



EUROPEAN CENTRAL BANK

EUROSYSTEM

# TARGET Annual Report

2023

June 2024



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# Introduction

Market infrastructures, together with markets and institutions, constitute one of the three core components of the financial system. The market infrastructure for payments<sup>1</sup> consists of the set of instruments, networks, rules, procedures and institutions that ensure the circulation of money. Its purpose is to facilitate transactions between economic agents and to support efficient resource allocation in the economy.

The Eurosystem has the statutory task of promoting the smooth operation of payment systems. This is crucial for a sound currency, the conduct of monetary policy, market functioning and financial stability. The Eurosystem's provision of payment settlement facilities is instrumental in carrying out this task.<sup>2</sup>

To this end, in 1999 the Eurosystem created the Trans-European Automated Real-time Gross settlement Express Transfer (TARGET) system<sup>3</sup> for the settlement of large-value payments in euro, offering a central bank payment service across national borders in the European Union (EU).

TARGET was developed to achieve three main objectives:

1. provide a safe and reliable mechanism for the settlement of euro payments on a real-time gross settlement (RTGS) basis;
2. increase the efficiency of inter-Member State payments within the euro area;
3. serve the needs of the Eurosystem's monetary policy.

In May 2008 TARGET2 replaced TARGET, the first-generation system. Like its predecessor, TARGET2 was used to settle payments connected with monetary policy operations, as well as interbank payments, customer payments exchanged between banks, and transactions related to other payment and securities settlement systems, i.e. ancillary systems. As TARGET2 provided intraday finality, meaning that settlement was final for the recipient once the funds had been credited, it was possible to reuse these funds several times a day.

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<sup>1</sup> A payment is defined as the process by which cash, deposit claims or other monetary instruments are transferred between economic agents.

<sup>2</sup> The Eurosystem fulfils this task by:

- providing payment and securities settlement facilities (T2 (including TIPS) and TARGET2-Securities (T2S)), as well as a mechanism for the cross-border use of collateral (the correspondent central banking model (CCBM));
- overseeing the euro payment and settlement systems;
- setting standards for the use of securities clearing and settlement systems;
- acting as a catalyst for change (e.g. facilitating the development of the Single Euro Payments Area (SEPA)).

<sup>3</sup> A real-time gross settlement (RTGS) system is a payment system in which payments are processed and settled in real time (i.e. continuously), rather than in batches. It enables transactions to be settled with immediate finality. Gross settlement means that each transfer is settled individually, rather than on a net basis. TARGET, TARGET2 and its successor T2 are all RTGS systems.

From June 2015 TARGET2 participants were able to open dedicated cash accounts (DCAs) on the TARGET2-Securities (T2S) platform<sup>4</sup>, which they could use to settle the cash leg of their securities transactions. In addition, from November 2018, TARGET2 participants were able to open DCAs for TARGET Instant Payment Settlement (TIPS).<sup>5</sup> TIPS is a service implemented by the Eurosystem for settling euro-denominated instant payments on an individual basis, around the clock.

Building on the synergies between the two market infrastructures, the Eurosystem has worked intensively to consolidate the TARGET2 and T2S services. The project has brought technical as well as functional enhancements. This has allowed constantly evolving market requirements to be met by replacing TARGET2 with a new system called T2. T2 is formally encompassing two settlement services: (i) Central Liquidity Management (CLM) for the settlement of central bank operations and the management of participants' liquidity and (ii) Real-Time Gross Settlement (RTGS) for payments and ancillary system settlement.

The project has been an opportunity to optimise liquidity management across all TARGET Services. T2 provides the market with enhanced, state-of-the-art RTGS services that are also available for currencies other than the euro. The messaging standard used in T2 has been migrated to ISO 20022, which is already in use for T2S and TIPS. In addition, the consolidation project has further strengthened cyber resilience capabilities and established a single point of access to all Eurosystem market infrastructure services. Finally, it supports multi-vendor connectivity, allowing participants to choose between different connectivity options and fostering competition among network service providers. The new T2 went live on 20 March 2023.

T2 offers harmonised market infrastructure services at the EU level, as well as a single pricing structure. It provides ancillary systems with a standard set of cash settlement services in central bank money and supports its users with enhanced liquidity management tools. In this way, it contributes to financial integration, financial stability and liquidity efficiency in the euro area.

T2 is accessible to a large number of participants. Approximately 1,000 credit institutions in Europe use it to make payments on their own behalf, on behalf of other addressable participants or on their customers' behalf. Taking branches and subsidiaries into account, around 40,000 banks worldwide (and all of these banks' customers) can be reached via T2.

## The report and its structure

As in previous years, the report provides information on TARGET2/T2<sup>6</sup> traffic, its performance and the main developments that took place in 2023. It is addressed

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<sup>4</sup> For more information, see the ECB's website: [What is TARGET2-Securities \(T2S\)?](#) and [T2S Annual Report 2023](#).

<sup>5</sup> For more information, see the ECB's website: [What is TARGET Instant Payment Settlement \(TIPS\)?](#)

<sup>6</sup> Before 20 March 2023 for TARGET2 and thereafter for T2.

mainly to decision-makers, practitioners and academics who need to have an in-depth understanding of T2. We hope it will also appeal to members of the general public with an interest in market infrastructure issues, and T2 in particular.

In addition to the core content, this report includes eight boxes on topics of particular relevance in 2023, namely: the evolution of turnover and traffic in TARGET2/T2; TIPS volume development, evolution in the number of reachable parties and functional evolution; participants' use of extended T2 operating hours; the identification of tiered participation arrangements in T2; the new pricing structure for TIPS; the TARGET2/T2S consolidation project and, in particular, testing, system migration and first weeks of operation; and the evolution of multi-currency capability in T2 and TIPS.

In the report, references made to the first-generation TARGET system (in operation from January 1999 to May 2008) and TARGET2 (in operation from May 2008 to March 2023) are also applicable to the third-generation system, T2 (which replaced TARGET2 in March 2023).

As the changeover from TARGET2 to T2 took place on 20 March, the figures show payments settled on TARGET2 while others settled on T2.

### **Methodological clarifications**

This report provides information on the cash transfers in T2 according to the T2 statistical framework, which aims to reflect cash transfers from a business perspective. In this respect, some cash transfers (e.g. any liquidity transfers between two accounts held for the same party) are not included in the volume and value figures in this report.

Liquidity transfers between T2 and T2S/TIPS DCAs and payments processed on T2S/TIPS DCAs are not included in the T2 indicators presented in this report.

Although both T2S and TIPS DCAs are legally part of TARGET, these (technical) transactions are excluded from the calculations to prevent the system's indicators from being artificially inflated and to make it easier to compare the figures from year to year. Nevertheless, as a matter of transparency, some general statistics on T2S and TIPS DCAs are provided on the European Central Bank's (ECB's) website.<sup>7</sup>

Owing to methodological changes in the compilation of T2 statistics following the go-live of the T2-T2S consolidated platform, the T2 statistics may be subject to revisions in the first year of operation.

## **TARGET2/T2 activity**

In 2023 TARGET2/T2 maintained its leading position in Europe and remained one of the largest payment systems worldwide. Compared with the previous year, the total

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<sup>7</sup> See the ECB's website: [Monthly statistics of traffic settled in the TARGET Services](#).

turnover processed decreased by 1.96% to €559.3 trillion.<sup>8</sup> The total volume of payments grew by 1.8% to 104.4 million transactions.

The highest daily turnover during the year was recorded on 20 March, with a total value of €4,703 billion, and the highest daily volume of payments was recorded on 11 April, when 659,146 transactions were processed. This was the highest peak in the volume of payments since the launch of the euro.

In 2023 the availability of TARGET2's Single Shared Platform and T2's RTGS and CLM services stood at 100%.

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<sup>8</sup> Together with the payments processed on T2S DCAs, overall turnover in 2023 reached €827.9 trillion, corresponding to a daily average of €3.2 trillion. More detailed information can be found on the ECB's website: [Traffic settled in the TARGET Services](#).

# 1 Evolution of TARGET2\T2

**Table 1**

Evolution of TARGET2\T2 turnover and traffic

TARGET2 overall	Value (EUR billions)			Volume (number of transactions)		
	2022	2023	Change (%)	2022	2023	Change (%)
<b>Total</b>	570,539	559,336	-2.0%	102,597,758	104,408,254	1.8%
<b>Daily average</b>	2,220	2,193	-1.2%	399,213	409,444	2.6%

Note: There were 255 operating days in 2023 and 257 operating days in 2022.

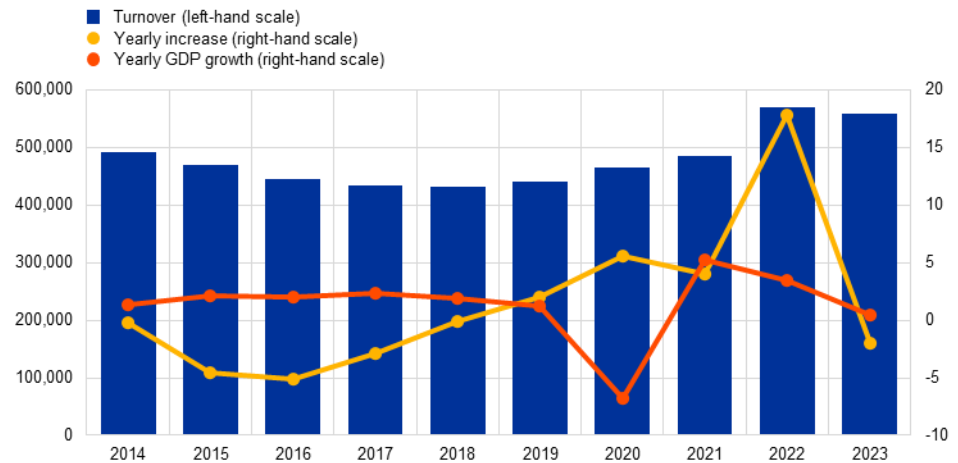
## 1.1 TARGET2/T2 turnover

TARGET2/T2 turnover in 2023 amounted to €559.3 trillion, corresponding to a daily average of €2.2 trillion (Chart 1 and Chart 2). As shown in Table 1 above, the total value of TARGET2/T2 turnover was therefore down by 2.0% compared with the previous year. This decline came after four years of steady growth<sup>9</sup> and was particularly visible in the second half of the year. From a business perspective, it was mainly driven by central bank operations (see Box 1 for more details).

**Chart 1**

TARGET2/T2 turnover

(left-hand scale: EUR billions; right-hand scale: percentages)



Sources: TARGET2/T2 and Eurostat.

TARGET2/T2 settled the equivalent of the annual euro area GDP<sup>10</sup> in six days of operations. This reflects the efficiency of the system and the crucial role it plays,

<sup>9</sup> TARGET2 turnover fell by almost 15% between 2015 and 2017, following the launch of T2S. As a result of the migration of the central securities depositories (CSDs) to T2S, final settlement of the cash leg of securities transactions is no longer carried out on the RTGS accounts of their participants in T2. Instead, it takes place via the DCAs held in T2S.

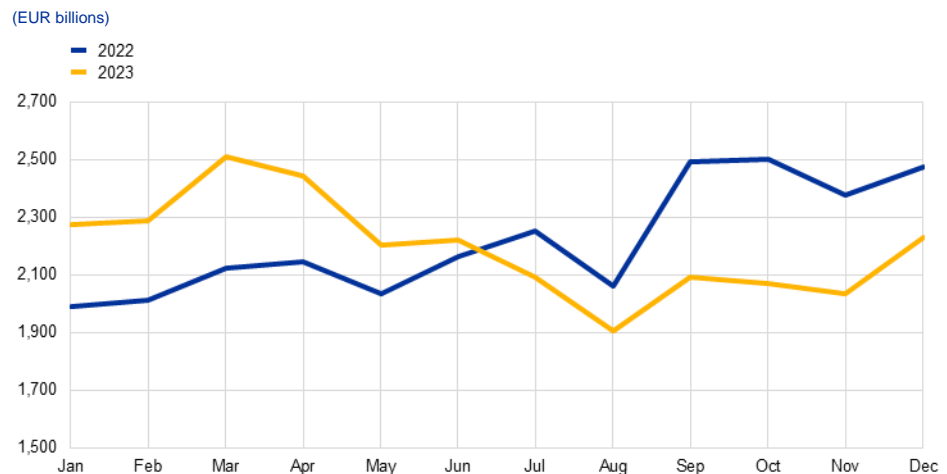
<sup>10</sup> According to Eurostat, annual euro area GDP stood at €13.4 trillion in 2023.



providing intraday finality for transactions and allowing the funds credited to the participant's account to become immediately available for other payments. Consequently, the same euro can be reused several times by several participants in the same day.

The average daily turnover generated in TARGET2/T2 declined by approximately 10.9% in the second half of the year compared with the first half of the year (Chart 2). This trend was mainly driven by a reduction in central bank operations (see Box 1 for more details). The highest daily turnover was recorded on 20 March and stood at €4,703.8 billion – an exceptionally high figure. However, it should be noted that 20 March was the first day of operation of the CLM and RTGS services of the new T2 system and that a large amount of liquidity transfers needed to be carried out to migrate participants' funds from one system to the other. The lowest value was €1,412.3 billion on 29 May (Whit Monday), which was a public holiday in many of the countries participating in TARGET.

**Chart 2**  
Average daily TARGET2/T2 turnover

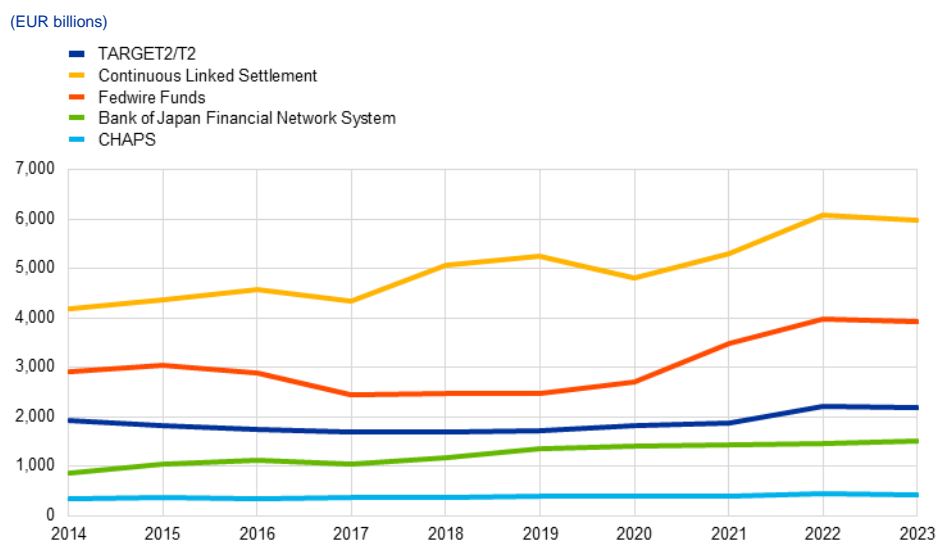


Source: TARGET2/T2.

Compared with other systems, the average daily turnover in TARGET2/T2 remains high and is in line with the turnover observed in other jurisdictions (Chart 3).

### Chart 3

#### Average daily turnover in major large-value payment systems around the globe



Sources: TARGET2/T2, Fedwire Funds Service (website of the Federal Reserve System), BOJ Time-Series Data (Bank of Japan website), CLS Annual Report and Bank of England (CHAPS).

### Box 1

#### Evolution of TARGET2/T2 turnover in 2023

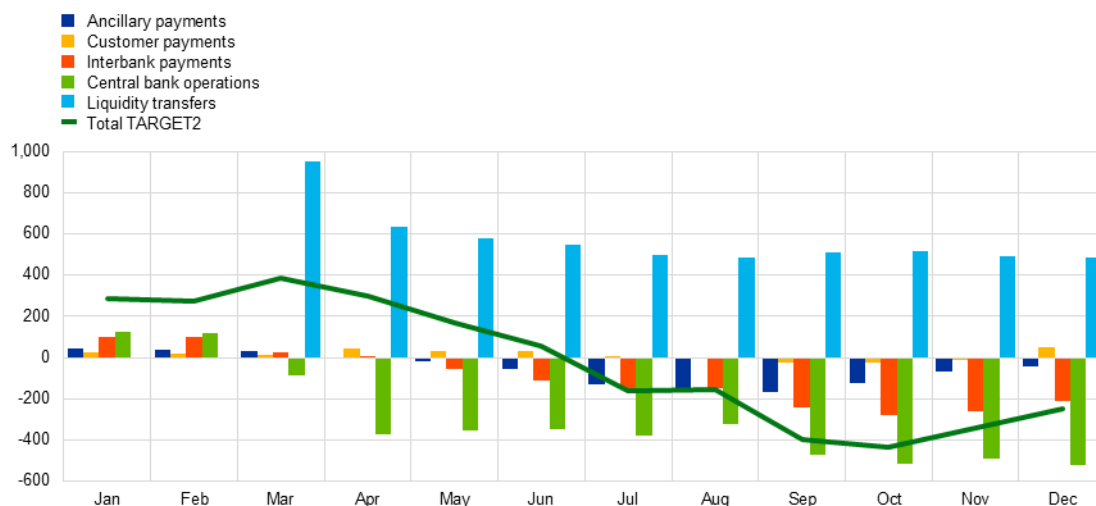
TARGET2/T2 turnover declined by 1.2% in 2023 compared with 2022 as measured by daily averages. The fall was due to declines in central bank operations, interbank payments and ancillary system payments that outweighed increases in other categories. The drop in central bank operations and interbank payments was attributable to the new platform configuration, while the fall in ancillary system payments was due to various business developments.

Average daily central bank operations turnover declined by 69% overall in 2023, representing a drop of €300 billion. This steep decline was related to the switch to the consolidated T2-T2S platform, which made it compulsory for all participants' accounts to be held in TARGET. Before March 2023, it was still possible for central banks to hold accounts with participants in domestic systems, for instance for the purpose of computing minimum reserve fulfilment or the provision of intraday credit. This set-up led to a number of liquidity transfers between local systems and TARGET2, particularly at the start and end of the day. With the centralisation of all accounts in T2, these "technical" transfers are no longer needed. The decline in daily central bank operations turnover could already be seen in March, although it was a month in which both the TARGET2 and T2 were operating (Chart A). The drop in the average daily value remained below €400 billion up until August, but then steepened between September and December. The accelerated decline during the last months of the year was due to the significant increase in central bank operations from September 2022 onwards, when the key ECB deposit facility interest rate returned to positive territory, leading to an increase in "technical" transfers between local systems and TARGET2. These transfers were made by participants with accounts in the domestic systems so that they could access the overnight deposit facility. In terms of nominal value, central bank operations were relatively stable from April 2023 to the end of the year. During this period, daily averages per month hovered between €26 billion and €48 billion (Chart B).

## Chart A

### Decline in average daily TARGET2/T2 turnover: breakdown by payment type

(EUR billions)



Sources: TARGET2/T2 and ECB calculations.

Note: There were 255 operating days in 2023 and 257 operating days in 2022.

In 2023, average daily interbank payments turnover declined by 9%, equivalent to €104 billion for each business day on average. The decline in interbank payments was mainly due to the migration of financial institutions in the euro area from the legacy message standard (Swift MT) to the new ISO 20022 message standards (PACS and CAMT). While the MT standard used in TARGET2 did not allow interbank payments to be distinguished from liquidity transfers (both used the same message type, MT 202), the new ISO 20022 classification now allows this distinction to be made. Under the old standard, some liquidity transfers carried out in TARGET2 were classified as interbank transfers, which led to an overestimation in that category. The decrease in the 2023 figures therefore reflects a methodological adjustment rather than a business change driven by participants.

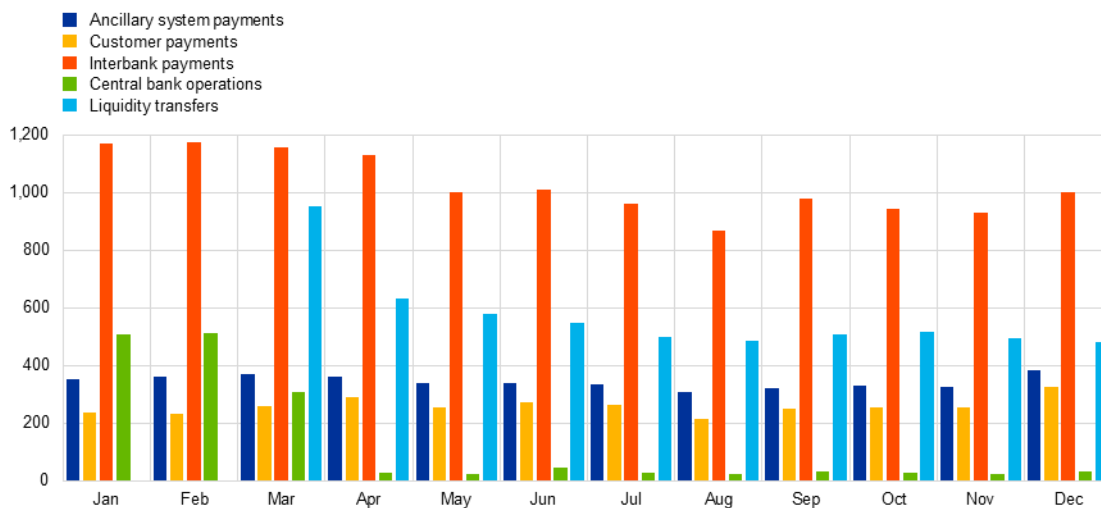
Average daily ancillary system payments turnover declined by 14% or €56 billion. This drop came from a change in the prefunding behaviour of some counterparties that participate in the retail business, as well as from infrastructure changes related to securities settlement. Average daily ancillary system payments turnover per month fluctuated between €307 billion and €385 billion, with no discernible pattern (Chart B).

Finally, liquidity transfers rose significantly in 2023. This was due to two factors. First, as explained above, some transactions previously counted as interbank payments were reclassified as liquidity transfers thanks to the richer classification now available under the ISO 20022 standards. The second factor related to the new account structure in T2 and the different tools made available to participants for managing their liquidity, resulting in greater recourse to liquidity transfer orders. Average daily liquidity transfers in March stood at €952.7 billion. This exceptionally high figure was mainly due to the multiple liquidity transfers carried out on migration to the new system. During the rest of the year, turnover varied between €483.0 billion and €632.6 billion (Chart B). However, the rise in this new category of transactions could not make up for the decline observed in the other three categories.

## Chart B

### TARGET2/T2 average daily turnover by payment type

(turnover in EUR billions)



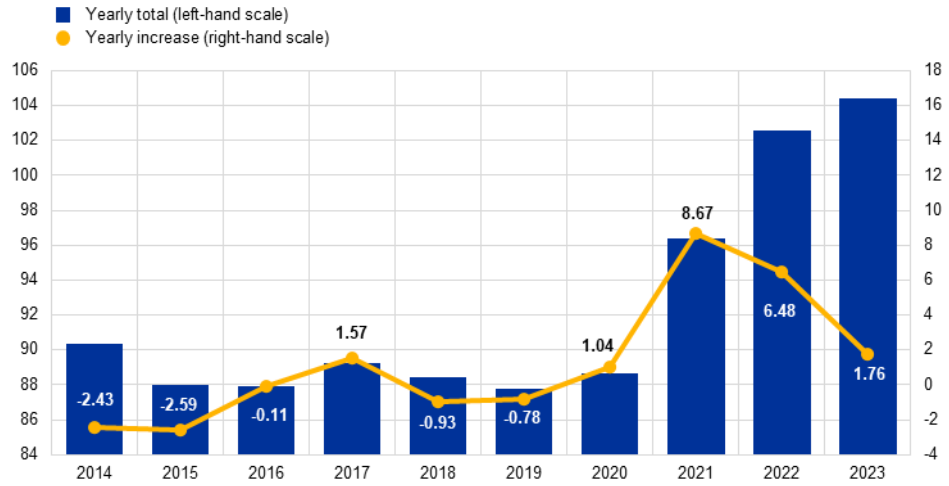
Sources: TARGET2/T2 and ECB calculations.

## 1.2 Volume of transactions in TARGET2/T2

TARGET2/T2 traffic reached a new historical peak in 2023 with a total volume of 104,408,254 payments. This continues the steady increase seen since 2020, with yearly growth of 1.04%, 8.67% and 6.48% respectively over the last three years (Chart 4). Although the pace of growth slowed in 2023, this still represents a very strong performance and confirms that the system is overwhelmingly supported by its participants. As in the previous two years, the increase was mostly driven by interbank and customer payments (see Box 2 for more details).

### Chart 4 TARGET2/T2 traffic

(left-hand scale: number of transactions in millions; right-hand scale: percentages)

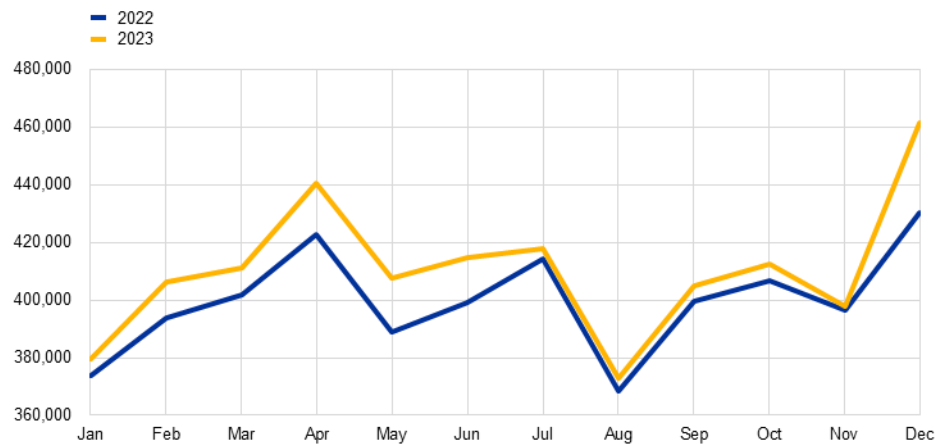


Source: TARGET2/T2.

Throughout the year the average daily volumes calculated on a monthly basis were consistently above the levels recorded in 2022, while the seasonal pattern remained similar to that of the previous years (Chart 5). The biggest year-on-year difference, amounting to 7%, was observed in December, when the largest average daily volume was also recorded – in line with the high daily volumes traditionally observed at the end of each year. The lowest volume of the year was recorded on 29 May (Whit Monday) – which was also the day with the lowest turnover – and amounted to 254,488 payments. The highest volume was recorded on 11 April, the first business day after the Easter break, when the figure rose to 659,146 payments. This is not an unusual pattern, as it follows the closure of the system for four days in a row.

### Chart 5 Average daily TARGET2/T2 volumes per month

(number of transactions)

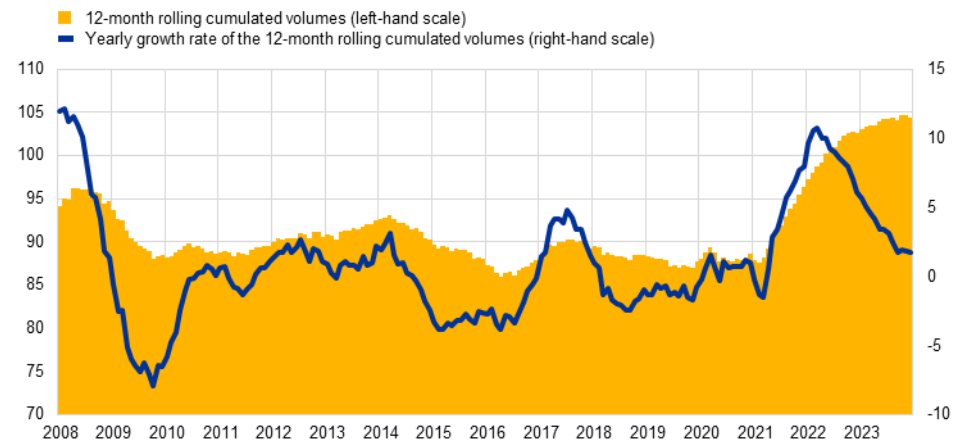


Source: TARGET2/T2.

Chart 6 shows the historical evolution of traffic in TARGET2\T2. Volumes started to decline in the second half of 2008 with the onset of the financial crisis. The number of transactions continued to drop sharply almost until the end of 2009, but subsequently stabilised until the end of 2011. They then started to grow moderately until the end of the first quarter of 2014, when they reached their highest point since the crisis. After this date, the volume began to drop owing to the Single Euro Payments Area (SEPA) migration, which caused a significant shift in customer payments from TARGET2 to SEPA Clearing and Settlement Mechanisms (CSMs) until mid-2017. The negative trend was reversed in 2017 because of the increases observed in the customer and interbank payments segment. It then remained stable throughout 2018 and 2019. In 2020 TARGET2 volumes peaked temporarily in the first quarter as a result of the market turbulence driven by the COVID-19 pandemic. After a slight decrease in the first quarter of 2021, TARGET2 volumes rose steadily over the rest of that year and throughout 2022 and 2023 to reach their highest levels since the system was launched.

**Chart 6**  
12-month moving sum of TARGET2\T2 volumes

(left-hand scale: number of transactions in millions; right-hand scale: percentages)



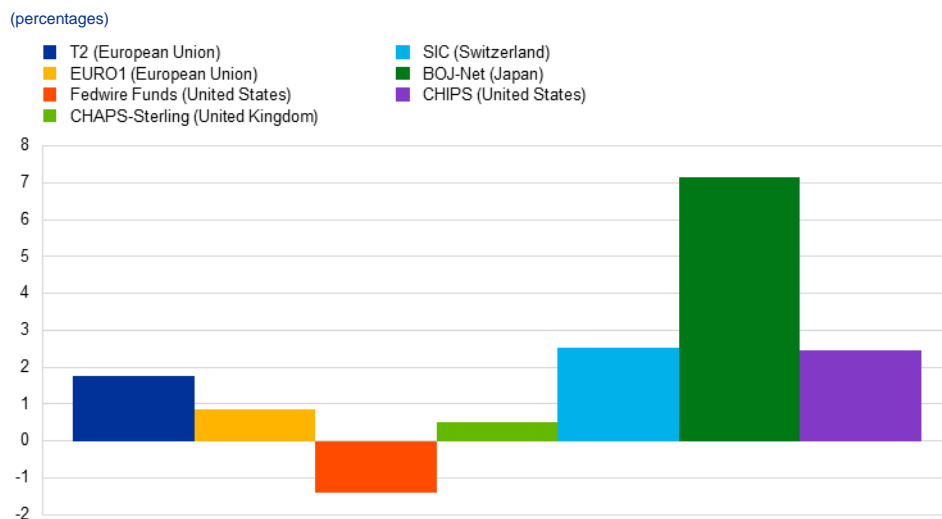
Source: TARGET2/T2.

Notes: The chart shows the 12-month rolling sum of TARGET2 volumes and the corresponding year-on-year growth rate. This indicator helps to eliminate the strong seasonal pattern observed in TARGET2 traffic.

Most major payment systems worldwide recorded an increase in their payments activity in 2023. BOJ-NET stands out with an increase of 7.2%, while most of the other systems showed a moderate increase close to that in TARGET2/T2. By contrast, the payments activity of Fedwire Funds (the US payment system), decreased by 1.4%.

### Chart 7

#### Comparison of the changes in traffic in major large-value payment systems between 2022 and 2023



Sources: TARGET2/T2, [Fedwire Funds Service](#) (Federal Reserve System website), [BOJ Time-Series Data](#) (Bank of Japan website), [Key payment statistics](#) (Bank of England website), [Annual Statistics From 1970 to 2023](#) (the Clearing House website), [SIC statistics](#) (SIX website) and ECB data.

### Box 2

#### Evolution of TARGET2/T2 traffic in 2023

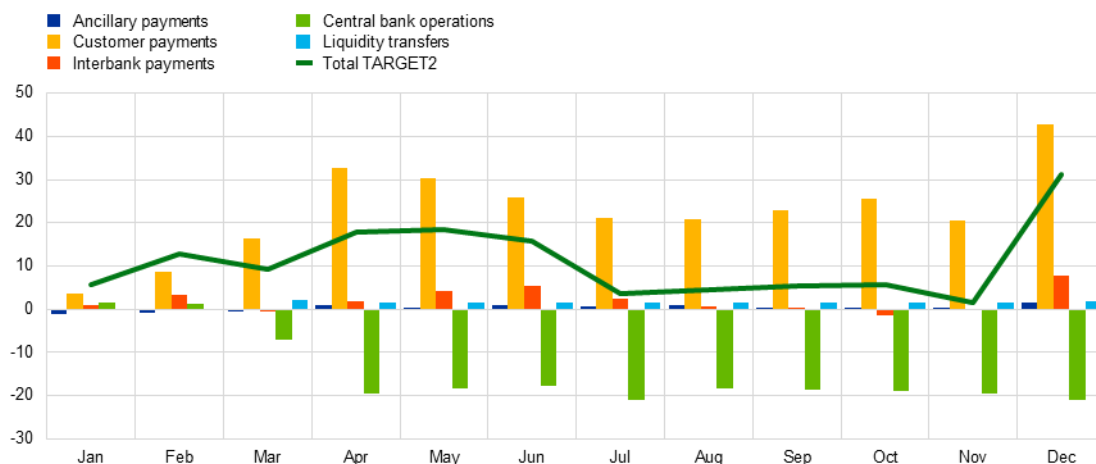
TARGET2/T2 daily average traffic increased by 2.6%, continuing the upward trend from previous years despite the infrastructure change. The increase was mainly driven by customer payments. Although there was a significant decline in central bank payments, as these are typically less numerous than customer payments, it did not outweigh the increase in the other categories (Chart A).

Daily average customer payment volumes increased by 9.3% on the previous year. This is a significant rise given that in 2021, the year of the exceptional post-pandemic recovery, the daily average volume growth rate already stood at 8.6%. The increase is visible across almost all EU Member States covered by TARGET2/T2. These positive figures confirm once more that the number of customer payments has so far not suffered from the uptake of instant payments in Europe. The daily average traffic of customer payments, calculated on a monthly basis, was consistently over 220,000 transactions. Spikes were recorded in April (286,576) and December (302,149) and were attributable to Easter and year-end effects (Chart B).

## Chart A

### Change in daily average volume in TARGET2/T2: breakdown by payment type in 2023

(number of transactions in thousands)



Sources: TARGET2/T2 and ECB calculations.

Note: There were 258 operating days in 2021 and 257 operating days in 2022.

The daily average volume of interbank payments also increased compared with 2022, although at a slower pace, rising by 1.7%. The change was mainly positive across the year (Chart A). Unlike for customer payments, the increase in the volume of interbank payments was not widespread across countries but was mostly driven by developments in France, Italy and the Netherlands. The daily average volume of payments processed through ancillary systems rose by 1.0% compared with 2022 but remained much lower than interbank payment and customer payment averages. Volumes were also very low in the new liquidity transfers category, with daily averages ranging from 1,503 to 2,000 during the period between March and December 2023.

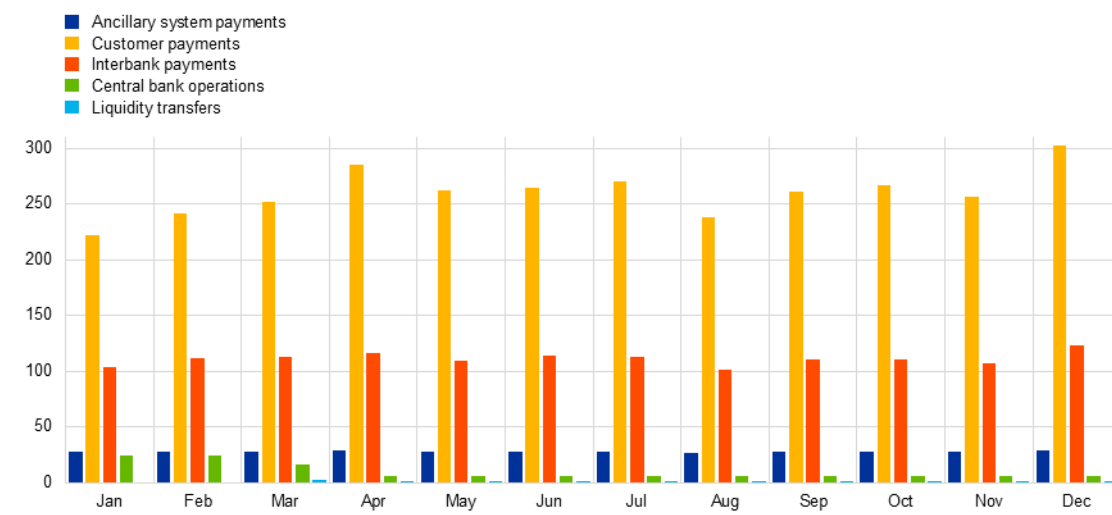
Finally, daily average volumes of central bank operations declined by 60.5% compared with 2022. The decline began in March 2023 (Chart A) and, for the reasons explained in Box 1, was attributable to the introduction of the new T2-T2S consolidated platform.



## Chart B

### TARGET2/T2 daily average volumes by payment type in 2023

(number of transactions in thousands)



Sources: TARGET2/T2 and ECB calculations.

Note: There were 258 operating days in 2021 and 257 operating days in 2022.

## 1.3 Payment types in TARGET2/T2

Traffic in TARGET2/T2 can be divided into five categories: (i) interbank transactions, (ii) customer transactions, (iii) operations with the central bank (such as monetary policy operations and cash operations)<sup>11</sup>, (iv) ancillary system settlement, and (v) liquidity transfers.

In terms of volume, most transactions settled in TARGET2/T2 in 2023 were customer payments, accounting for 64% of the 2023 traffic. Interbank payments represented 27% of the total traffic. Ancillary system settlement made up 7% of the total volume of payments, while central bank operations accounted for 2%, and liquidity transfers represented only a very small proportion at slightly above 0% (Chart 8).<sup>12</sup>

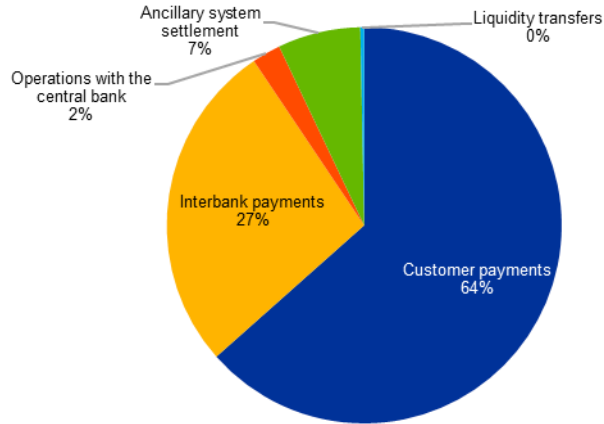
<sup>11</sup> For example banknote and coin withdrawals and deposits.

<sup>12</sup> Note that, owing to rounding effects, the percentages do not add up to 100%.

### Chart 8

#### Breakdown of TARGET2/T2 volumes by payment type in 2023

(percentages)

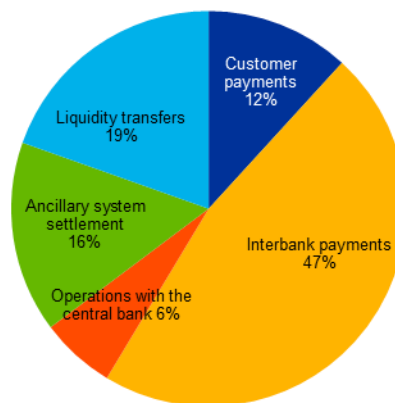


Source: TARGET2/T2.

### Chart 9

#### Breakdown of TARGET2/T2 turnover by payment type in 2023

(percentages)



Source: TARGET2/T2.

Meanwhile, interbank payments accounted for the biggest proportion of the total turnover at 47%. Customer payments, although the most numerous, represented only 12% of the total turnover, as these payments are typically smaller in value. While the number of liquidity transfers was small, they made up 19% of the total turnover, as these transactions are typically for very large amounts (Chart 9). The liquidity transfers category gained traction in 2023 with the migration to the consolidated T2-T2S platform. There are two main reasons for this development. First, T2 has a different account set-up, with main cash accounts (MCAs) serving as pivot accounts for participants' liquidity management across all TARGET Services, and RTGS DCAs dedicated to the settlement of RTGS operations. This new set-up leads to a higher number of liquidity shifts between participants' MCAs and DCAs. The second reason relates to the migration to new messaging standard (ISO 20022),

with a dedicated message type now used for liquidity transfers. Under TARGET2, the same message type was used for liquidity transfers as for interbank payments, making it difficult to distinguish which of the mass of interbank transactions were liquidity transfers. Meanwhile, the value of ancillary system settlement amounted to 16% of the total volume, a slightly higher proportion than in the previous year, when it stood at 13%. The share of central bank operations declined significantly compared with the previous year, standing at 6% in 2023 compared with 19% in 2022. This is also related to the migration to the consolidated T2-T2S platform, which has made it compulsory for all participants' accounts to be centralised in TARGET. Under TARGET2, some of the accounts were held on the proprietary local systems of central banks, requiring movements of funds between these platforms at specific times of the day, mainly for accounting purposes. With the centralisation of accounts on the consolidated platform, these "technical" transfers of participants' liquidity are no longer needed (see Box 1).

## 1.4 Interactions between T2 and T2S

T2S is the Eurosystem's pan-European platform for securities settlement in central bank money, bringing together both securities and cash accounts on a single technical platform.

T2S went live on 22 June 2015, with central securities depositories (CSDs) joining the platform for euro settlement in waves until September 2017. In addition, on 29 October 2018 Danmarks Nationalbank connected its RTGS, Kronos2, to T2S, so Danish kroner can now also be used to settle the cash leg of securities transactions in T2S. On the same date, VP Securities (a Danish CSD that had already been using T2S for settlement in euro) migrated its Danish krone settlement to the platform. Finally, on 11 September 2023, five new CSDs successfully migrated to T2S, bringing the number of CSDs connected to T2S to 24, and the number of European countries with CSDs using T2S to 23.

Although the accounts are centralised on a single platform, the legal and business relationships of the holders of the securities and cash accounts in T2S remain with the CSDs and national central banks respectively. T2S DCAs are opened with the central banks and used exclusively for the securities settlement business in T2S. Although they are technically held on the T2S platform, euro-denominated DCAs are legally part of TARGET. Therefore, the rights and obligations of T2S DCA holders are set out in the TARGET guideline.<sup>13</sup> At the end of 2023 there were 892 active DCAs for settlement in euro on the T2S platform.

At the start of each T2S business day, liquidity in euro is sent from T2 to T2S, while towards the end of the day the liquidity on DCAs can be swept back to T2. As of the launch of T2, participants can also leave liquidity overnight on their T2S DCAs. During the day, liquidity can be freely transferred from T2 to T2S and vice versa. In

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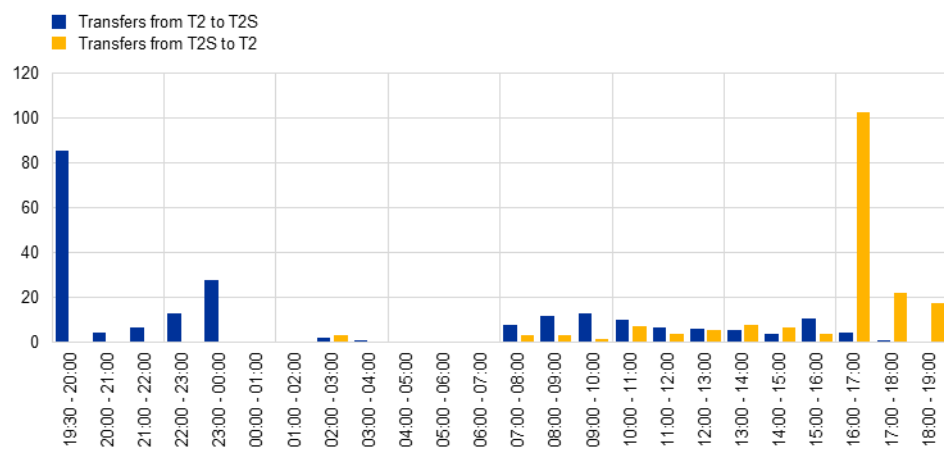
<sup>13</sup> Guideline (EU) 2022/912 of the European Central Bank of 24 February 2022 on a new-generation Trans-European Automated Real-time Gross Settlement Express Transfer system (TARGET) and repealing Guideline ECB/2012/27 (ECB/2022/8).

2023 there were an average of 710 liquidity transfers from T2 to T2S and 534 liquidity transfers from T2S to T2 each day.

Most of the liquidity in euro is sent from T2 to T2S at the start of the business day at 19:30 CET and repatriated between 16:00 CET and the end of the day. Chart 10 shows the daily average value of these liquidity transfers between 20 March and 31 December 2023. Almost €140 billion of liquidity was sent from T2 to T2S in the first hours of operation, that is to say between 19:30 CET and 23:59 CET. Transfers slowed considerably during the night and then picked up again moderately from 07:00 CET, mainly owing to additional liquidity injected into T2S. Around €143 billion of liquidity was sent back from T2S to T2 between 16:00 CET and the end of the day.

**Chart 10**  
Liquidity transfers between T2 and T2S

(x-axis: times in CET; y-axis: daily averages in EUR billions)



Source: T2.

Notes: The data cover the period from 20 March to 31 December 2023. Only transfers between T2 and T2S are included, although transfers between TIPS and T2S are also technically possible.

## 1.5 Interactions between T2 and TIPS

TIPS is a harmonised and standardised pan-European service for the settlement of instant payments in central bank money. The service went live on 30 November 2018 with high capacity and 24/7/365 availability.

TIPS functionalities include the sending and receipt of instant payments, liquidity transfers and recalls of settled instant payment transactions based on the ISO 20022 standard and in accordance with the SEPA Instant Credit Transfers (SCT Inst) scheme. These instant payments are settled on TIPS DCAs held by payment service providers with the respective national central banks. Legally, euro-denominated TIPS DCAs are within the scope of TARGET, so the rights and obligations of TIPS DCA holders are set out in the TARGET guideline. At the end of 2023 there were 232 active euro-denominated TIPS DCAs, 11 TIPS Ancillary System Technical Accounts and 13,252 reachable parties in TIPS for settlement in euro.

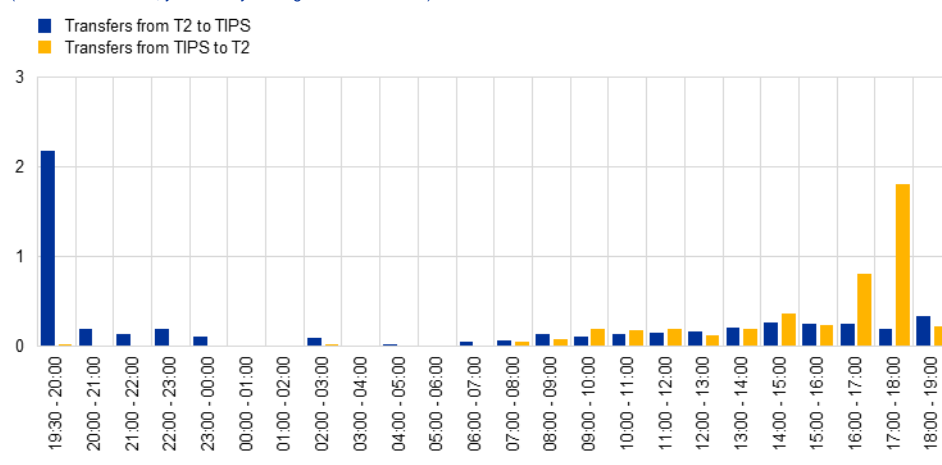
During the day liquidity can be freely transferred from T2 to TIPS and vice versa. In 2023 there were an average of 86 liquidity transfers from T2 to TIPS and 129 liquidity transfers from TIPS to T2 each day.

Almost €3 billion of liquidity was sent from T2 to TIPS in the first hours of operation, that is to say between 19:30 CET and 23:59 CET. Transfers slowed considerably during the night and picked up again moderately from 07:00 CET. Around €2 billion of liquidity was sent back from TIPS to T2 between 17:00 CET and the end of the day.

**Chart 11**

Liquidity transfers between T2 and TIPS

(x-axis: times in CET; y-axis: daily averages in EUR billions)



Source: T2.

Notes: The data cover the period from 20 March to 31 December 2023. Only transfers between T2 and TIPS are considered, although transfers between TIPS and T2S are also technically possible.

**Box 3**

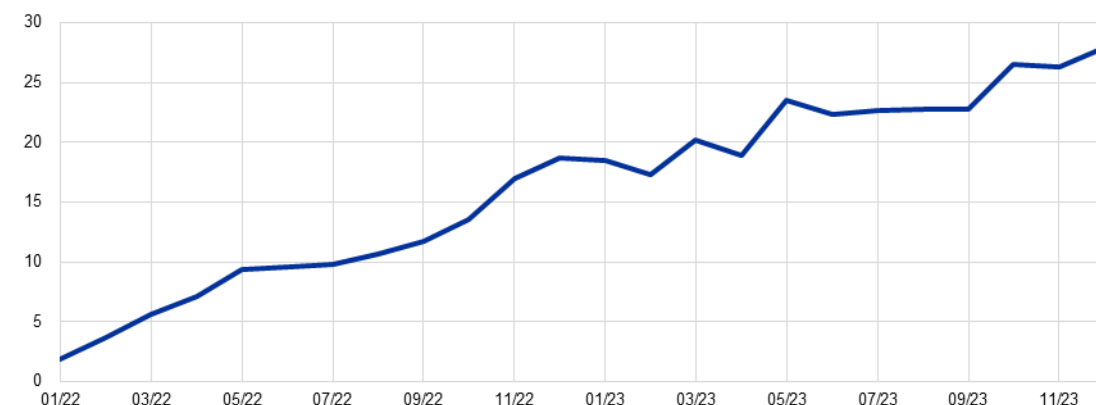
TIPS volume development, evolution in the number of reachable parties and functional evolution

TIPS settled a total of 269.8 million instant payments in 2023, approximately twice as many as in 2022. This significant uptake was primarily driven by positive traffic developments in specific national banking communities (in particular Luxembourg, the Netherlands, Italy, Germany and the Baltic region). The growing success of TIPS can also be seen from the increase in the number of parties involved, with a total of 209 participants (holding 232 TIPS DCAs and 11 TIPS Ancillary System Technical Accounts) and 13,252 reachable parties at the end of 2023.

## Chart A

### TIPS monthly volumes

(number of transactions in millions)



Source: TIPS.

The majority of TIPS traffic is made up of instant payments directly settled on participants' TIPS DCA accounts (55% in December 2023). The rest consists of transactions between automated clearing houses (ACHs) and participants' DCAs (27% in December 2023) and transactions between two ACHs (18% in December 2023). This is evidence of the interoperability that TIPS brings to all parties.

The average value of an instant payment in TIPS is around €641. Only 13% of instant payments processed in TIPS in 2023 had a value of over €1,000.

The most significant enhancement to TIPS in 2023<sup>14</sup> took place in February, when a third site was added to increase the overall resilience of the system. This infrastructure improvement, called the Resilience And Continuity Enhancement (RACE), is aimed at allowing automatic recovery in the event of a single site failure in the TIPS internal network, without any service interruption. It also improves the timeliness and efficiency of the vulnerability and patch management process.

The Eurosystem is also considering further enhancements to TIPS, particularly in the field of cross-border payments, for which the TIPS platform can become instrumental. On 28 November 2023, the European Payment Council (EPC) launched the One-Leg Out Instant Credit Transfer (OCT Inst) scheme dedicated to cross-currency instant credit transfers. The Eurosystem has been observing and contributing to such developments. Several change requests are being assessed with a view to making possible use of this new instrument in TIPS.

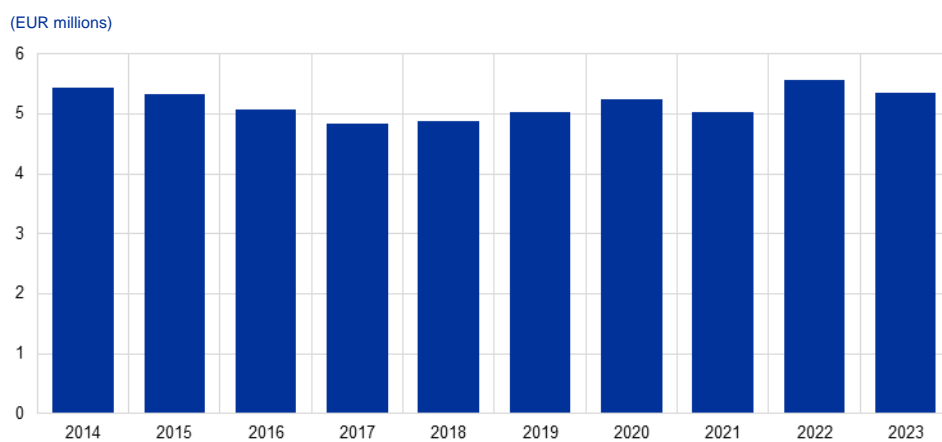
<sup>14</sup> The migration of the SCT Inst scheme to the 2019 version of the ISO 20022-based XML messaging standard had initially been scheduled for November 2023. However, the EPC subsequently decided to postpone the migration of the SEPA payment schemes, so it did not take place until March 2024.

## 1.6 Value of TARGET2/T2 payments

In 2023, the average value of a payment in TARGET2/T2 fell by 3.7% compared with the previous year to stand at €5.4 million. Despite the slight decrease, this figure is broadly in line with those in previous years (Chart 12).<sup>15</sup>

**Chart 12**

Average value of a TARGET2/T2 payment



Source: TARGET2/T2.

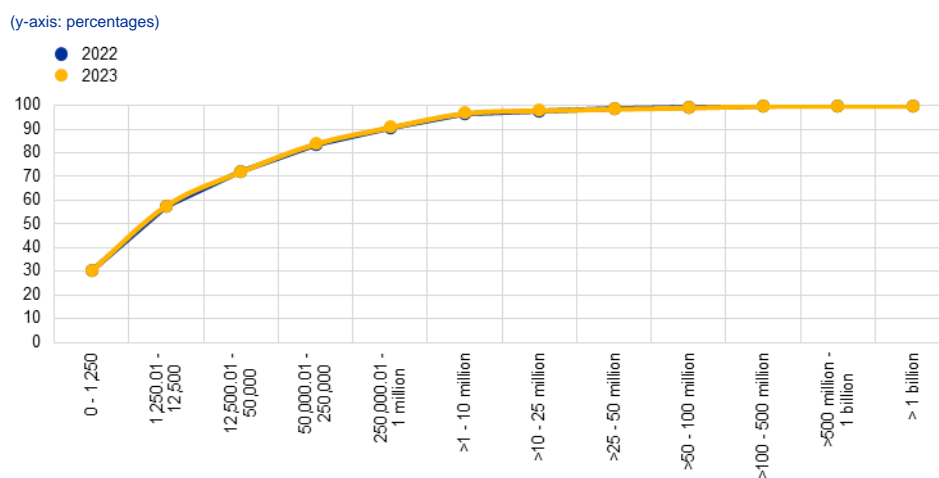
The distribution per value band of T2 transactions, i.e. transactions settled only on the new T2-T2S consolidated platform, was also similar to that of the previous year (Chart 13). More specifically, 72% of all T2 transactions had a value of less than €50,000, while transactions with a value of more than €1 million accounted for only 9% of traffic. Only 0.06% of payments, equivalent to an average of 132 transactions per day, had a value of more than €1 billion. The value of the median payment in T2 was €6,500, meaning that half of the transactions processed each day were below this amount. This figure confirms that T2 offers a range of features attracting a large number of low-value transactions, which are mainly of a commercial nature.

Although the picture changed slightly after completion of the migration to SEPA in 2014/2015, notably with regard to commercial payments, T2 was still widely used for low-value payments in 2023, in particular urgent customer transactions. The fact that a large-value payment system such as T2 is also used for settling low-denominated payments is not unusual and is also observed in other systems worldwide. While it remains to be seen whether the increased prominence of instant retail payments will have an impact on this trend in the future, the current developments do not seem to indicate any substitution effect.

<sup>15</sup> The steady decrease between 2015 and 2017 was largely because of the migration of securities settlement system traffic to T2S, as the cash legs of security transactions are typically high-value operations.

**Chart 13**

Distribution of T2 transactions across value bands



Source: T2.

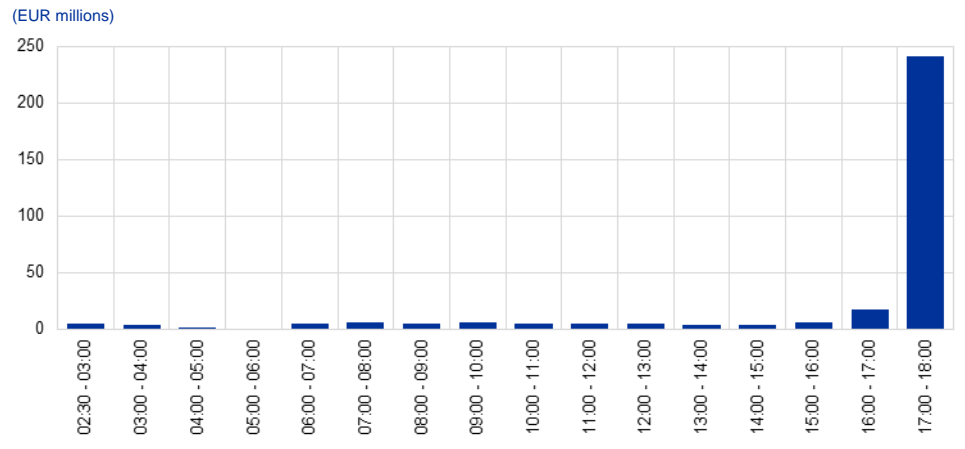
With the go-live of T2 in March 2023, the time window during which customer and interbank payments can be settled has been extended and now starts at 02:30 CET instead of 07:00 CET. This phase, which lasts until 18:00 CET<sup>16</sup>, is called the RTGS RTS II period. The value of an RTGS transaction fluctuated minimally throughout this interval, with the exception of the last two hours of operation (Chart 14). This is also a pattern previously observed in TARGET2. A first visible increase is recorded between 16:00 CET and 17:00 CET and is mostly due to liquidity repatriation from T2S to T2, for which an optional cash sweep is scheduled in T2 during this time window. It is also attributable to ancillary systems such as EURO1 settling their cash balances in T2 at that time of the day. An even more significant increase is visible during the last hour of operation, i.e. between 17:00 CET and 18:00 CET, as banks are squaring their balances and refinancing themselves on the money market during this time. The last two hours of RTGS operations are typically characterised by transactions that are limited in number but of very high value.

<sup>16</sup> The cut-off for customer payments is at 17:00 CET while all other categories can be settled until 18:00 CET.



**Chart 14**

**Average value of an RTGS payment during RTS II**



Source: T2.

Note: This chart includes only RTGS payments that were settled after the T2-T2S consolidation.

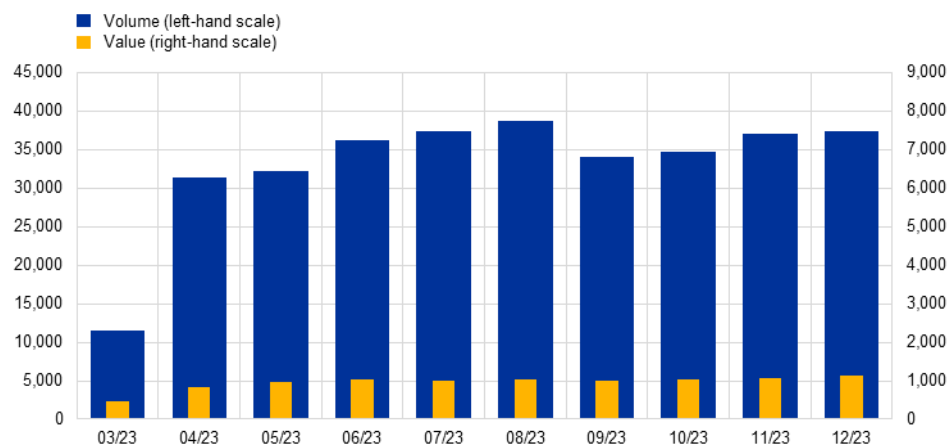
## 1.7 RTGS RTS I settlement

The RTGS RTS I period stretches from 19:30 CET to 02:30 CET. During this phase only ancillary and liquidity transfers can be processed. Since the start of T2 operations on 20 March 2023, these two categories have been quite balanced in value terms, with ancillary systems making up 50.8% of the traffic and liquidity transfers representing 49.2%. In volume terms, 93.7% of the transactions settled are ancillary system transactions, while only 6.3% are liquidity transfers.

Since the system is closed to other forms of payment processing during this period of the operational day, ancillary systems can take advantage of banks' stable and predictable liquidity positions and settle their transactions efficiently and safely. In general, this phase is mainly used by retail payment systems to settle their members' positions. In 2023, an average of around 1,653 payments with a total value of €47.8 billion were settled during the RTGS RTS I period.

**Chart 15**  
RTGS RTS I settlement

(left-hand scale: number of transactions; right-hand scale: EUR billions)



Source: T2.

## 1.8 Pattern of RTGS RTS II flows

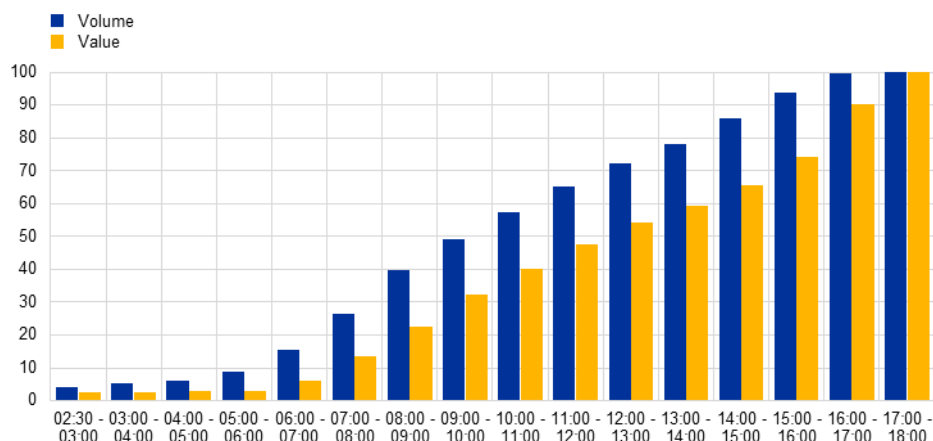
As far as the two systems can be compared, the distribution of RTGS RTS II traffic in 2023 was similar to the distribution of intraday TARGET2 traffic in 2022 (Chart 16). The RTGS RTS II period in T2 is from 02:30 CET to 18:00 CET, whereas the daytime settlement window in TARGET2 did not start until 07:00 CET. The distribution of traffic, i.e. the percentage of daily volumes and values settled by a certain time between 07:00 CET and 18:00 CET, has remained broadly the same. The most visible difference is that the traffic which used to settle between 07:00 CET and 08:00 CET is now settled instead between 02:30 CET and 07:00 CET (see more details in Box 4). In volume terms, nearly all traffic is settled by 17:00 CET, whereas in value terms 10% of the traffic is settled only in the last hour of the system's operations, when the largest payments of the day take place. More specifically, more than 90% of the traffic in volume terms is settled by 16:00 CET, while in value terms the figure is only 74%. Nevertheless, this distribution gives confidence to the TARGET operator that settlement is evenly spread throughout the day<sup>17</sup>, while the longer RTGS RTS II operating hours compared with the daytime settlement phase of TARGET2 reduce the concentration of traffic that used to occur between 07:00 CET and 08:00 CET.

<sup>17</sup> Ideally, the value and volume distribution should be as linear as possible to avoid liquidity risk and operational risk.

## Chart 16

### RTGS RTS II traffic distribution

(x-axis: times in CET; y-axis: percentages of daily volumes and values)



Source: T2.

Note: The chart shows the average percentages of payments settled both in value and volume terms within a certain hour of the day in the period between 20 March and 31 December 2023.

Payments in T2 can be introduced in advance. “Warehoused payment” orders are submitted to T2 for settlement on specific days and at specific times up to ten days later. As most warehoused transactions are settled immediately after the opening of the RTGS service, a significant share of them fall between 02:30 CET and 03:00 CET, when they represent up to 25% of the settled values. A smaller share of these payments are settled at noon and in the afternoon. Most of the warehoused transactions are introduced into the system between 10:00 CET and 12:00 CET and again between 16:00 CET and 18:00 CET.

## Box 4

### Participants’ use of extended T2 operating hours

With the launch of T2, the time window for payment settlement was extended beyond the window available in TARGET2. In T2, participants can settle customer and interbank payments in the RTGS system starting at 02:30 CET, whereas in TARGET2 this was only possible from 07:00 CET. This decision followed a request received from participants during a market consultation. One of its aims is to support correspondent banking activities with non-European markets, which were previously constrained by the time difference, particularly the Asian market.<sup>18</sup> This box analyses the payments settled during these extended hours.

The extended opening hours in T2 have reduced the concentration of payments at the start of the day. A look at the volume of payments settled within each hour of the business day shows that the concentration of payments at 07:00 CET observed in TARGET2 has been considerably reduced in T2 (Chart A, panel a). In TARGET2, the average daily volume of the transactions settled in the third quarter of 2022 peaked at around 102,000 in the first operating hour of the day (between 07:00 CET and 08:00 CET). In T2, a considerable share of these payments were settled over a longer time window, starting at 02:30 CET. In the third quarter of 2023, 15,675 payments were settled, on

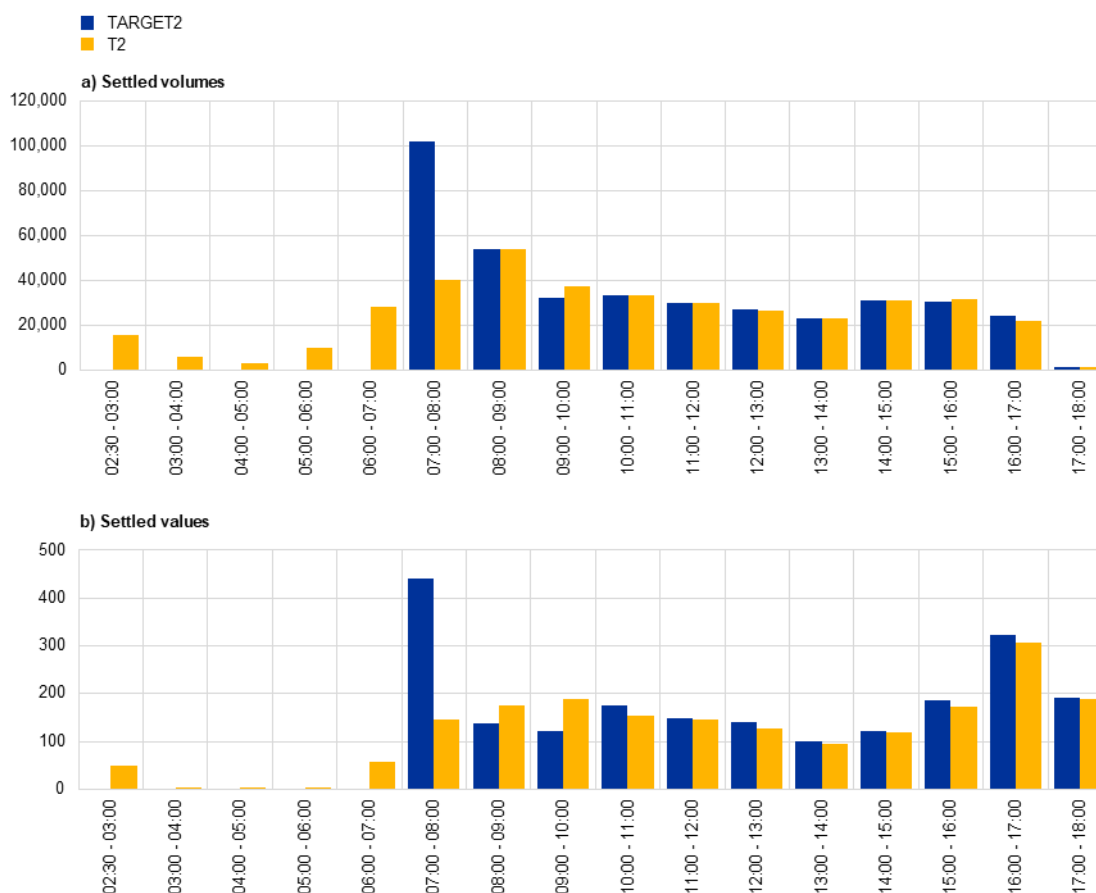
<sup>18</sup> See the RGTS services consultative report entitled [Eurosystème’s vision for the future of Europe’s financial market infrastructure](#).

average, between 02:30 CET and 03:00 CET, while more than 38,000 payments were settled between 05:00 CET and 07:00 CET, and around 40,000 payments were settled between 07:00 CET and 08:00 CET. The pattern observed in T2 for the remainder of the day was similar to that in TARGET2. A similar trend can be observed in the hourly distribution of payment values (Chart A, panel b). This confirms that the concentration of payments that occurred in TARGET2 just after the system opened has been significantly reduced in T2, relieving the burden on the infrastructure and decreasing operational risk.

## Chart A

### Traffic settled in TARGET2 and T2 by hour

(panel a – x-axis: times in CET; y-axis: daily averages in number of transactions; panel b – x-axis: times in CET; y-axis: daily averages in EUR billions)



Sources: TARGET2 and T2.

Note: The data for T2 cover the third quarter of 2023 while those for TARGET2 cover the third quarter of 2022.

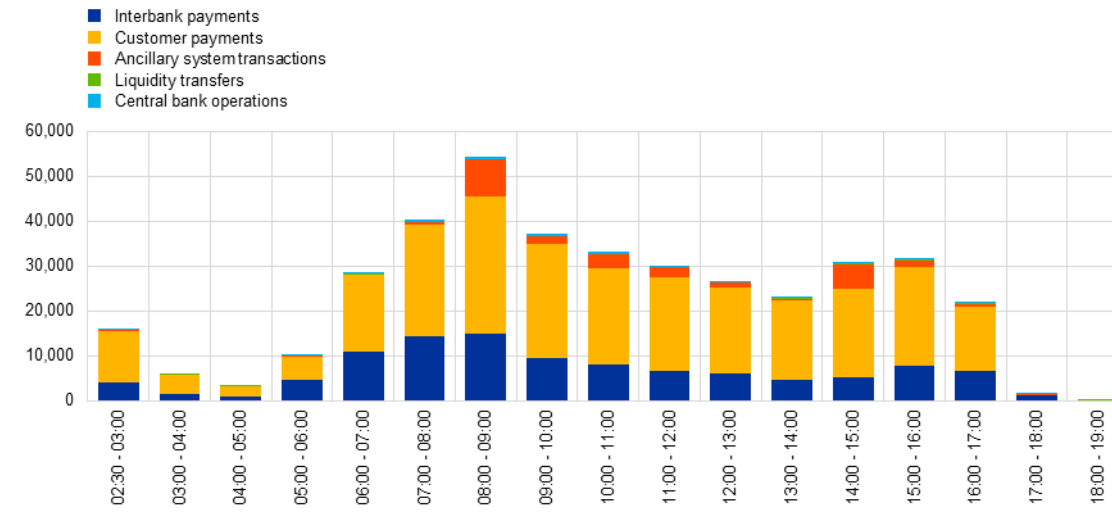
During the extended opening hours, the volume of traffic settled in T2 mainly consisted of customer payments. A breakdown of the traffic settled in each business hour by payment category provides additional insights into the intraday settlement pattern (Chart B). Throughout the business day, customer payments made up the main transaction type, in line with the overall T2 traffic. At the start of day, between 02:30 CET and 03:00 CET, around 11,200 customer payments were settled each day, on average, in the third quarter of 2023. Starting at 06:00 CET, the share of customer payments increased again, peaking at over 30,000 payments between 08:00 CET and 09:00 CET, before stabilising at around 20,000 payments settled each subsequent hour until the end of the day. Ancillary system transfer traffic reached its hourly peak between 08:00 CET and 09:00 CET, while

interbank payments increased in the first half of the morning and then remained relatively constant until 16:00 CET. Liquidity transfers were high in the early morning and in the late afternoon.

### Chart B

T2 traffic in volume settled by hour and by category

(x-axis: times in CET; y-axis: daily averages in number of transactions)



Source: T2.

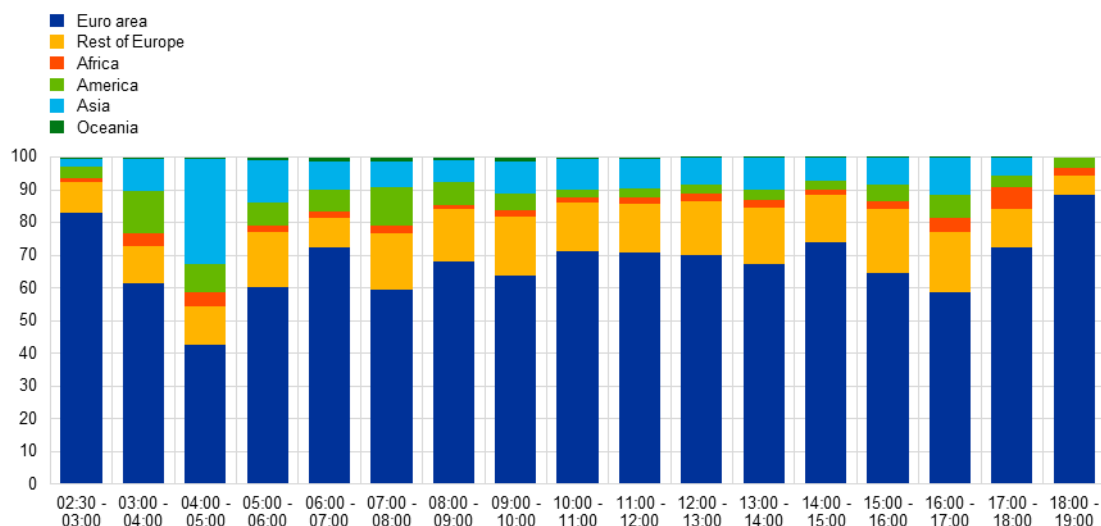
Note: The data for T2 cover the third quarter of 2023.

By identifying the originating entity of payments, it is possible to obtain a breakdown of the use of the extended operating hours by geographical location across financial markets worldwide. As explained in Section 1.11, banks without direct access to T2 can participate indirectly by using correspondent banking services offered by directly connected institutions. The breakdown of T2 traffic by business hour and by the geographical area of the originating entity reveals that the share of payment values sent by Asian banks via T2 is significantly higher in the morning, especially between 03:00 CET and 07:00 CET (Chart C). This confirms that the new extended opening hours are used for cross-border transactions with countries outside the euro area.

## Chart C

### T2 traffic in volume settled by hour by originating country

(x-axis: times in CET; y-axis: daily averages in percentage)



Source: T2.

Note: The data for T2 cover the third quarter of 2023.

In summary, the extended operating hours of T2 have significantly reduced the concentration of payment traffic at the start of the day, leading to a reduced burden on the infrastructure and lower operational risk. The extension is particularly beneficial for financial markets outside the European Economic Area (EEA), since the first hours of the day are mainly used by Asian banks. This outcome is in line with the expectations during the project phase. In addition, as the opening hours in different time zones become more aligned, this may lead to faster cross-border payments, as well as a reduction in liquidity costs and settlement risk, in line with objectives of the G20 cross-border payments programme.

## 1.9 Use of prioritisation

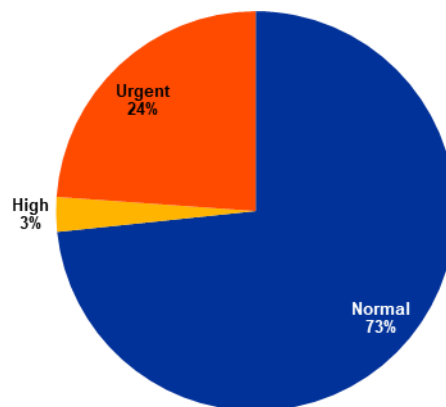
The option to assign priorities to payments helps participants to optimise their liquidity usage. It does so by allowing them to reserve a certain amount of liquidity for specific payment priorities. When submitting payments in T2, participants can assign a priority of “normal”, “urgent” or “high”. In general, payments are settled immediately on a “first in, first out” basis, as long as sufficient liquidity is available in the participant’s RTGS account. However, if this is not the case, payments that cannot be settled immediately are queued according to priority. Participants can reserve a set amount of their liquidity for the “urgent” and “high” priority classes, while payments in the “normal” priority class are made when excess liquidity is sufficient. This offers a means of securing liquidity for urgent and high-priority payments. The priorities for pending transactions can be changed at any time in application-to-application (A2A) or user-to-application (U2A) mode via the RTGS graphical user interface (GUI).

With the switch to T2, the distribution of the priorities assigned when submitting payments to the RTGS service has changed quite substantially compared with TARGET2. The proportion of “normal” transactions declined from 87% to 73% in 2023, while transactions given “high” priority dropped from 6% to 3%. By contrast, the percentage of “urgent” transactions increased from 7% to 24%. Overall, these figures indicate that the prioritisation feature is used more extensively in the RTGS service than it was in TARGET2.<sup>19</sup>

**Chart 17**

Use of priorities in TARGET2/RTGS in 2023 based on volumes

(percentages)



Source: TARGET2/T2.

## 1.10 Non-settled payments

Non-settled payments in TARGET2/RTGS are transactions that are not processed by the end of the business day, for example because they were erroneous, insufficient funds were held in the account to be debited, or a sender’s limit had been breached. These transactions are ultimately rejected when the cut-off time<sup>20</sup> is reached.

The number of rejected transactions was carefully monitored on migration to T2 as a move to a new system brings with it the risk of a potential increase in rejections. Fortunately, the number of non-settled transactions actually declined significantly after the switch to T2. This shows in particular that in the new system, rejections due to lack of funds are reduced thanks to the liquidity optimisation mechanisms that have been implemented in T2. Between April and December 2023 the monthly average of non-settled payments generally ranged between seven and 56 transactions per day, which was a very low level. The exception was one spike in June, when the daily average for the month stood at 223 transactions. This was due to an incident on 30 June that affected the ancillary system algorithms. However, even this spike was relatively small compared with the daily number of non-settled

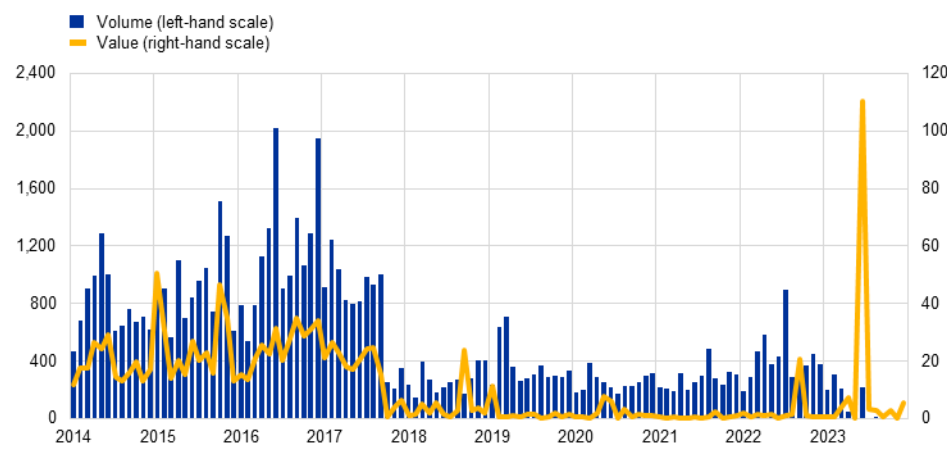
<sup>19</sup> Chart 19 combines both TARGET2 and RTGS information on priorities, so a further change may be seen in the 2024 figures.

<sup>20</sup> 17:00 CET for customer payments and 18:00 CET for all other types of transaction.

transactions in TARGET2 in 2022, when they stood at between 196 and 900 on average per month. As was the case in TARGET2, the average daily value of these non-settled transactions in the new RTGS system was small in 2023, ranging from €0.4 billion to €7.5 billion, except in June when the average daily value spiked at €110.1 billion because of liquidity transfers erroneously entered by participants.

**Chart 18**  
Non-settled payments in T2

(left-hand scale: number of transactions; right-hand scale: EUR billions)



Source: TARGET2/T2.

## 1.11 Use of credit lines in TARGET2/T2

The intraday credit line is a facility in TARGET2/T2 through which banks can overdraw their intraday account against eligible collateral. By the end of 2023, the average daily intraday credit line per month had increased to €2,022.8 billion, representing a 22.2% increase compared with the previous year (Chart 19). The increase recorded in the T2 credit line is linked to the release of the collateral following the repayment of targeted longer-term refinancing operations (TLTRO) by counterparties. These counterparties were then able to mobilise this freed-up collateral to access the intraday credit line in T2.

This increase followed a prolonged period of decline in the intraday credit line, running from late 2014, when the ECB's asset purchase programme (APP) began, and October 2022. Abundant central bank reserves during this period made participants less reliant on intraday credit lines, while their collateral was used for non-standard monetary policy measures such as the APP, the pandemic emergency purchase programme and the TLTRO.



**Chart 19**

**TARGET2/T2 intraday credit line**

(EUR billions, daily average per month)



Source: TARGET2/T2.

Notes: The chart covers the period from January 2014 to December 2023. Figures represent monthly averages. The daily intraday credit line is calculated as the sum of the individual intraday credit line limits set at the start of day. The chart shows the intraday credit line daily average per month.

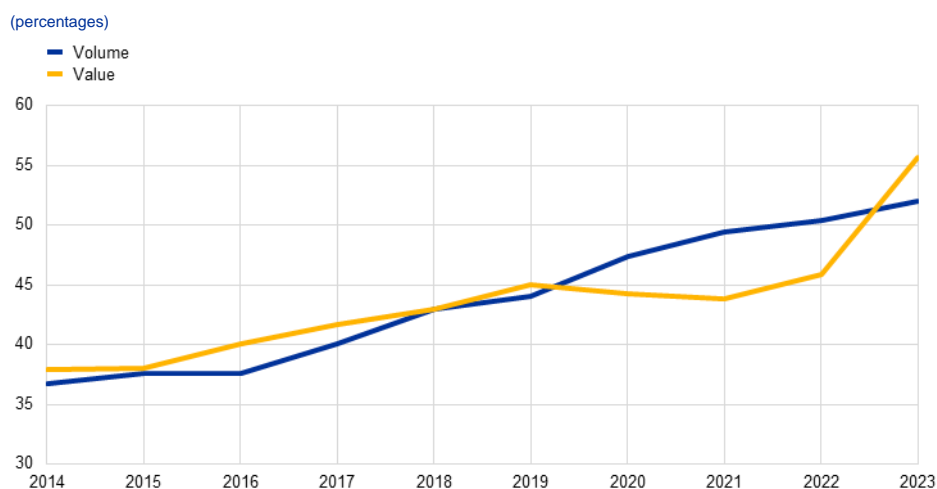
## 1.12 Share of inter-Member State traffic

The share of inter-Member State traffic in TARGET2/RTGS indicates the percentage of traffic that is exchanged between participants belonging to different banking communities.<sup>21</sup> In 2023 the share of inter-Member State traffic increased to 52% in volume terms, while in value terms it increased to 55.7% (Chart 20). This share of traffic in value terms represents an increase of nearly 10 percentage points compared with the previous year. However, this is primarily the consequence of a change in the calculation methodology resulting from the move to T2. The indicator only takes into account transactions settled in the RTGS system. As central bank operations do not take place in the RTGS system but in the CLM component, they are no longer included in the calculation. This caused an increase in the cross-border share of the total traffic in 2023, since these transactions are typically domestic and of high value. At the same time, the cross-border share also increased in volume terms, albeit at a slower pace. Since this indicator is less affected by central bank operations, which by nature are not numerous, the upward trend is more a reflection of the increasing level of cross-border transactions, and hence the level of financial integration in the large-value payment segment, which is mainly supported by TARGET2/RTGS.

<sup>21</sup> When analysing these data, it should be borne in mind that whether a payment is sent or received by a given banking community may depend more on a bank's internal organisation than on its real geographical domicile. For example, a subsidiary of a French bank located in Italy, because of its internal organisation, may send TARGET2/T2 payments to another bank also located in Italy via its headquarters in France. In this case, the payment flow will be considered to be cross-border, even though the payment is taking place between two entities located in the same country. By contrast, banks located in European Economic Area (EEA) countries whose central banks do not provide TARGET Services, such as the Czech Republic or Sweden, could participate in TARGET2/T2 component systems provided by other central banks. For example, if a Swedish bank participating in TARGET2-Bank of Finland sent TARGET2 payments to banks in Finland that also participated in TARGET2-Bank of Finland, the payment flows would be considered domestic, even though they took place between entities located in different countries.

## Chart 20

### Share of inter-Member State traffic in TARGET2/RTGS



Source: TARGET2/T2.

The inter-Member State traffic depicted in Chart 20 is calculated based on the national banking communities to which the direct participants sending and receiving payments on the platform belong. Since it is also possible to connect to TARGET2/RTGS from a non-EEA country as the holder of an addressable Bank Identifier Code (BIC), the cross-border share of TARGET2/RTGS traffic can also be computed taking into account information for the full payment chain (originator, sending settlement bank, receiving settlement bank and beneficiary, and possible intermediate agents). A calculation of the inter-Member State shares based on the originator and beneficiary of each payment shows that the average monthly share of cross-border payments in the RTGS system stood at 63.4% in terms of volume and 48.4% in terms of value in 2023. Taking the full payment chain into account therefore leads to a cross-border share that is significantly higher in volume but lower in value. However, these figures still represent an increase compared with the previous year for reasons similar to those described in the previous paragraph.

## 1.13 Tiering

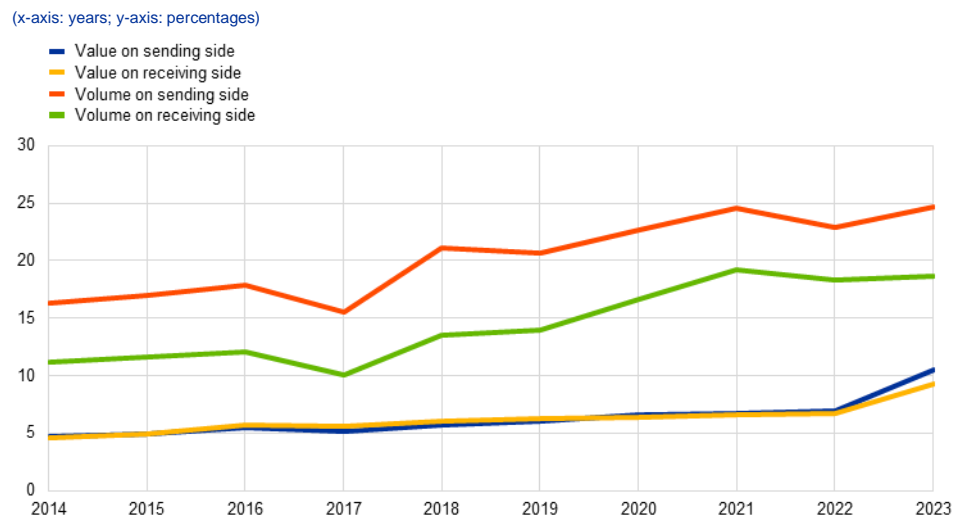
Tiered participation arrangements are made in a system such as T2 when a direct participant of that system provides services that allow other participants to access the system indirectly. The indirectly connected participants benefit in turn from the clearing and settlement facility services offered by direct participants.

While indirectly connected parties (referred to as addressable BIC holders in T2) benefit from a settlement facility that would otherwise be costly to access directly, these types of arrangement also entail risks. Tiered participation arrangements can create dependencies that may lead to credit, liquidity or operational risks for the payment system, its participants and ultimately the stability of the banking system. Close monitoring of the tiering level in T2, and previously in TARGET2, has thus

always been of paramount importance. It is also an oversight requirement under Article 17 of the SIPS Regulation.<sup>22</sup>

Over the last ten years, the share of payments sent or received by direct participants in TARGET2/T2 has followed an upward trend, especially in terms of volume. The level of tiered traffic in value terms hovered around 5.3% on both the sending and the receiving side until 2018 and then increased to around 6.6% by 2022 (Chart 21). The methodological changes applied in T2 explain most of the increase observed in 2023, when the share of tiered traffic in value terms reached 10.6% on the sending side and 9.3% on the receiving side (see Box 5 for further details). Meanwhile, the tiered volume increased steadily from 16.3% in 2014 to 24.6% in 2023 on the sending side and from 11.2% to 18.7% on the receiving side.

**Chart 21**  
Tiering levels in TARGET2 and T2 over time



Sources: TARGET2/ T2.

There is persistent asymmetry between the share of tiered traffic in value terms and the share of tiered traffic in volume terms, as well as between payments that are tiered on the sending side and those that are tiered on the receiving side. This suggests first of all that indirect participants use direct participants in T2 to settle transactions more frequently on the sending side than on the receiving side. Second, it suggests that the average tiered transaction size is larger on the receiving side than on the sending side. The results in T2 are consistent with those in TARGET2.

**Box 5**  
Identification of tiered participation arrangements in T2

Like TARGET2, T2 is subject to the SIPS Regulation, and after the go-live of the T2-T2S consolidated platform, the Eurosystem has adapted the tiering exercise developed for TARGET2 to

<sup>22</sup> Regulation of the European Central Bank (EU) No 795/2014 of 3 July 2014 of 3 July 2014 on oversight requirements for systemically important payment systems (ECB/2014/28) and Regulation of the European Central Bank (EU) 2017/2094 of 3 November 2017 amending Regulation (EU) No 795/2014 (ECB/2017/32).

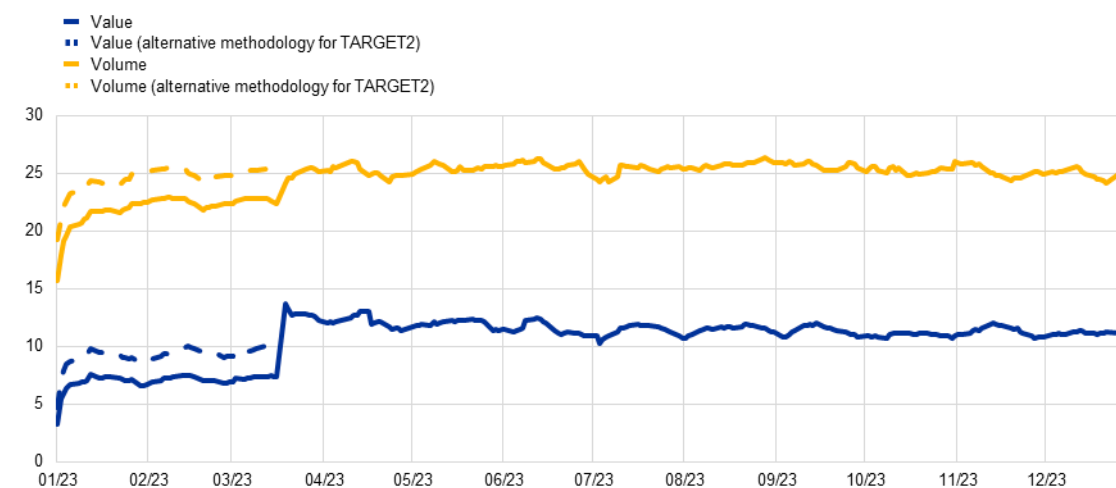
the T2 system configuration, where T2 is composed of the CLM and RTGS services. This box illustrates the impact of these adaptations on the tiered traffic sent to T2, and in particular to the RTGS service, in 2023.

A level shift in the share of overall tiered traffic, especially in value terms, occurred when T2 went live on 20 March 2023. In the first two months and a half of 2023, the share of tiered traffic sent in TARGET2 stood at 7.0% in terms of value and 21.9% in terms of volume. Between 20 March 2023 and the end of the year, it increased to an average of 11.5% in terms of value and 25.4% in terms of volume in T2 (Chart A).

### Chart A

Tiered traffic sent to TARGET2 and T2 in 2023

(x-axis: days; y-axis: percentages)



Sources: TARGET2/T2.

These developments can mainly be explained by the methodological changes introduced on migration to the new T2. The calculations only include customer and interbank transactions settled in the RTGS service. This means that all CLM activity, ancillary system-related activity in the RTGS service and liquidity transfers are now excluded. These are mostly high-value payments and were part of the methodology for TARGET2. This has caused a reduction in the total traffic considered “eligible” for tiering, which is the denominator in the share of tiered traffic. As a result, the indicator went up in 2023. At the same time, it has had an asymmetrical impact on the level shift in the share of tiered traffic in terms of value on the one hand and volume on the other.

When recalculating the share of tiered traffic in TARGET2 using a methodology similar to the current one, which means including customer and interbank payments only, the gap compared with T2 is significantly reduced. The recalculated share of tiered payments sent in TARGET2 increases from 7.0% to 9.2% in terms of value. This means that the gap compared with T2 is reduced to only 2.3-2.4 percentage points. It also suggests that there is continuity in the customer and interbank payment traffic in TARGET2 and T2. In terms of volume, the share increases to 24.5%, fully closing the gap compared with the T2 levels.

Overall, the results for the first year of T2’s operation were consistent with those for TARGET2. The level shift in the share of tiered traffic can be mainly explained by methodological changes that affected the pool of transactions considered eligible for tiering. The analysis of the full set of

indicators developed for the identification of risks arising from tiering in T2 also confirms that those risks did not materially change compared with TARGET2 and remained at an acceptable level in 2023.

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## 1.14 Money market transactions in T2

In the same way as with its predecessor TARGET2, market participants use T2 to settle unsecured money market transactions in central bank money. By applying the Furfine algorithm<sup>23</sup> to the T2 transaction-level data, it is possible to identify which transactions were related to money market loans, or, more precisely, to the unsecured overnight money market.<sup>24</sup> This unique dataset is updated regularly to obtain the latest information about the money market. Overall, T2 transaction data provide a rich source of information for analysing monetary policy implementation and T2 operations. The importance of the money market is twofold: (i) it is an important vehicle for redistributing liquidity among T2 participants; and (ii) it is a large-value and time-critical area of business that the operator needs to be aware of, in particular when dealing with abnormal situations.

In 2023 around 35,890 money market loans with a total value of about €2.73 trillion were identified. This corresponded to a daily average volume of 141 money market loans, with a daily average value of about €10.76 billion (Chart 22). Activity had already started to increase slightly in July 2022 as a result of the increases in the key ECB policy rates, although with no disruptive effects. The amount of unsecured funds traded on the overnight market continued to increase in 2023 but remained at low levels compared with the period before the financial and sovereign debt crises.

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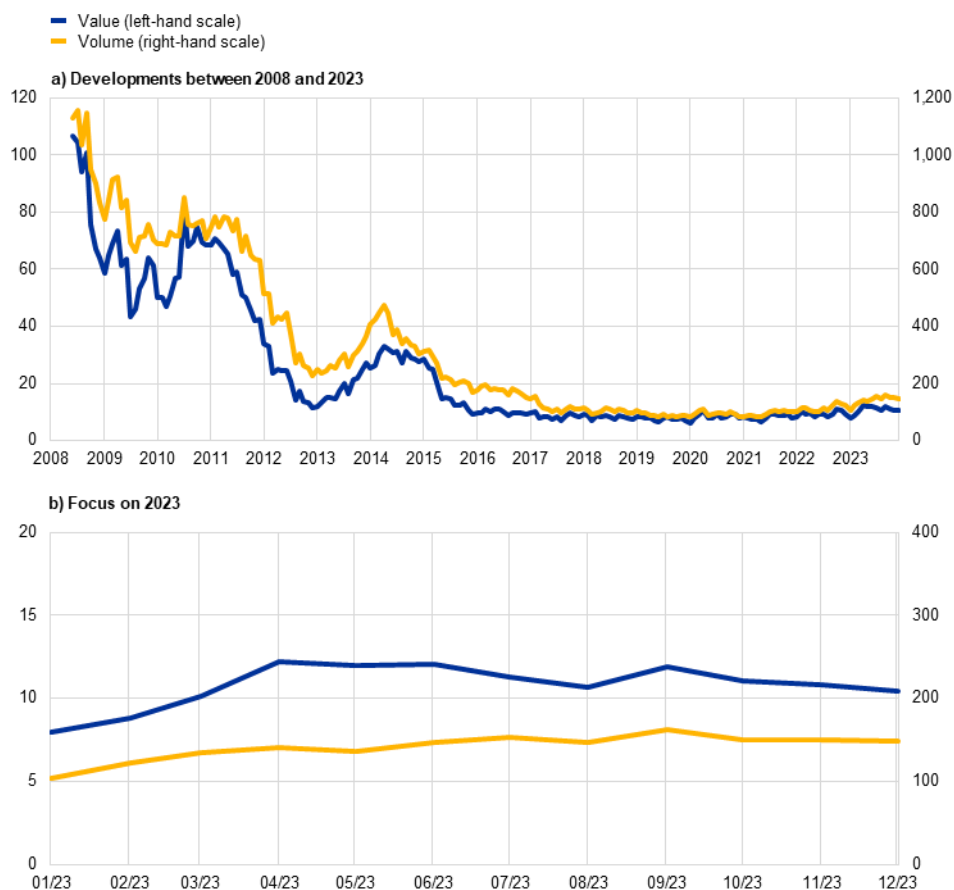
<sup>23</sup> For more information, see Frutos, J., Garcia-de-Andoain, C., Heider, F. and Papsdorf, P., “[Stressed interbank markets: evidence from the European financial and sovereign debt crisis](#)”, *Working Paper Series*, No 1925, ECB, Frankfurt am Main, June 2016. As a result of the go-live of the T2-T2S consolidation, the Furfine algorithm that was previously run on TARGET2 data has been adapted to the new T2 data model.

<sup>24</sup> For more information, see the box entitled “[The usefulness of TARGET2 transaction data for the analysis of the unsecured overnight money market](#)”, *Economic Bulletin*, Issue 6, ECB, 2015.

## Chart 22

### Unsecured overnight money market activity in TARGET2 and T2

(daily averages per month, left-hand scale: EUR billions; right-hand scale: number of transactions)



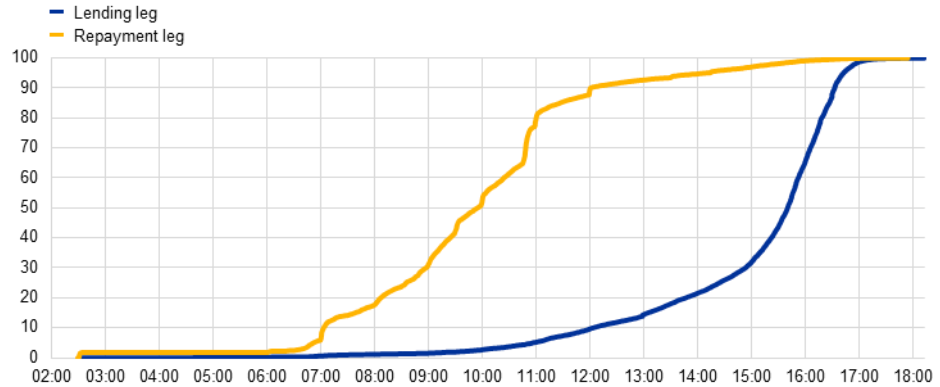
Sources: TARGET2/T2.

Chart 23 complements this analysis by showing the cumulative distribution in value of all money market transactions in T2 during the day in the period from 20 March 2023. On the lending leg, 50% of total value was settled by around 15:40 CET, while 98% was settled by around 16:55 CET. This confirms the assumption that the last few hours of T2 operations were particularly important for the interbank market, as was the case with TARGET2. Three-quarters of loans were repaid by around 10:50 CET each day and 90% by around 12:00 CET. Therefore, compared with TARGET2, repayments took place earlier in T2, since payment settlement in T2 can start as early as 02:30 CET (see Section 1.8 for more details). At the same time, these patterns ensured that liquidity repaid could be reused for payment purposes later that day.

### Chart 23

#### Cumulative distribution of T2 money market transactions during the day in value terms

(x-axis: times in CET; y-axis: percentages)



Source: T2.

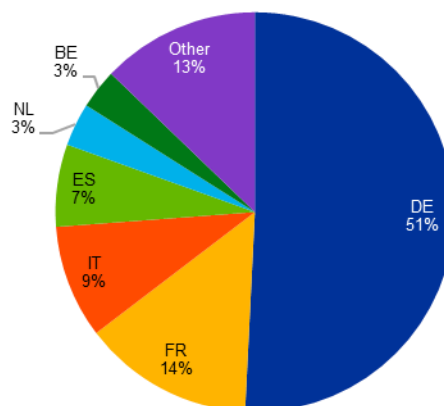
## 1.15 Shares of national banking communities

The distribution of traffic across banking communities, both in terms of volume and in terms of value, was largely unchanged compared with the previous year. The largest contributor to TARGET2/T2 traffic in volume terms in 2023 was Germany, which accounted for just over half of the transactions settled in the system (51%). Next came France (14%) and Italy (9%) (Chart 24). Meanwhile, the two largest contributors in value terms were the same as the two largest in volume terms, namely Germany (41%) and France (16%). The third-largest contributor in terms of turnover was the Netherlands with 9%, while Italy accounted for only 3% of the traffic in value terms (Chart 25).

### Chart 24

#### Contributions to TARGET2/T2 volume by country in 2023

(percentages)

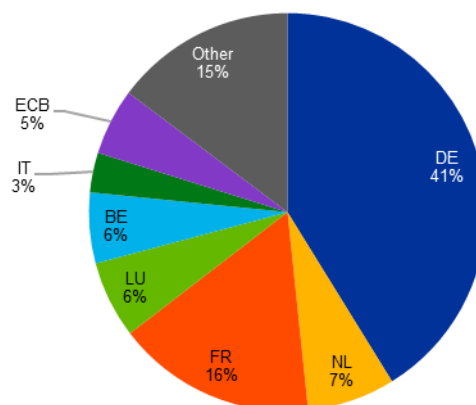


Source: TARGET2/T2.

### Chart 25

#### Contributions to TARGET2/T2 value by country in 2023

(percentages)



Source: TARGET2/T2.

The ECB accounted for 5% of total TARGET2/T2 traffic value, making it among the top contributors in terms of value settled. Like any other Eurosystem central bank, the ECB has its own TARGET component system. However, the ECB has as participants financial market infrastructures of European or international relevance, such as CLS, EURO1 and STEP2-CGS. These financial market infrastructures conduct only a few transactions, but the transaction amounts are high, which explains why the ECB component system makes up such a large share of the total TARGET2/T2 traffic.

The high concentration of both TARGET2/T2 values and volumes in certain countries is not only due to the size of particular markets. It can also be attributed to the fact that from November 2007 onwards the system allowed the activities of banking groups to be consolidated in a single RTGS account held by the group's head office, increasing concentration in countries where a large number of these groups are domiciled.



## 2 TARGET2/T2 service level and availability

In 2023, 99.85% of all payments settled in T2 were processed in less than two minutes, while 0.06% of payments were settled in two to five minutes. Only 0.09% payments took more than five minutes to be processed. These figures are very much in line with the corresponding figures in 2022, which shows that the migration to the new system has allowed the high level of performance to be maintained.

Service delivery times and payment processing times generally remained stable in 2023, confirming the high-performance level of T2. This excellent performance was advantageous for the banking community, and particularly for its real-time liquidity management.

Payment processing times were measured for all payments settled in the RTGS service, with the exception of (i) ancillary system settlement transactions using the ancillary system settlement procedures and (ii) payments not settled owing to a lack of funds or a breach of limit. In practice, around 8% of all RTGS payments fell into one of these two categories, meaning that the statistics on processing times applied to around 92% of the system's traffic.

A full 100%<sup>25</sup> of requests or enquiries were processed in less than one minute, an increase on the level achieved in 2022.

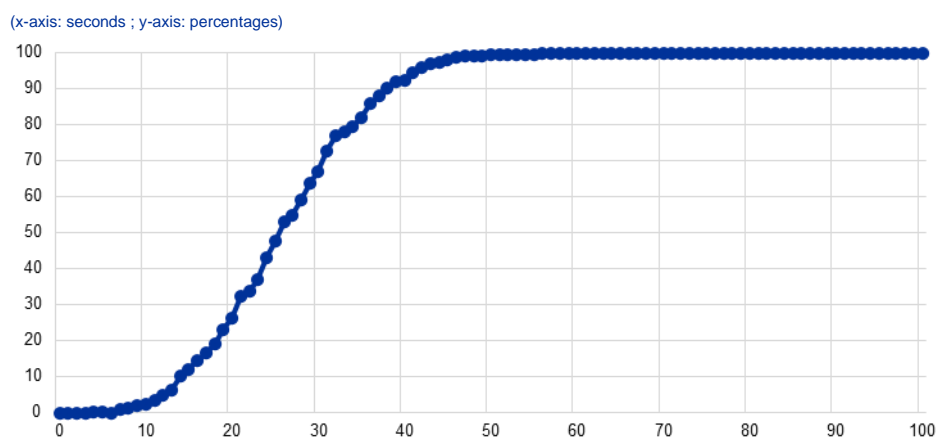
Chart 26 helps to better quantify the system's performance by showing the distribution of processing times on the RTGS service, i.e. the percentage of traffic with a processing time below a certain number of seconds. The reference point taken is the peak day of the year, 11 April 2023, when 659,146 payments were settled. The chart shows that on this day 50% of transactions were settled within 26 seconds and 90% within 38 seconds, confirming the new T2 service high level of performance.

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<sup>25</sup> This figure covers messages received by the RTGS service in both U2A and A2A mode.

**Chart 26**

Processing times on 11 April 2023, excluding the first hour



Source: RTGS.

## 2.1 Technical availability

In the light of T2's importance for the functioning of the financial system and the knock-on effects that any potential malfunctions could have had on other market infrastructures, the Eurosystem paid particular attention to ensuring its smooth operation. This is clearly underlined by the fact that T2 achieved 100% technical availability in 2023. This is a remarkable performance considering that it was the new system's first year of operation.

Technical availability was measured on TARGET business days during the RTGS RTS II phase (including end-of-day processing), i.e. from Monday to Friday between 02:30 CET and 18:45 CET (19:00 CET on the last day of the minimum reserve period), and during any extension to that period required to complete the operational day (e.g. in the event of delayed closing owing to a technical problem in T2 – or in T2S, which has an effect on T2 – or in the event of major problems in ancillary system settlement in T2). The availability measurement did not include systems or networks not directly managed by T2 (in particular, the availability of network service providers' services). Incidents occurring during the RTGS RTS I phase were not included either.

Technical availability was not intended to measure the impact of partial outages involving the T2. For example, incidents affecting only the processing of ancillary system transactions without any effect on other payment processing activities could not be measured in this figure, although they had an overall impact on T2 and were taken into account when assessing the system's performance. However, such incidents were considered when measuring processing times where applicable, and were also reported transparently and followed up accordingly.

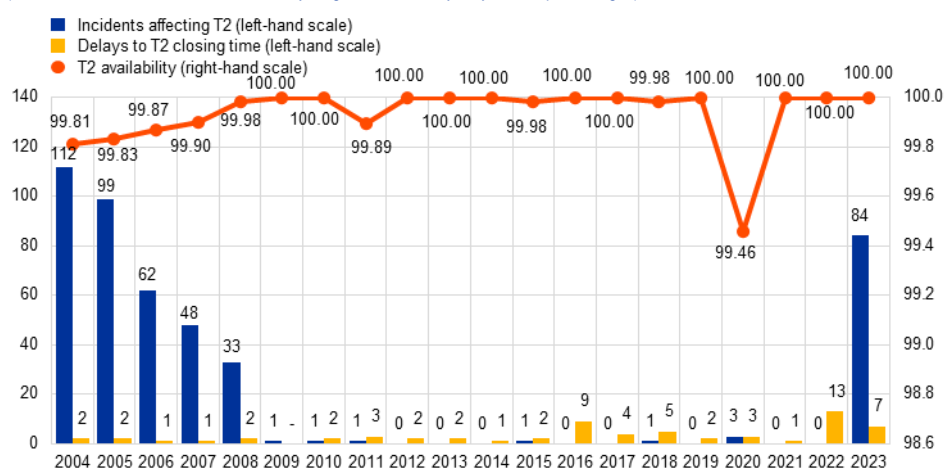
## 2.2 Incidents in T2

The ECB publishes up-to-date information about the availability of T2 via the Market Information Dissemination tool.<sup>26</sup> All incidents are followed up with a detailed incident report and risk management process. The aim of this approach is to learn from these events in order to avoid a recurrence or incidents of a similar nature.

**Chart 27**

### T2 incidents and delays in closing the system

(left-hand scale: number of incidents/delays; right-hand scale: yearly data in percentages)



Source: T2.

T2 did not experience any incidents in 2023 that led to a complete suspension of payment settlements. Nevertheless, there were 84 incidents in total, which were mainly small issues linked to the first months of operations. Most of these teething problems were related to the unavailability of U2A access to GUIs, to the delayed provisioning of data in the Data Warehouse, or to some business day events taking longer than usual. These incidents were experienced mainly in the months following the migration, and their frequency clearly decreased in the second half of the year.

The interbank payment cut-off was nevertheless delayed beyond 18:00 CET on seven occasions, although this represented a significant decrease compared with the previous year.

The most significant incidents were as follows.

- On 25 May 2023 an incident affected the execution of U2A instructions requiring a signature via non-repudiation of origin (NRO) between 17:05 CET and 19:20 CET. As a result of the incident, RTGS and CLM closed at 20:30 CET in order to leave enough time for participants to submit their last liquidity transfers and have recourse to overnight deposits.
- On 20 June 2023 an incident affected the processing of ancillary system files (settlement procedures A, B and E) between 17:16 CET and 18:08 CET. On the

<sup>26</sup> For more information, see [Market Information Dissemination](#).

same day, a second incident affected the execution of U2A instructions requiring a signature via NRO for about two hours. As a result of these combined incidents, the interbank cut-off was delayed until 19:00 CET.

- On 27 October 2023 an incident affected the outbound traffic from T2, which was completely blocked, while the inbound traffic was processed at an extremely slow pace. The closure of CLM and RTGS was delayed by three hours, i.e. until 21:00 CET.
- On 23 November 2023 an incident affected U2A access to the Eurosystem Single Market Infrastructure Gateway (ESMIG) between 17:00 CET and 18:06 CET. As a result, T2 closing was delayed by one hour to 19:00 CET.

## 3 T2 participants

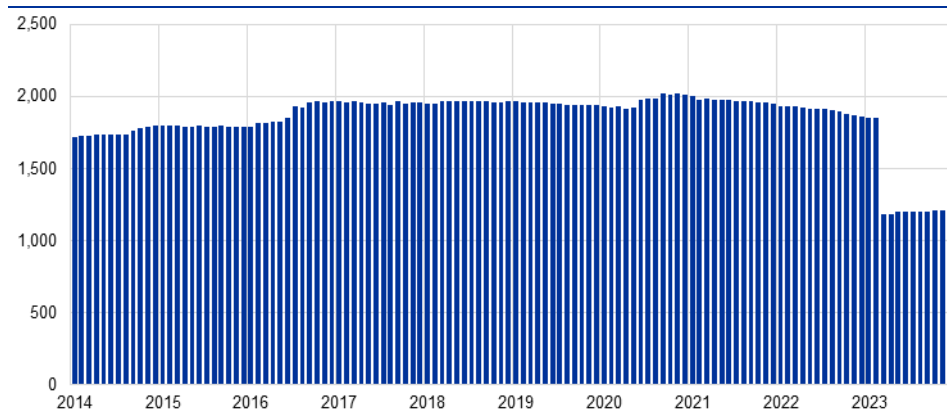
### 3.1 RTGS accounts

In December 2023 the total number of RTGS accounts active in T2 (encompassing direct participants, technical accounts, ancillary system accounts and special-purpose accounts) was 1,212, i.e. lower than at the end of 2022 (1,863). The number of RTGS accounts decreased significantly owing to the different account structure in T2 compared with TARGET2.

Under TARGET2, holding an RTGS account was a technical precondition for taking part in refinancing operations with the Eurosystem. In some Member States, it was also the only way for monetary policy counterparties to directly fulfil their minimum reserve requirements. In fact, a significant number of TARGET2 participants held an RTGS account for these purposes alone. This was typically the case for small-size institutions.

In T2, transactions with the central banks, including refinancing operations, are now carried out from MCAs held on the CLM service. In addition, funds on MCAs are also counted against minimum reserve requirements. This has provided an opportunity for some monetary policy counterparties to simply open an MCA without holding an RTGS DCA.

**Chart 28**  
Number of RTGS accounts in T2



Source: TARGET2/T2.

## 3.2 Participation types

At the end of December 2023, 956<sup>27</sup> direct participants held an RTGS account in T2 and were registered as such in the directory. Through these, 5,368 correspondents worldwide were able to settle their transactions in T2.

**Table 2**  
Participation types

	Number of participants
Direct participation	956
Multi-addressee – credit institution	8
Multi-addressee – branch of direct participant	920
Addressable BIC – correspondent	5,368
Addressable BIC – branch of direct participant or entity that is part of the same group	22,792
Addressable BIC – branch of correspondent or entity that is part of the same group	9,778

Including the branches of direct participants and correspondents, a total of 39,822 BICs around the world (54.93% of them located in the EEA) were accessible via T2 at the end of 2023. Compared with the number of reachable BICs at the end of 2022, this figure represents a drop of around 4%, driven mainly by the decrease in the number of addressable BIC holders associated with branches of direct participants and correspondents.

Participants and institutions addressable via T2 were listed in the T2 RTGS directory, which was available to all direct participants for information and routing purposes. In addition to direct participants with an RTGS account for sending payments to and receiving payments from other direct participants, a number of banks opted to open special-purpose RTGS accounts which were not reported as direct participants in the T2 RTGS directory. These were used, among other things, to settle specific business. There were 175 of these accounts, also known as “unpublished BICs”, at the end of 2023 (compared with 423 in 2022).

## 3.3 Ancillary systems

At the end of 2023 a total of 67 ancillary systems were using the RTGS service for settlement purposes, including 29 retail payment systems, 21 securities settlement systems and 12 central counterparties.

Of the 67 ancillary systems using the RTGS service for settlement purposes, 54 made use of the RTGS ancillary system settlement procedures, which were developed to facilitate and harmonise cash settlement of these systems in RTGS.<sup>28</sup>

<sup>27</sup> This figure represents the number of direct participants with at least one account in the RTGS service of T2. Direct participants may have had more than one account, which is why the figure is lower than the number of RTGS accounts reported in Section 3.1.

<sup>28</sup> Ancillary systems not using the RTGS ancillary system settlement procedures alternatively hold a regular RTGS account and exchange normal credit transfers with their settlement banks.

Table 3 shows the number of times each of the available RTGS ancillary system settlement procedures was used during the year.<sup>29</sup>

**Table 3**  
RTGS ancillary system settlement procedures

	Usage
Ancillary system settlement procedure A	20
Ancillary system settlement procedure B	13
Ancillary system settlement procedure C	16
Ancillary system settlement procedure D	5
Ancillary system settlement procedure E	34

<sup>29</sup> An ancillary system may make use of more than one RTGS ancillary system settlement procedure.

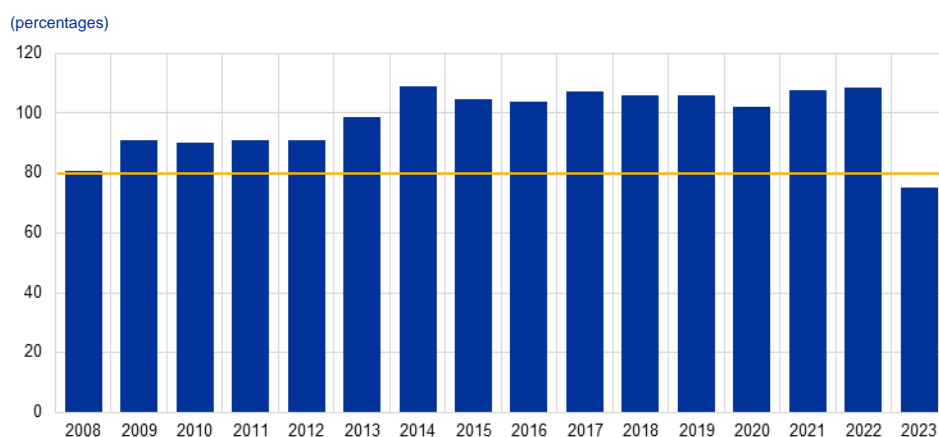
## 4 TARGET2 financial performance

### 4.1 Cost recovery objectives

The objective initially set by the ECB's Governing Council in 2007 was for TARGET2 to recover all its costs (with the exception of the "public good factor")<sup>30</sup> over the six-year amortisation period, i.e. between May 2008 and April 2014. This included development costs, running costs, overhead costs and capital costs.

The evolution of TARGET2's cost recovery rate since the finalisation of its migration phase in 2008 is shown in Chart 29.

**Chart 29**  
TARGET2 annual cost recovery rate



Source: ECB calculations.  
Note: The data for 2008 only cover the period from July to December.

### 4.2 Financial performance of TARGET2

At the time of TARGET2's development, a number of assumptions were made about the volume of operations in relation to cost recovery. It was estimated that in the first year of operation (i.e. from May 2008 to April 2009), TARGET2 would settle a total of 93.05 million transactions and that this figure would then need to increase by an average of 6% per year. Although the objective was met the year the system was launched, the overall economic slowdown and exceptional market conditions in the ensuing years made it impossible to meet the targeted 6% increase.

<sup>30</sup> For further considerations on the public good factor, see "Public good issues in TARGET – Natural monopoly, scale economies, network effects and cost allocation", Working Paper Series, No 505, ECB, Frankfurt am Main, July 2005, "Settlement finality as a public good in large-value payment systems" Working Paper Series, No 506, ECB, Frankfurt am Main, July 2005 and "Incorporating a "public good factor" into the pricing of large-value payment systems", Working Paper Series, No 507, ECB, Frankfurt am Main, July 2005. A special study group analysed various issues relevant for the design of TARGET2. On completion of the group's work, the ECB issued a series of published papers in its Working Paper Series.



From launch the system saw an average annual decrease in billed traffic of 0.7%, which largely explains why cost recovery was only around 90% for the first few years of operation.

In July 2012, acknowledging this underperformance, the Eurosystem decided to amend the single pricing scheme as of January 2013. In 2013 the amended pricing scheme helped to bring cost recovery close to 100%.

By 2014 most<sup>31</sup> of the investment costs were amortised, which substantially reduced the costs still to be recovered and lifted recovery to more than 100%. These annual profits were used to offset the losses accumulated over the first few years of operation.

While TARGET2 generated annual profits from 2014 onwards, the level of cost recovery fluctuated considerably each year. The reasons for this were, first, that the SEPA migration end date resulted in a one-off drop in the total amount of customer payments settled. Second, T2S migration had an effect from both a cost and revenue perspective. TARGET2 underwent adaptations in preparation for the launch of T2S, the costs of which started to be recouped from 2015 onwards. These adaptation costs were passed on to system participants in the form of a specific fee.<sup>32</sup> The successful migration of the respective CSDs to T2S from June 2015 onwards also reduced the total amount of ancillary system transactions settled in TARGET2.

The total amount of billable traffic in TARGET2 increased significantly in 2021 and 2022, which were the best years for the system's financial performance with annual cost recovery rates above 105%. By the end of 2022, the accumulated loss since the start of TARGET2 had decreased considerably, and the system was very close to equilibrium with only €0.8 million of losses after 15 years of operations.

In the first quarter of 2023, participants were billed for a total of 16.2 million transactions, and total TARGET2 revenues reached €7.6 million. It should be noted that the TARGET2 revenues in the first quarter of 2023 did not include the fees collected for the March traffic as it had been decided that, for that month, participants would only be billed in the new T2 system.

TARGET2 was finally decommissioned on 20 March 2023, closing with a loss of €3.4 million. This loss was largely attributable to the decision not to invoice TARGET2 participants for March 2023, which alone led to an estimated shortfall of €2.5 million. It should be noted that this loss will be entirely transferred to the new system and will be included as part of its cost recovery model. The final loss of €3.4 million is equivalent to around 0.5% of the total costs of more than €600 million to be recovered for the entire operational lifetime of TARGET2. This means that the final cost recovery rate of TARGET2 is 99.5%. Although the objective set by the Governing Council in 2008 has not been formally achieved, the marginal loss

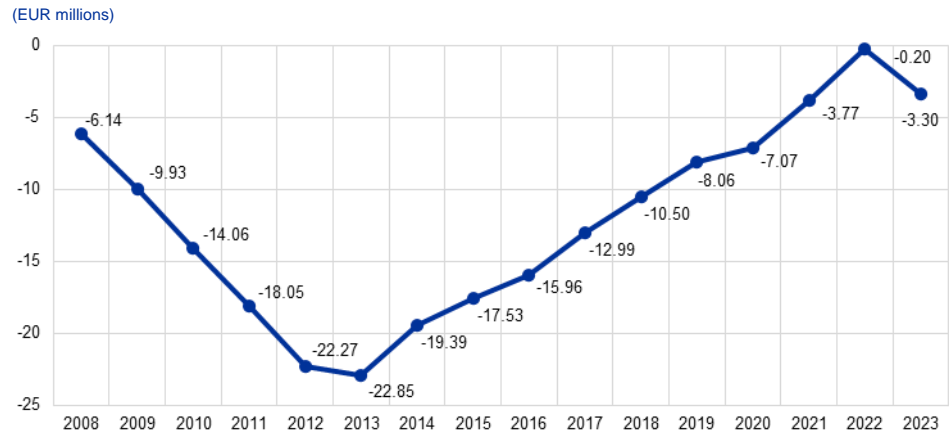
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<sup>31</sup> This part corresponds to the initial development costs (i.e. Release 1.0). Only costs corresponding to the development of annual releases that had not yet been fully amortised (i.e. Release 2.0 and beyond) were still to be recovered.

<sup>32</sup> In 2015 a new monthly fee was introduced for the DCAs linked to TARGET2 RTGS accounts and for the use of value-added services.

eventually recorded should still be seen as a very good result given all the unexpected and sometimes extreme conditions under which TARGET2 has operated throughout the last 15 years.

**Chart 30**  
Accumulated profit/loss



Source: ECB calculations.  
Note: The data for 2008 only cover the period from July to December.

## 5 T2 risk management and oversight activities

### 5.1 T2 risk management

The management of operational risks was key for ensuring the resilience of the T2 service in 2023. At the end of 2023, TARGET Services risk management was strengthened with the establishment of an independent TARGET Services Risk Committee (TSRC). The TSRC was set up to support the risk management function and assist the Market Infrastructure Board (MIB) in fulfilling its responsibility to advise on the relevant policies and frameworks for monitoring and mitigating risks.

Additionally, the MIB endorsed the new TARGET Services cyber resilience and information security framework (TS CRISF). The framework contains a dedicated set of processes and requirements to identify, protect, detect, respond to and recover from the plausible materialisation of cyber threats to TARGET Services.

The TARGET Services risk management framework (TS RMF), which describes the operational risk management of the TARGET Services and was initially approved by the Governing Council in December 2021, has also been further enhanced to link to the new TS CRISF.

Both frameworks are applicable to all TARGET Services (T2, T2S and TIPS) and were endorsed by the Governing Council in February 2024.

### 5.2 Oversight activities

As part of the continuous oversight cycle, in 2023 the Eurosystem oversight function monitored TARGET's compliance with the SIPS Regulation and other relevant oversight requirements.

In view of the go-live of the T2-T2S consolidated platform in March 2023, the oversight function monitored the progress of the testing and migration activities during the first quarter of the year and subsequently the operational performance of the consolidated platform throughout the stabilisation period. In parallel with the operational reorganisation triggered by this project, the oversight function also consolidated its approach for the oversight of the different TARGET Services in terms of activities, outputs and reporting.

One major milestone in the oversight function's activities came in October 2023 with the launch of a comprehensive assessment of TARGET Services (including TIPS) with reference to the SIPS Regulation. The assessment is expected to be concluded by the end of 2024. Additionally, in 2023 the oversight function continued to conduct regular assessments of operational performance, as well as assessments of the changes introduced in both the T2 and TIPS services, with releases implemented in

June and November 2023. The oversight function also monitored developments in the participation of connected markets.

The operations function regularly reports on progress in addressing open findings from past oversight assessments. After assessing the progress made during 2023, the oversight function closed a number of recommendations issued in the context of (i) the assessment of TARGET2 with reference to the Eurosystem's cyber resilience oversight expectations<sup>33</sup> and (ii) the assessment of TIPS incidents.

Finally, in 2023 the oversight function organised regular meetings with the operations function at different levels of governance. These meetings served as an opportunity to discuss developments and risks in the system, as well as providing a means for the overseer to effectively monitor the system's operational performance and risk profile.

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<sup>33</sup> [Cyber resilience oversight expectations for financial market infrastructures](#)

## 6 System evolution

Release management is a process for assessing and ranking change requests and production problems and for defining the scope and the implementation date of a new T2 functional release. This ensures that all aspects related to the system's evolution, both technical and non-technical, are properly taken into account. It includes coordination with other TARGET Services when required. The two types of functional release usually covered by release management are as follows.

### Yearly major release during the second weekend in June

- This includes a set of software changes affecting T2 functionality as authorised by the steering level, as well as fixes for, or the resolution of, any production problems identified.

### Yearly minor release during the third weekend of November

- This includes a set of software changes to align T2 with the regularly scheduled update of the ISO 20022 message standards, as well as the resolution of any production problems identified.

In 2023, the T2 service underwent both types of functional release, one in June and the other in November. Both releases mainly included fixes for production problems identified and for release defects.

In 2024, the T2 service will undergo three releases. The usual functional releases in June and November will include important changes relating to, for example, the Eurosystem Collateral Management System (ECMS) and multi-currency adaptations to enable the onboarding of Danmarks Nationalbank. In addition to these, an ad hoc release was planned for February to provide fixes to pending defects.

The content of each release, together with main milestones and documentation, is published on the [T2 page](#) of the ECB's website, alongside a list of change requests.

### Box 6

#### New pricing structure for TIPS

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The ECB's Governing Council reviewed the TIPS pricing scheme in June 2023. As a result of the review, a new pricing structure has been introduced.

As of 1 January 2024, TIPS charges fees for settlement service activity and monthly fixed fees.

Participants holding a TIPS DCA are subject to the fixed fee of €800 per month for each account, plus €20 per month for each BIC that is authorised to settle instant payments in each TIPS DCA and in each credit memorandum balance (CMB) linked to the TIPS DCA. One BIC is included free of charge and the total number of chargeable BICs is limited to 50 per account.

ACHs holding a TIPS Ancillary System Technical Account (ASTA) are subject to the fixed fee of €3,000 per month for each account, plus €20 per month for each BIC that is authorised to settle instant payments in each TIPS ASTA and in each CMB linked to the TIPS ASTA. The total number of chargeable BICs is limited to 50 per account.

A fee of €0.002 per instant payment order and per settled/unsettled positive recall answer is shared equally between the originator and the beneficiary participant. The fee applies to both types of account, namely TIPS DCA and ASTA, and is charged to the account holder.

A degressive fee applies for internally settled ACH transactions per month (i.e. instant payment transactions, near-instant payment transactions and positive recall answers that have been settled within the ACH). It ranges from €0.0004 for the highest price band to €0.00015 for the lowest price band.

Information services (reports and queries) and liquidity transfers in TIPS, as well as liquidity transfers between TIPS and other TARGET Services, remain free of charge.

No fee applies to new participants joining TIPS.

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## **Box 7**

### **T2-T2S consolidation project: testing, migration and first weeks of operation**

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#### **The project**

The T2-T2S consolidation project replaced TARGET2 with a new RTGS system and applied a CLM tool across all TARGET Services (T2, T2S, TIPS and the forthcoming ECMS).

As part of the functional consolidation, the T2-T2S consolidation project delivered several components to be used by T2 and other TARGET Services. These common components consist of the Eurosystem Single Market Infrastructure Gateway (ESMIG), Common Reference Data Management (CRDM), Business Day Management (BDM), a billing component (BILL), the Data Warehouse (DWH) and Legal Archiving (LEA).

The functional specification phase of the project ended in 2020 following the publication of stable User Detailed Functional Specifications (UDFS) and User Handbooks (UHBs). Further updates were made in 2021 to prepare those deliverables for testing.

In 2022 the focus was on the updates required for production, incorporating change requests approved after the publication of UDFS version 2.2 and UHB version 2.0 in 2021. UDFS version 3.0 and UHB version 3.0 were published in October 2022.

On 20 October 2022, the Governing Council decided to postpone the launch of services by four months, from 21 November 2022 to 20 March 2023. The decision followed an assessment by the ECB's MIB and was driven by the need to allow users more time to complete their testing in a stable environment. It also took into account the importance and systemic nature of T2, especially in view of the prevailing geopolitical conditions and volatile financial markets. This decision proved

beneficial as it helped central banks to stabilise the system and all participants to complete their preparations for the go-live.

### Testing and migration

The testing of the software consisted of three stages: (i) the Eurosystem Acceptance Testing (EAT) performed by the Eurosystem as a whole, (ii) the Central Bank Testing (CBT) conducted by central banks and (iii) the User Testing (UT) conducted by central banks and their participants.

During these test stages, some software limitations were identified. While most of the limitations have been resolved, those remaining and those identified after the go-live are being gradually removed during the ongoing operational phase.<sup>34</sup>

The migration to the new system followed a “Big Bang” approach, meaning all participants had to move to the new system at the same time during the same weekend. This represented a significant challenge considering that participants needed to prepare not only for the new RTGS features but also for the new messaging standards based on ISO 20022.

The migration process had been thoroughly rehearsed in a set of successful go-live tests, some of which involved the whole TARGET community.

Activities during the migration weekend (17-19 March 2023) were completed in line with the original migration playbook.

### First weeks of operations

On 20 March 2023, the first day of operations, the system was 100% available and performing as expected. All cut-offs were executed on time on the first business day, while traffic was in line with that on an average TARGET2 day (around 400,000 transactions). The system encountered two main issues: one caused by expired BICs leading to rejections that was fixed during the day, and one related to the end of day processing, which delayed the start of the next business day. During the first weeks of operations, the system remained 100% available, with no delays in closing the business days and with good performance, including on peak days (at the end of the first quarter of 2023 and after the Easter weekend). During the first four weeks of operations, the traffic settled remained similar to that processed in TARGET2.

Further details are available on the [T2 page](#) of the ECB’s website.

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## Box 8

### Evolution of T2 and TIPS: multi-currency capability

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From the outset, both T2 and TIPS were designed as services with multi-currency capability. This means that, in addition to the euro, T2 and TIPS are able to settle transactions in central bank money in several other currencies. Non-euro currencies can only be onboarded onto any of these

<sup>34</sup> Many fixes were deployed with the first standard T2 release R2023.NOV (18 November 2023). Further fixes are planned with the T2 release R2024.JUN and the T2 release R2024.NOV. In addition, a T2 Hot Fix release was planned for February 2024.

TARGET Services once a formal Currency Participation Agreement (CPA) has been signed between the Eurosystem and the central bank issuing that currency.

On 3 April 2020 Sveriges Riksbank signed a CPA with the Eurosystem to use TIPS in Swedish krona. The technical connection between the Swedish RTGS system RIX on the one hand and TIPS on the other was established on 23 May 2022. This marked the successful completion of the first phase of the migration of the Swedish community to TIPS. The connection is essential for funding and defunding the accounts of future Swedish participants in TIPS. In the second phase, the Swedish market carried out testing and preparation for final migration to take place in the course of February 2024.

Sveriges Riksbank also expressed an interest in joining T2 (and T2S) by signing a letter of intent on 13 October 2023. Sveriges Riksbank is preparing a feasibility assessment so that its Board can potentially reach a decision in mid-2024. The assessment focuses on topics such as security, legal aspects and contingency solutions. Sveriges Riksbank has not yet proposed a go-live date.

Danmarks Nationalbank was the second non-euro central bank to express an interest in joining TARGET Services for payments. In December 2020, it signed a letter of intent to onboard the Danish krone onto both T2 and TIPS, making it the first non-euro central bank to express an interest in joining TARGET Services for securities as well as payments settlements (Danmarks Nationalbank has already been using T2S since 2018). This milestone marked the start of close cooperation between the ECB, Danmarks Nationalbank and the service provider for TARGET. Subsequently, in April 2022, Danmarks Nationalbank submitted a feasibility assessment covering functional, operational and regulatory aspects. Danmarks Nationalbank and the Eurosystem are expected to sign the CPA in the course of 2024. This last step in the process will pave the way for the migration of the Danish krone to T2 and TIPS in April 2025.

Meanwhile, on 3 November 2023, Norges Bank received a draft version of its CPA agreement with the Eurosystem with a view to onboarding Norges Bank onto TARGET Services for payments.

Norges Bank is currently preparing a TIPS feasibility assessment. From Norges Bank's perspective, the assessment serves two objectives: (i) to demonstrate its compliance with the functional, technical, operational, and legal and regulatory requirements of TIPS; and (ii) to verify that TIPS and the ECB are able to accommodate the needs of the Norwegian community. Processes for onboarding other non-euro central banks are still at a preliminary stage.

For the Eurosystem, the onboarding of non-euro currencies brings numerous benefits in terms of volume and cost sharing. For instance, the current Danish krone wholesale payments system (the equivalent to T2) settles around DKK 640 billion per day on average (equivalent to approximately a quarter of Danish GDP). Migrating this amount to T2 will lead to significant volume growth for TARGET Services and substantially boost cost recovery. At the same time, Danmarks Nationalbank gains from sharing with the Eurosystem the development costs for its core payment infrastructure, including those related to cyber and resilience measures. Beyond the mutual financial benefits to all institutions involved, the added value of onboarding non-euro currencies is that the non-euro area national central banks in question add to the financial integration value of the TARGET Services. TARGET Services implement the latest harmonisation standards in Europe and globally, while at the same time providing safe and efficient financial market infrastructure services in central bank money. These are important elements supporting financial integration and the capital markets union



in Europe. At the same time, directly connecting new currencies with the euro enhances the single currency's international role.

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## Additional data

**Table**

Distribution of payment flows in TARGET2/T2

	2023				2022			
	Value (EUR billions)	%	Volume	%	Value (EUR billions)	%	Volume	%
<b>AT</b>	13,732	2%	2,405,972	2%	9,514	2%	2,369,055	2%
<b>BE</b>	32,119	6%	3,350,646	3%	29,412	5%	3,331,345	3%
<b>BG</b>	790	0%	318,102	0%	855	0%	296,394	0%
<b>CY</b>	238	0%	191,352	0%	109	0%	169,355	0%
<b>DE</b>	230,317	41%	53,027,555	51%	221,248	39%	53,063,586	52%
<b>DK</b>	2,625	0%	261,918	0%	2,858	1%	286,344	0%
<b>EE</b>	204	0%	100,429	0%	174	0%	94,413	0%
<b>ES</b>	23,438	4%	6,957,944	7%	16,833	3%	6,876,927	7%
<b>EU</b>	30,252	5%	156,324	0%	27,073	5%	200,154	0%
<b>FI</b>	20,672	4%	1,297,440	1%	12,079	2%	1,113,117	1%
<b>FR</b>	90,845	16%	14,467,963	14%	100,415	18%	14,144,262	14%
<b>GR</b>	6,964	1%	1,006,505	1%	1,122	0%	945,384	1%
<b>HR</b>	385	0%	304,616	0%	172	0%	111,490	0%
<b>IE</b>	5,226	1%	716,356	1%	3,637	1%	751,392	1%
<b>IT</b>	18,079	3%	9,575,614	9%	18,552	3%	9,097,425	9%
<b>LT</b>	1,456	0%	246,156	0%	1,316	0%	253,707	0%
<b>LU</b>	35,081	6%	2,769,072	3%	70,166	12%	2,612,936	3%
<b>LV</b>	453	0%	163,547	0%	329	0%	222,928	0%
<b>MT</b>	774	0%	78,189	0%	1,002	0%	86,523	0%
<b>NL</b>	40,064	7%	3,638,791	3%	49,112	9%	3,216,861	3%
<b>PL</b>	1,860	0%	1,442,446	1%	1,679	0%	1,412,439	1%
<b>PT</b>	1,425	0%	859,304	1%	1,363	0%	839,041	1%
<b>RO</b>	185	0%	160,927	0%	176	0%	140,931	0%
<b>SI</b>	424	0%	737,887	1%	334	0%	798,092	1%
<b>SK</b>	1,727	0%	173,199	0%	1,009	0%	163,657	0%
<b>Total</b>	<b>559,336</b>	<b>100%</b>	<b>104,408,254</b>	<b>100%</b>	<b>570,539</b>	<b>100%</b>	<b>102,597,758</b>	<b>100%</b>

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