serve as an example. In order to estimate the excess liquidity for this day, the expected change in liquidity conditions needs to be assessed (column VII). This corresponds to the day-to-day difference in reverse transactions¹³ (RT; column I) as well as the difference between the realised autonomous factors on the previous day (column IV) and the forecast of autonomous factors.

$$EL_t (\text{estimate}) = EL_{t-1} + AF_{t-1} - AF_{\text{forecast}_t} + (RT_t - RT_{t-1})$$

For this observation, the day-to-day difference in reverse transactions equals nil in the absence of liquidity-providing or absorbing operations or early repayments of three-year LTROs. Hence, the expected change in liquidity conditions consists of the difference between the realised autonomous factors on the previous day (column IV) and the autonomous factor forecast (column VI). On 21 January this difference equalled -€17.1 billion (column VII). Finally, excess liquidity (column VIII) can be estimated by adding the -€17.1 billion expected change in liquidity to the previously realised excess liquidity (column V).

The same estimation is performed in the dark blue area, but the forecast of average daily autonomous factors is adjusted to take into account the evolution of government deposits (column X) – a matter of particular relevance during the tax collection period and at the beginning of the month, when salary and pension disbursements take place. Note that the mean of the daily error for the more precise estimate including expectations about government deposits stands at €3.6 billion – almost half the magnitude of the less precise estimate of €6.5 billion.

Estimations of daily liquidity conditions in a sample period

(EUR billions)

Reference date (2014)	Refinancing and fine-tuning operations I	Outstanding volumes of securities II	Reserve requirements III	Realised autonomous factors IV	Realised excess liquidity V = I + II - III - IV
Mon., 20 Jan.	493.4	233.8	103.6	484.3	139.4
Tue., 21 Jan.	493.4	233.8	103.6	498.3	125.3
Wed., 22 Jan.	540.9	233.8	103.6	499.9	171.2
Thu., 23 Jan.	540.9	233.8	103.6	509.9	161.2
Fri., 24 Jan.	540.9	233.5	103.6	502.7	168.1
Sat., 25 Jan.	540.9	233.5	103.6	502.7	168.1
Sun., 26 Jan.	540.9	233.5	103.6	502.7	168.1
Mon., 27 Jan.	540.9	233.5	103.6	500.8	170.1
Tue., 28 Jan.	540.9	233.5	103.6	497.1	173.7
Wed., 29 Jan.	537.4	233.0	103.6	502.0	164.9
Thu., 30 Jan.	540.5	233.0	103.6	511.9	157.9
Fri., 31 Jan.	540.5	233.0	103.6	500.3	169.6
Sat., 1 Feb.	540.5	233.0	103.6	500.3	169.6
Sun., 2 Feb.	540.5	233.0	103.6	500.3	169.6
Mon., 3 Feb.	540.5	231.3	103.6	482.3	185.9
Tue., 4 Feb.	540.5	231.3	103.6	480.8	187.4

Source: ECB.

¹³ Reverse transactions include refinancing operations and fine-tuning (liquidity-providing/absorbing) operations. Changes here are known a day in advance unless they are related to operations where settlement and allotment take place on the same day.

Estimations of daily liquidity conditions in a sample period (cont'd)

(EUR billions)

Reference date (2014)	Estimation without adjusting for the monthly evolution of government deposits				Estimation adjusting for the monthly evolution of government deposits			
	Autonomous factors forecast	Expected change in liquidity	Estimation of liquidity	Error	Autonomous factors	Expected change in liquidity	Estimation of liquidity	Error
	VI	VII	VIII	IX	X	XI	XII	XIII
		$= IV_{t-1} - VI_t + I_t - I_{t-1}$	$= V_{t-1} + VII_t$	$= VIII_t - V_t$		$= IV_{t-1} - X_t + I_t - I_{t-1}$	$= V_{t-1} + XI_t$	$= XII_t - V_t$
Mon., 20 Jan.								
Tue., 21 Jan.	501.4	-17.1	122.3	-3.1	499.7	-15.4	124.0	-1.4
Wed., 22 Jan.	501.4	44.4	169.7	-1.5	500.4	45.4	170.7	-0.5
Thu., 23 Jan.	501.4	-1.5	169.7	8.5	501.4	-1.5	169.7	8.5
Fri., 24 Jan.	501.4	8.5	169.7	1.6	502.0	7.9	169.1	1.0
Sat., 25 Jan.	501.4	1.3	169.5	1.3	502.0	0.7	168.9	0.7
Sun., 26 Jan.	501.4	1.3	169.5	1.3	502.0	0.7	168.9	0.7
Mon., 27 Jan.	501.4	1.3	169.5	-0.6	502.2	0.5	168.7	-1.4
Tue., 28 Jan.	492.2	8.6	178.7	4.9	497.0	3.8	173.9	0.1
Wed., 29 Jan.	492.2	1.5	175.2	10.3	497.2	-3.5	170.2	5.3
Thu., 30 Jan.	492.2	12.8	177.7	19.7	497.3	7.7	172.6	14.6
Fri., 31 Jan.	492.2	19.7	177.7	8.1	497.4	14.5	172.5	2.9
Sat., 1 Feb.	492.2	8.1	177.7	8.1	497.4	2.9	172.5	2.9
Sun., 2 Feb.	492.2	8.1	177.7	8.1	497.4	2.9	172.5	2.9
Mon., 3 Feb.	492.2	8.1	177.7	-8.2	480.0	20.3	189.9	4.0
Tue., 4 Feb.	492.2	-9.9	176.0	-11.4	474.0	8.3	194.2	6.8
	<i>Mean absolute error</i>			6.5	<i>Mean absolute error</i>			3.6

Source: ECB.