



EUROPEAN CENTRAL BANK  
EUROSYSTEM

# TARGET Annual Report

2021

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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. A key instrument which the Eurosystem uses for carrying out this task is the provision of payment settlement facilities.<sup>2</sup>

To this end, in 1999 the Eurosystem created the Trans-European Automated Real-time Gross settlement Express Transfer system<sup>3</sup> (TARGET) 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 meet 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, most importantly, the needs of the Eurosystem's monetary policy.

In May 2008 TARGET2 replaced the first-generation system, TARGET. Like its predecessor, TARGET2 is 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 provides intraday finality, meaning that settlement is final for the receiving participant once the funds have been credited, it is 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 (TARGET2 (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 processing and settlement take place in real time (i.e. continuously), rather than in batch-processing mode. 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, and its successor TARGET2, are both RTGS systems.

Since June 2015 TARGET2 participants have been able to open dedicated cash accounts (DCAs) on the TARGET2-Securities (T2S) platform<sup>4</sup>, which they can use to settle the cash leg of their securities transactions. In addition, since November 2018 TARGET2 participants have been able to open DCAs for TARGET Instant Payment Settlement (TIPS).<sup>5</sup> TIPS is the 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 been working intensively to consolidate TARGET2 and T2S services. The project brings technical as well as functional enhancements. It allows changing market requirements to be met by replacing TARGET2 with a new RTGS system called T2 and it allows liquidity management to be optimised across all TARGET services. The new RTGS system will provide the market with enhanced and modernised services, which will also be available for currencies other than the euro. The messaging standard will migrate to ISO 20022, as for T2S and TIPS. In addition, the project will further strengthen cyber resilience capabilities and establish a single point of access to all Eurosystem market infrastructure services. It will support multi-vendor connectivity, thus allowing participants to choose between different connectivity options and fostering competition among network service providers.

TARGET2 offers harmonised market infrastructure services at EU level, as well as a single pricing structure. It provides ancillary systems with a harmonised set of cash settlement services and supports its users with enhanced liquidity management tools. In this manner, it contributes to financial integration, financial stability and liquidity efficiency in the euro area.

TARGET2 is accessible to a large number of participants. Approximately 1,000 credit institutions in Europe use TARGET2 to make payments on their own behalf, on behalf of other (indirect) participants or on their customers' behalf. Taking branches and subsidiaries into account, over 43,000 banks worldwide (and thus all of the customers of these banks) can be reached via TARGET2.

## The report and its structure

This report is the 22nd edition of the TARGET Annual Report. The first edition was published in 2001, covering TARGET's first two years of operation (1999 and 2000). As in previous years, the report provides information on TARGET2 traffic, its performance and the main developments that took place in 2021. It is aimed mainly at decision-makers, practitioners and academics who need to have an in-depth understanding of TARGET2. We hope it will also appeal to members of the general public with an interest in market infrastructure issues and, in particular, TARGET2.

In addition to the core content, this report includes seven boxes on topics of particular relevance in 2021. The boxes focus, respectively, on the evolution of traffic in TARGET2; the update on TIPS pan-European reachability measures; the

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

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

international perspective on cross-border payments in TARGET2; indirect participation in TARGET2; the external review carried out by Deloitte on incidents that affected TARGET services in 2020; an update on the TARGET2/T2S consolidation project and future RTGS services; and operational communication to TARGET2 participants.

In the report, references made to the first-generation TARGET system (which was in operation from January 1999 to May 2008) are also applicable to its second generation, TARGET2 (which replaced TARGET in May 2008).

### Note

*Liquidity transfers between TARGET2 and T2S/TIPS DCAs and payments processed on T2S/TIPS DCAs are not included in the TARGET2 indicators presented in this report.*

*Although both T2S and TIPS DCAs are legally part of TARGET2, these (technical) transactions are excluded from the calculations to prevent the system's indicators from being artificially inflated and to make the figures more easily comparable from year to year. Nevertheless, as a matter of transparency, some general statistics on T2S and TIPS DCAs are provided on the ECB's website.<sup>6</sup>*

## TARGET2 activity

In 2021 TARGET2 maintained its leading position in Europe, processing 90% of the total value settled by large-value payment systems in euro. TARGET2 also remained one of the largest payment systems worldwide. Compared with the previous year, the total turnover processed increased by around 4%, reaching €484.3 trillion.<sup>7</sup> The total volume of payments grew by 8.7% to 96.4 million transactions.

The highest daily turnover during the year was recorded on 24 December, with a total value of €2,772 billion, and the highest daily volume of payments was recorded on 6 April, when 580,290 transactions were processed.

In 2021 the availability of TARGET2's Single Shared Platform (SSP) stood at 100%.

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<sup>6</sup> See [Monthly statistics of payment instructions processed by TARGET and EURO1/STEP1](#).

<sup>7</sup> Together with the payments processed on T2S DCAs, the overall turnover in 2021 reached €722.2 trillion, corresponding to a daily average of €2.8 trillion. More detailed information can be found on the ECB's website under: [Value of transactions per month processed by TARGET and selected interbank funds transfer systems](#).

# 1 Evolution of TARGET2 traffic

**Table 1**  
Evolution of TARGET2 traffic

TARGET2 overall	Value (EUR billions)			Volume (number of transactions)		
	2020	2021	Change (%)	2020	2021	Change (%)
<b>Total</b>	465,794	484,252	+4,0%	88,666,544	96,354,615	+8,7%
<b>Daily average</b>	1,812	1,877		345,006	373,468	

Note: There were 258 operating days in 2021 and 257 operating days in 2020.

## 1.1 TARGET2 turnover

TARGET2 turnover in 2021 amounted to €484.3 trillion, corresponding to a daily average of €1.9 trillion. Chart 1 shows the evolution of the value of TARGET2 traffic over the last ten years. In 2011 and 2012 TARGET2 settlement values continued to recover after the slump caused by the financial crisis, with an annual growth rate of around 3%. The drop of 22% in 2013 was due mainly to a change in the statistical methodology, which involved some transactions ceasing to be included in the aggregate representing the turnover.<sup>8</sup> Overall, after two years of stable figures, TARGET2 turnover on RTGS accounts fell by almost 15% between 2015 and 2017, following the launch of T2S.<sup>9</sup> In 2018 the TARGET2 turnover stabilised, and in 2019, 2020 and 2021 it recorded annual increases of 2.0%, 5.6% and 3.9% respectively. These increases in turnover stemmed mainly from payments relating to operations with the central bank and from interbank payments.

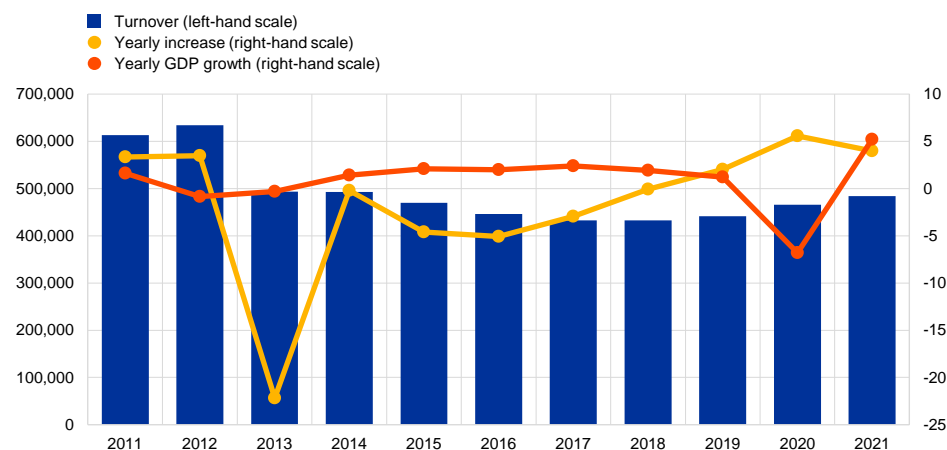
<sup>8</sup> See the box entitled “Changes to the statistical framework of TARGET2”, *TARGET Annual Report 2013*, ECB, May 2014.

<sup>9</sup> 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 TARGET2. Instead, it takes place via the DCAs held in T2S.

**Chart 1**

**TARGET2 turnover**

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



Source: TARGET2.

For activities involving market participants (i.e. excluding central bank and ancillary system transactions), interbank transactions (transactions exclusively involving credit institutions) accounted for 75% of the total value of payments in 2021, while the remaining share was composed of customer transactions (i.e. transactions processed on behalf of a non-bank party, be they individuals or corporate customers). This share has remained stable over the past few years (76% of interbank payments in 2020).

A comparison of the TARGET2 turnover and the euro area's annual GDP (around €12 trillion) shows that TARGET2 settles the equivalent of the annual GDP in six days of operations. This reflects the role and efficiency of TARGET2, which provides intraday finality for transactions and allows 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 TARGET2 participants in the same day.

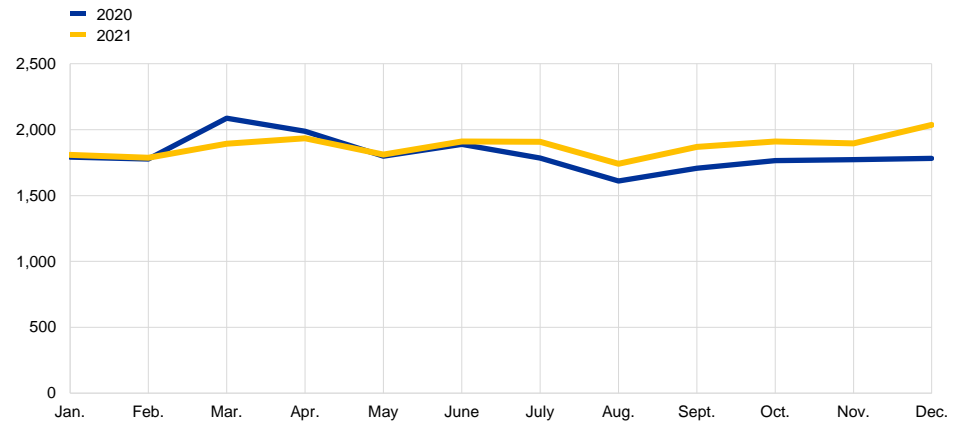
Chart 2 depicts the average daily turnover generated in TARGET2 for each month in 2020 and 2021, thus showing the seasonal pattern of the system. While the general pattern for both years is very similar during the second half of the year, the values recorded in March 2020 are significantly higher than they were in the same period of 2021. The difference is largely attributable to the impact of the coronavirus (COVID-19) pandemic, which resulted in increased market activity during this month.



## Chart 2

### Average daily TARGET2 turnover

(EUR billions)



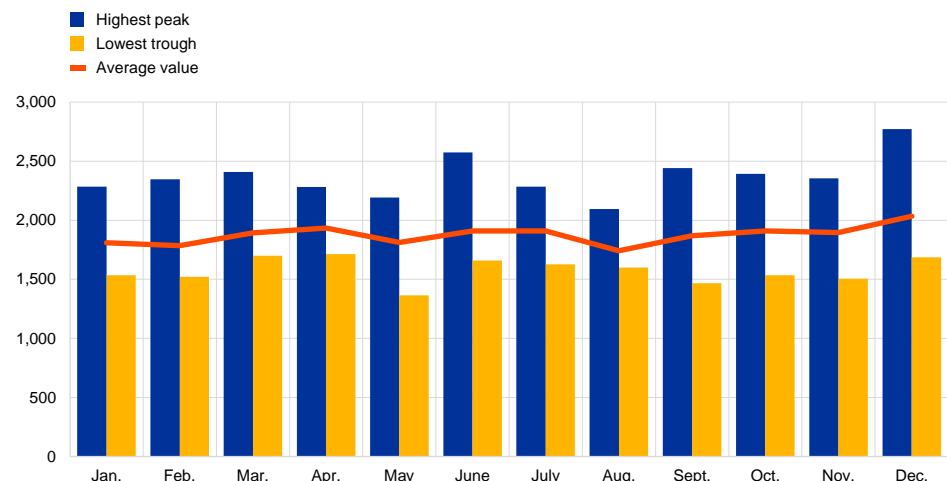
Source: TARGET2.

Chart 3 displays the highest and lowest daily TARGET2 values for each month of 2021, as well as the average daily values. The days with the highest peaks are usually at quarter-ends, typically on the last day of the month, owing to reimbursements and due dates in various financial markets. This seasonal pattern was also visible in 2021. However, the day with the largest turnover of the year, with a total value of €2,772 billion, was 24 December. This is largely due to the combination of “end of month, end of quarter and end of year” traditionally observed around Christmas time.

## Chart 3

### Monthly peaks, troughs and averages of TARGET2 daily values in 2021

(EUR billions)



Source: TARGET2.

Throughout 2021 the amplitude of TARGET2 turnover, expressed as the difference between the highest and the lowest values, was 51%, compared with 58% the

previous year. Overall, the average values throughout the year followed a well-established seasonal pattern.

Peaks and troughs in the system's values can also be influenced by other factors, such as TARGET2 holidays or the end of reserve maintenance periods. For example, the lowest values are typically recorded during the summer holidays and on days that are national holidays in some Member States or in other significant economies outside the EU. In 2021, for instance, the lowest values processed coincided with a public holiday in most European countries (Ascension Day on 13 May).

Finally, Chart 4 compares traffic developments in the world's major payment systems. In particular, it depicts the daily average turnover in euro equivalents for the last 23 years of TARGET/TARGET2, Continuous Linked Settlement (CLS), Fedwire Funds (the US dollar-denominated RTGS system operated by the Federal Reserve System) and the Bank of Japan Financial Network System (BOJ-NET). Some common patterns, including the effect of the financial crisis on the number of processed transactions, can be identified across systems. However, the comparability of TARGET2 with other systems has been hampered by the change in the TARGET2 statistical methodology in 2013 and the migration of the securities settlement systems to T2S.<sup>10</sup> In the latter case, if the average daily volume in TARGET2 after 2015 is considered together with the average daily turnover for DCAs, which are technically held in T2S, total traffic continues to increase.<sup>11</sup>

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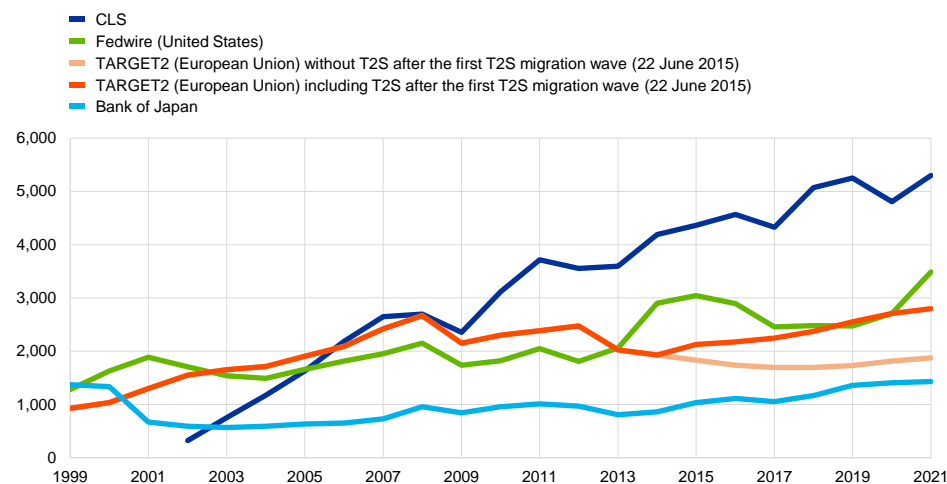
<sup>10</sup> It should, however, be taken into account that, while the trends illustrated give an indication of the size of each system and the long-term pattern, they are also affected by fluctuations in the euro's exchange rate vis-à-vis the US dollar and the Japanese yen, which may distort the figures. As both Fedwire Funds and CLS publish their turnover in US dollars, while the Bank of Japan uses Japanese yen, the turnover in euro is calculated on the basis of the ECB exchange rate for the last business day of the year in question.

<sup>11</sup> In 2021 the average daily turnover of TARGET2 including transactions on T2S DCAs amounted to almost €2,800 billion, compared with about €2,700 billion in 2020.

**Chart 4**

## Major large-value payment systems around the globe

(EUR billions)



Sources: TARGET2, Fedwire Funds Service (website of the Federal Reserve System); BOJ Time-Series Data (Bank of Japan website); ECB data.

## 1.2 Volume of transactions in TARGET2

After the low transaction volumes resulting from the financial crisis, TARGET2 traffic recovered, posting a positive trend between 2010 and 2013 (Chart 5). Although the number of transactions never reached pre-crisis levels, the system attracted around four million transactions more over that period. However, this trend reversed in 2014 and 2015 because after the period for migration to Single Euro Payment Area (SEPA) instruments ended,<sup>12</sup> there was once again a significant reduction in the customer payment segment, leading to lower TARGET2 volumes. On completion of the migration to SEPA, TARGET2 traffic stabilised at around 88 million transactions yearly. In 2021 the number of transactions increased significantly to more than 96 million.<sup>13</sup> This represents a historical peak since the launch of TARGET2 in 2008.

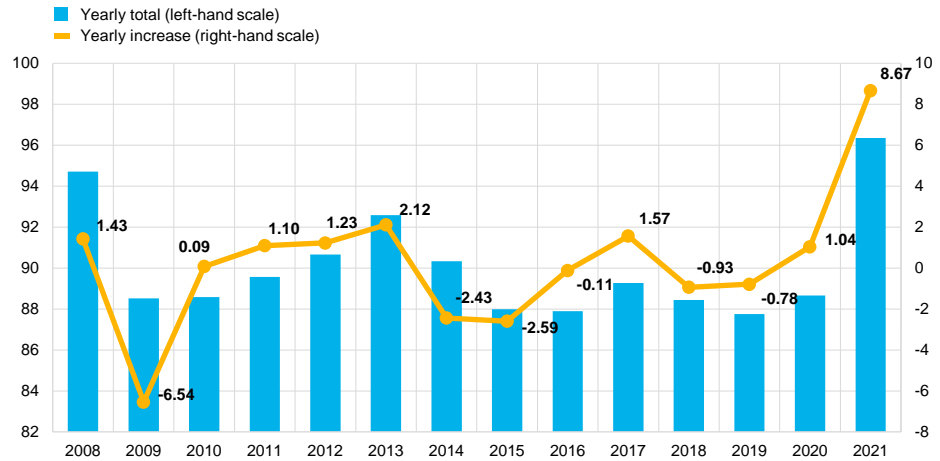
<sup>12</sup> With this major change for the industry, some participants reconsidered the routing policies for their customer payments and ultimately favoured channels other than TARGET2 (mainly SEPA-compliant ACHs), with some banks' customers (mainly large corporate customers) specifically requesting this.

<sup>13</sup> If the volume of transactions processed on T2S DCAs is included, this figure more than doubles, reaching 251 million. More details of the number of transactions settled on T2S DCAs, i.e. the cash leg of delivery-versus-payment transactions, can be found on the ECB's website under: [Monthly statistics of payment instructions processed by TARGET and EURO1/STEP1](#).

## Chart 5

### TARGET2 traffic

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



Source: TARGET2.

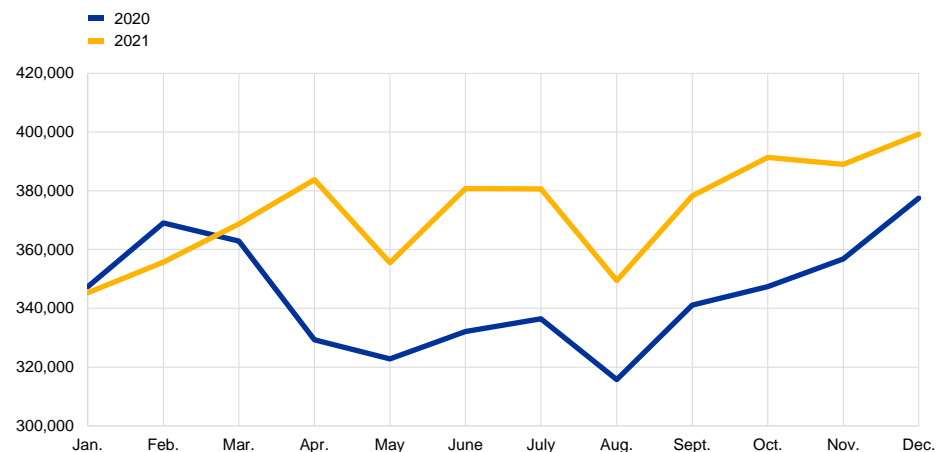
The exact volume settled in TARGET2 in 2021 amounted to 96,354,615 transactions, corresponding to a daily average of 373,468 payments. Compared with the previous year, the overall number of processed payments grew by 8.7%, driven by a higher number of interbank and customer payments. More detailed information on the evolution of the different traffic segments is provided in Box 1.

In only two months in 2021 average daily volumes in TARGET2 calculated on a monthly basis were below the levels recorded for the corresponding months in 2020 (Chart 6). The biggest year-on-year difference, amounting to 17%, was observed in April and this trend continued for the rest of the year. The difference in April was largely due to the impact of the COVID-19 pandemic in 2020. Overall, Chart 6 indicates a seasonal pattern similar to that of the previous year.

## Chart 6

### Average daily TARGET2 volumes per month

(number of transactions)

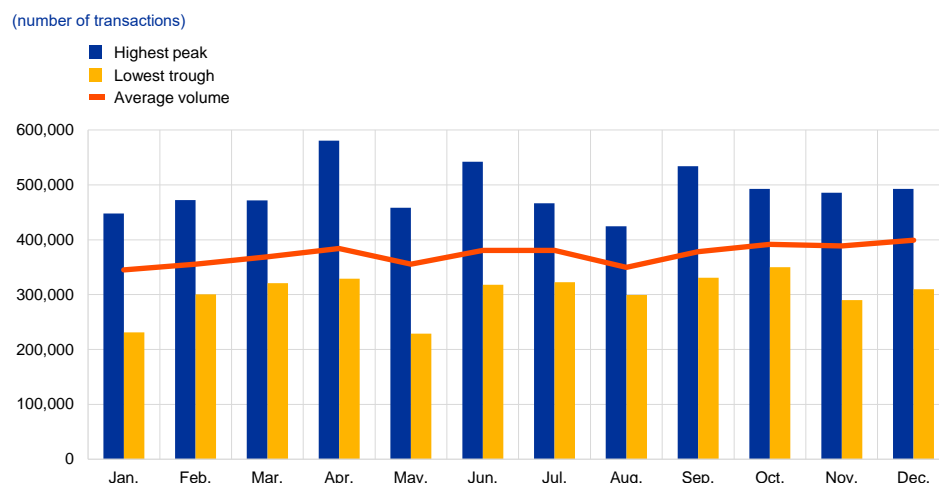


Source: TARGET2.

The highest average daily volume was recorded in December, when it reached close to 400,000 transactions. This figure may be related to the high daily volumes normally observed at the end of the year.

### Chart 7

#### Monthly peaks, troughs and averages of TARGET2 daily volumes in 2021



Source: TARGET2.

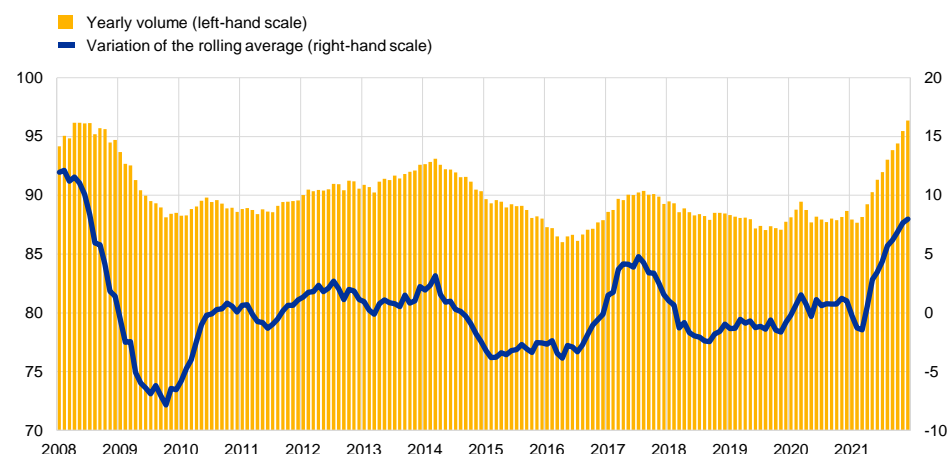
Chart 7 depicts the peaks and troughs in terms of the daily volume on RTGS accounts in TARGET2 in 2021 and the average daily volume for each month. As observed for the value-based figures, the peaks typically fall on the last day of the month, and are especially pronounced at quarter-ends for the same reasons (i.e. deadlines in financial markets or for corporate business). In 2021 the highest daily volume was recorded on 6 April (the day immediately following the Easter weekend, during which TARGET2 was closed for four consecutive calendar days), when 580,290 transactions were processed. This was the third-highest daily peak in TARGET2 since its launch. The lowest daily volume was recorded on 13 May (228,801 transactions), which was a public holiday in most European countries (Ascension Day).

Chart 8 shows the yearly moving average of TARGET2 volumes (i.e. the cumulative volume processed in the preceding 12 months) for each month. This indicator helps to eliminate the strong seasonal pattern observed in TARGET2 traffic. The variation of this cumulative volume from one year to the next is also presented as a percentage. The chart shows that the cumulative volume 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. After that TARGET2 volumes were roughly stable 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. Thereafter the cumulative volume started to drop for the reasons set out at the beginning of this section (SEPA migration) and in October 2014 the cumulative yearly growth rate turned negative and continued to decrease until mid-2017. The negative trend 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. In 2021, after recording a slight decrease in the first quarter, TARGET2 volumes rose steadily over the rest of the year to reach their highest levels since the system was launched.

**Chart 8**  
TARGET2 volumes

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



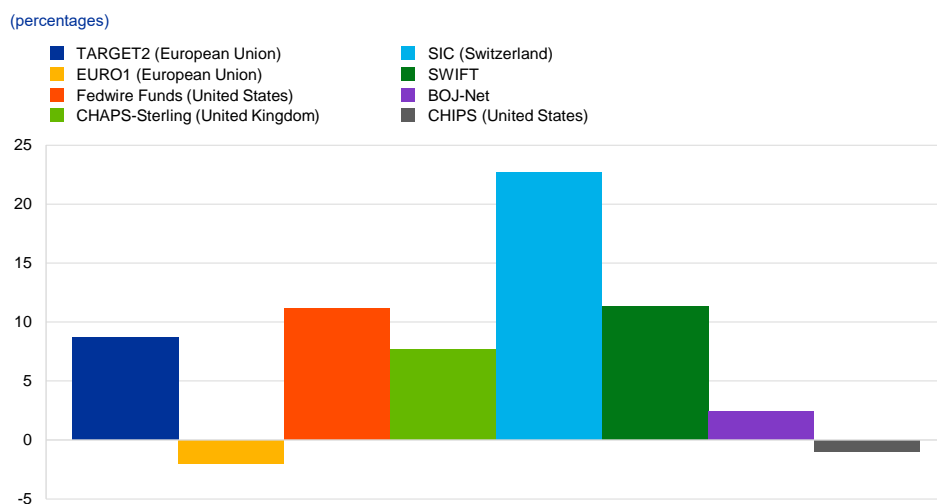
Source: TARGET2.

Chart 9 compares the growth rate (between 2020 and 2021) of traffic in TARGET2 with the growth rates of major payment systems worldwide and the growth rate of SWIFT payment-related FIN traffic (categories 1 and 2). The chart reveals that the changes in traffic diverged significantly across systems. The largest increase – over 22% – was recorded by SIC (the Swiss payment system), while the largest decrease – around 2% – was recorded by EURO1.<sup>14</sup> This shows that TARGET2 benefited from a general increase in payment activities worldwide in 2021.

<sup>14</sup> A detailed comparison of TARGET2 with EURO1 is provided in Section 1.5.

### Chart 9

Comparison of the changes in traffic in some major large-value payment systems and SWIFT between 2020 and 2021



Sources: TARGET2, [Fedwire Funds Service](#) (website of the Federal Reserve System); [SWIFT FIN Traffic](#) (SWIFT website); [BOJ Time-Series Data](#) (Bank of Japan website); [Key payment statistics](#) (Bank of England website); [Annual Statistics From 1970 to 2021](#) (the Clearing House website); [SIC statistics](#) (SIX website); and ECB data.

### Box 1

#### The evolution of TARGET2 traffic in 2021

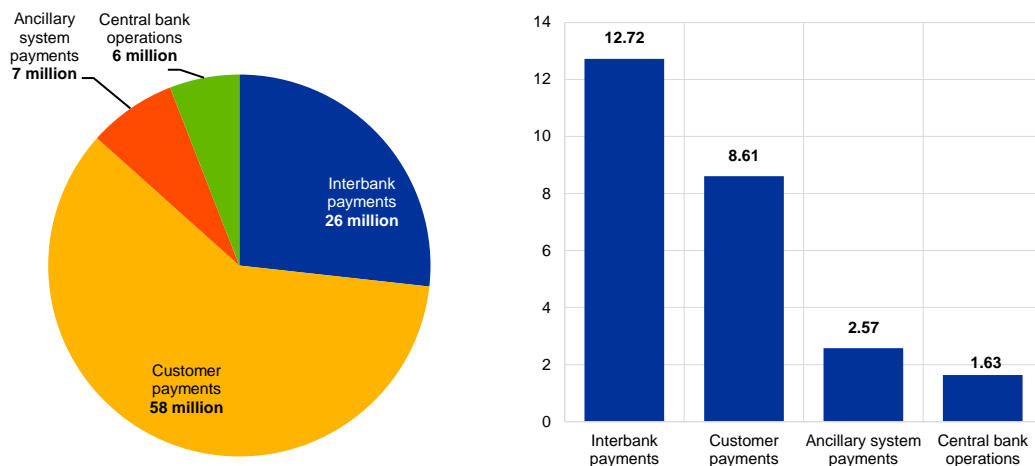
The Eurosystem has been carefully monitoring the evolution of TARGET2 volumes over time, especially considering their relevance for TARGET2 revenues and cost recovery. In 2021 monitoring was particularly strict to assess whether, in the second year of pandemic, any impact on TARGET2 traffic persisted. The purpose of this box is to share the insights gained from the analysis of 2021 volumes.

In 2021 customer payments accounted for 59.9% of total TARGET2 traffic in terms of volume, followed by interbank payments (26.8%), ancillary system payments (7.5%) and central bank operations (5.9%) (Chart A). Customer payment traffic increased by 8.6% compared with 2020, which is significant as the increase in 2020 compared with 2019 was only 1%. In particular, it shows that the number of customer payments has not been negatively affected, so far at least, by the uptake of instant payments in Europe. The increase was driven primarily by higher traffic in France (+22.1%), Spain (+13.5%) and Italy (+11%). Interbank payment traffic showed the greatest year-on-year increase, of 12.7% (the increase in 2020 compared with 2019 was 4%). This pattern was observed across all largest banking communities, in particular in Spain (+23.9%), France (+23.1%) and Germany (+11.1%). Central bank operations saw an inversion of last year's decrease (-7.1%), with a rise of 1.6%, driven mostly by Belgium (+8.3%) and France (+5.4%). Ancillary system payments increased by 2.6% compared with 2020 (in that year, the change was -2.3% compared with 2019). Most countries showed a significant rise in the number of ancillary system payments, with only few exceptions. Notably, a sharp decline in this payment category was observed in Spain (-43.1%), similar to last year, owing to an ancillary system changing its settlement procedure.

## Chart A

### TARGET2 volume distribution and yearly growth rate by payment type in 2021

(left panel: number of transactions, millions; right panel: percentages)



Source: TARGET2, ECB calculations.

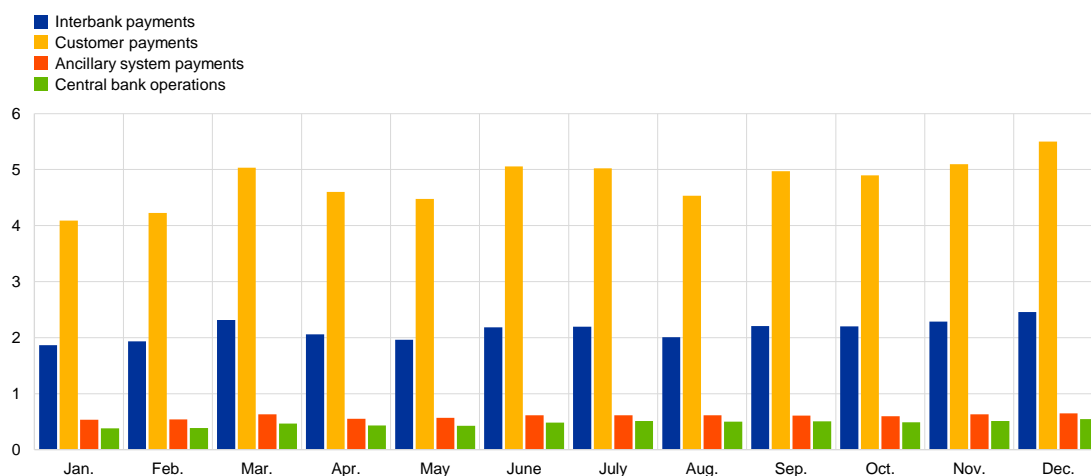
Note: there were 257 operating days in 2020 and 258 operating days in 2021.

Unlike in 2020, the different waves of the pandemic did not significantly influence the volumes settled in TARGET2 in 2021. Overall, between 4.1 million and 5.5 million customer payments were settled each month in 2021 (Chart B). Customer payments behaved in line with the seasonal patterns typical of the pre-pandemic period, decreasing in January and February, around April and May, and in August, while increasing towards the end of the year. In the last few months of 2021 customer payments rose progressively, exhibiting their usual year-end peak. Interbank payments ranged from 1.9 million to 2.5 million transactions per month in 2021 and followed a trend similar to customer payments, although it was less marked. By contrast, ancillary system payments and central bank operations were not significantly affected by seasonal effects.

## Chart B

### TARGET2 monthly volumes by payment type in 2021

(number of transactions in millions)



Source: TARGET2, ECB calculations.

Note: There were 257 operating days in 2020 and 258 operating days in 2021.

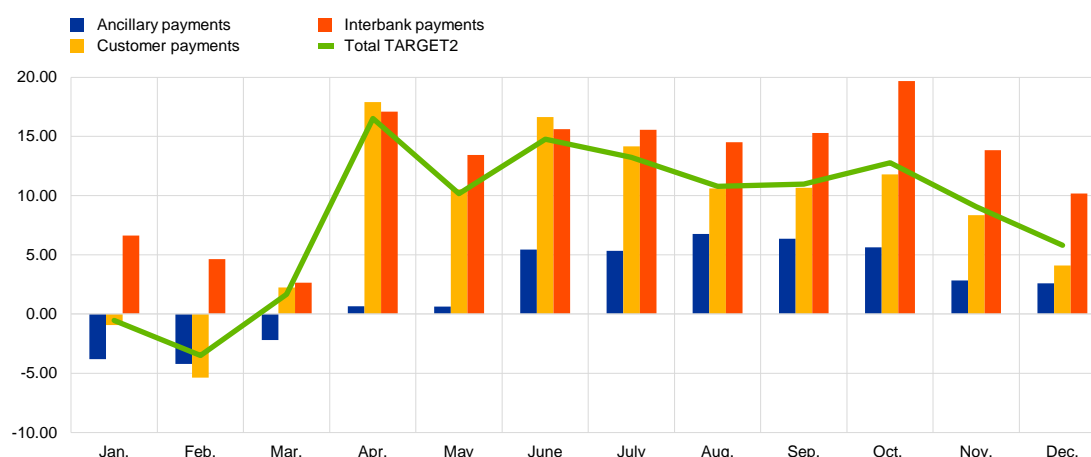


The fact that in 2021 TARGET2 volumes were on a recovery path after the first pandemic wave in 2020 is even more evident looking at the year-on-year growth rate of daily average payments each month (Chart C). In 2021 the only months that displayed negative growth rates in at least one payment category were those that had not been hit by the pandemic in 2020 (i.e. January and February) and March, when payments spiked owing to market uncertainty caused by the outbreak of COVID-19. Between April and December 2021 all payment categories experienced growth compared with 2020, although interbank payments experienced a less significant increase. Ancillary system payments saw their sharpest year-on-year decrease between January and March 2021 (-3.4% on average), while the average year-on-year change for customer payments was -1.4% over the same period. This was reflected in a drop of 0.8% at system level over these three months. The growth observed in the other months of 2021 largely offset the negative figures of the first quarter, resulting in yearly growth of 8.7% in daily average volumes.<sup>15</sup>

### Chart C

#### Year-on-year change in daily average TARGET2 volumes in 2021

(percentages)



Source: TARGET2 and ECB calculations.

Note: There were 257 operating days in 2020 and 258 operating days in 2021. Total TARGET2 volumes include ancillary system payments, customer payments, interbank payments and central bank operations.

Overall, volumes settled in TARGET2 in 2021 marked a strong increase compared with 2020. The Eurosystem will continue monitoring traffic developments throughout 2022.

## 1.3 Interactions between TARGET2 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<sup>16</sup>.

T2S went live on 22 June 2015, with central securities depositories (CSDs) joining the platform for euro settlement in waves. The final migration wave was completed

<sup>15</sup> See paragraph 1.2 for an analysis of yearly developments.

<sup>16</sup> For more information on T2S, see [T2S Annual Report 2021](#).

on 18 September 2017, thus making 2021 the fourth full year of operations. In addition, on 29 October 2018 Danmarks Nationalbank connected its RTGS and collateral management system, 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.

Although the accounts are centralised on a single platform, the legal and business relationships of the holders of the securities and cash accounts remain with the CSDs and national central banks respectively. T2S DCAs are opened with the central banks and are 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 TARGET2. Therefore, the rights and obligations of T2S DCA holders are reflected in the TARGET2 Guideline. At the end of 2021 there were 815 active euro-denominated DCAs on the T2S platform.

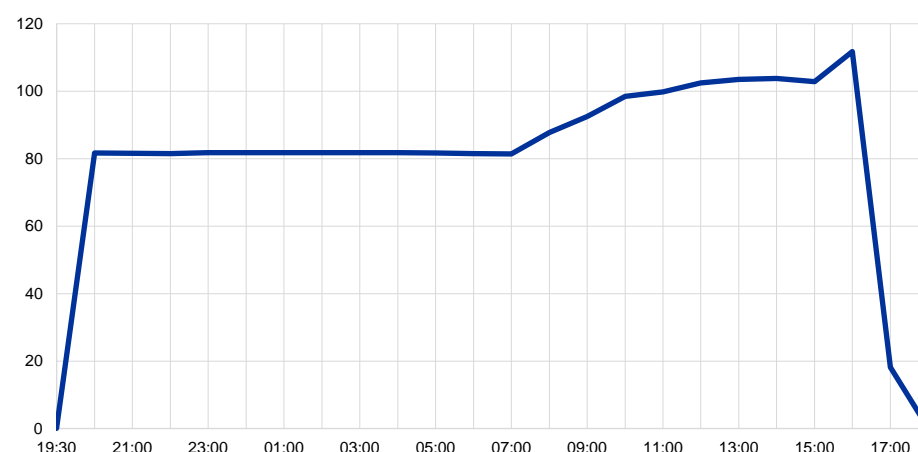
At the start of each T2S business day liquidity is sent from TARGET2 to T2S. Towards the end of the day any remaining liquidity on DCAs is swept back to the RTGS accounts in TARGET2. During the day liquidity can be freely transferred from TARGET2 to T2S and vice versa.

In 2021 there were an average of 614 inbound liquidity transfers from TARGET2 to T2S and 1,073 outbound liquidity transfers from T2S to TARGET2 each day.

Chart 10 shows the average cumulative central bank liquidity held in T2S on a daily basis between January and December 2021.<sup>17</sup>

**Chart 10**  
Time distribution of liquidity in DCAs

(EUR billions; daily averages)



Source: TARGET2.

In terms of the intraday pattern, liquidity is injected into T2S at the beginning of the TARGET2 night-time phase (19:30 CET) and its level then remains fairly constant

<sup>17</sup> Overall liquidity is computed hourly.

until the TARGET2 daytime processing (at 07:00 CET). After this more liquidity reaches T2S and fluctuations occur. There is a spike in the liquidity held in T2S before 16:00 CET, owing to participants sending liquidity to T2S to reimburse auto-collateralisation and to ensure the remaining transactions are settled. At 16:30 CET the liquidity in T2S decreases sharply as a consequence of the optional cash sweep that brings liquidity back from T2S to TARGET2. The next drop, to zero, is observed towards the end of the business day. This drop is related to the execution of the automated cash sweep from T2S to TARGET2 at 17:45 CET, when all remaining liquidity on DCAs is pushed from T2S back to TARGET2. The optional cash sweep is preferred to the automated cash sweep.

Chart 11 illustrates the daily average value of auto-collateralisation in T2S by month in 2021. Auto-collateralisation is intraday credit granted by a euro area central bank and triggered when a T2S DCA holder has insufficient funds to settle securities transactions.

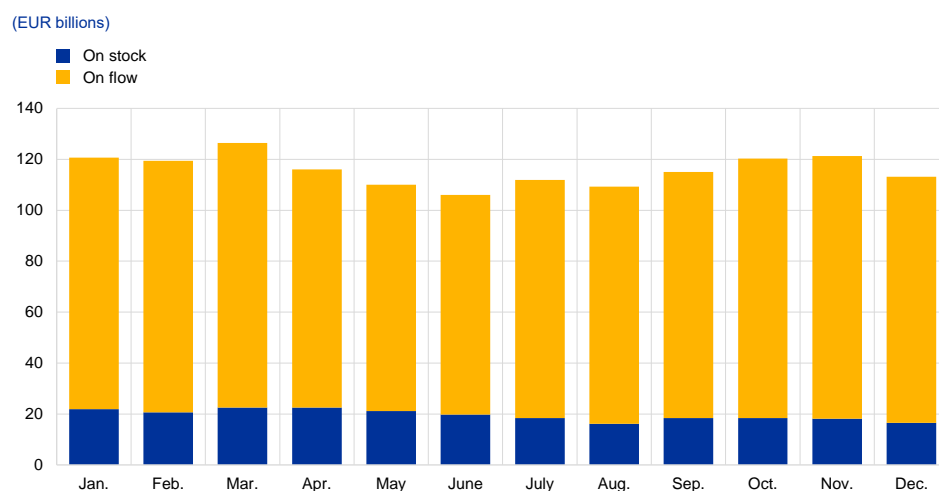
The average use of auto-collateralisation on stock, i.e. where the credit received from the central bank is collateralised by securities already held by the buyer, remained relatively stable throughout the year. The average daily value was €19.51 billion.

The average usage of auto-collateralisation on flow, i.e. settlement transactions that are financed via credit received from a central bank and collateralised by securities that are about to be purchased, was slightly more volatile and peaked at €103.89 billion in March 2021. The average daily value was €96.27 billion.

On average, 16.85% of the total value of auto-collateralisation was represented by auto-collateralisation on stock and 83.15% by auto-collateralisation on flow in 2021.

### Chart 11

#### Daily average value of auto-collateralisation for euro and Danish krone activity



Source: T2S.

Note: Amounts settled in Danish kroner are converted into euro at an exchange rate of DKK 1 = EUR 0.13.

## 1.4 Interactions between TARGET2 and TIPS

TIPS is a harmonised and standardised pan-European service for the settlement of instant payments in central bank money. TIPS went live on 30 November 2018 with a 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 with the respective national central banks.

Legally, euro-denominated TIPS DCAs fall within the perimeter of TARGET2, so the rights and obligations of TIPS DCA holders are included in the TARGET2 Guideline. At the end of 2021 there were 123 active euro-denominated TIPS DCAs and 9,134 reachable parties in TIPS.

From its inception, TIPS was designed with multi-currency capability. This means that on the request of a non-euro central bank TIPS is able to provide settlement in non-euro central bank money. Following the signing of a cooperation agreement between Sveriges Riksbank and the Eurosystem on 3 April 2020, instant payments in Swedish kronor are expected to be settled on the TIPS technical platform supporting the Swedish service RIX-INST as of May 2022. Instant payments in Danish kroner could also be available by November 2025, when Danmarks Nationalbank is planning to join TIPS. Moreover, in November 2021 Norges Bank expressed interest in entering into formal discussions on potentially joining TIPS and settling instant payments in Norwegian kroner. Building on the multi-currency capability, work to enable a cross-currency functionality, e.g. the settlement of instant payments between the euro and the Swedish krona, moved forward in 2021 and will continue in 2022.

### Box 2

#### Update on TIPS pan-European reachability measures

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On 24 July 2020 the ECB communicated the Governing Council decision to take significant steps to support the full deployment of the pan-European reachability of instant payments, an objective shared with the European Commission. According to the decision, by the end of an ad hoc migration period:

1. all payment service providers (PSPs) that are reachable in TARGET2 and that adhere to the SCT Inst scheme must also become reachable in TIPS, either as a participant or as a reachable party;
2. automated clearing houses (ACHs) must migrate their technical accounts from TARGET2 to TIPS.

The implementation of the pan-European reachability measures allows all PSPs that have adhered to the SCT Inst scheme to be reachable across the entire euro area, irrespective of which clearing and settlement mechanism (CSM) they are using for instant payments (i.e. TIPS or an ACH).

The advantages of these measures include the following:

1. PSPs are able to comply with the SEPA regulation.<sup>18</sup> PSPs that have adhered to SCT Inst are able to comply with their legal obligation to support full reachability, without any need to become participants in multiple CSMs.
2. Reachability is made a commodity, reflecting the fact that it is a legal requirement. Not only does TIPS benefit from 100% pan-European reachability, but all ACHs competing in the provision of instant payment services automatically include reachability as part of their service offer. Furthermore, ACHs no longer depend on bilateral agreements to establish links, and there is no potential credit exposure for cross-ACH transactions.
3. Liquidity management is facilitated. ACH accounts can be funded and defunded from central bank money accounts in TIPS at any time (24/7/365), in contrast to the limitations imposed by the opening hours of TARGET2. This also enables liquidity to be moved from one ACH to another without any time limitation, which can be particularly valuable during long weekends.
4. Participants can avail themselves of more options. Each PSP may decide independently (i) where to instruct an instant payment (in TIPS or in an ACH) and (ii) where to hold its liquidity and settle (in an ACH or in TIPS). The choice that one PSP makes in this respect does not depend on the choices of other PSPs.

In order to further support the development of the Single Market and SEPA, the pan-European reachability measures are ultimately aimed at supporting PSPs in enabling European citizens and businesses to give instructions for electronic payments to be made in euro from and to any country in real time, with the confidence that such payments will be settled and will not be rejected because of the inability to reach the beneficiary PSP. This is also a key element in supporting the continuous innovation of front-end solutions, which will benefit the euro community and pave the way for instant payments to become the “new normal”.

To ensure the timely implementation of the measures, the entire Eurosystem, including all national central banks (NCBs) and the ECB, assisted by monitoring market readiness. Dialogue with the market was established in different fora, including the Advisory Group on Market Infrastructures for Payments (AMI-Pay). To facilitate the onboarding process, the Eurosystem collaborated with the market, also taking advantage of the well-established communication channels between NCBs and their national communities. Regular Readiness Reports depicted the status of all NCB communities (i.e. PSPs and ACHs subject to the TIPS pan-European reachability measures) with regard to their readiness to migrate to TIPS. By 30 November 2021 294 PSPs had completed the onboarding process

ACHs were allocated to migration waves, spanning a period from December 2021 to February 2022, with a contingency wave in March 2022. At the end of 2021 six ACHs had migrated their technical accounts from TARGET2 to TIPS, and another five ACHs are expected to finalise their migration as planned in the respective waves in 2022.

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<sup>18</sup> SEPA regulation (EU) No 260/2012.

## 1.5 Comparison with EURO1

EURO1 is the only direct competitor to TARGET2 among large-value payment systems denominated in euro. Thus, the market share of TARGET2 is defined as its relative share vis-à-vis EURO1, as shown in Chart 12.

The two systems are different by design, since EURO1 operates on a net settlement basis and only achieves final settlement in central bank money (in TARGET2) at the end of the day. Furthermore, they respond partly to different business cases, since only TARGET2 settles individual transactions in central bank money and processes ancillary system transactions and payments related to monetary policy operations.

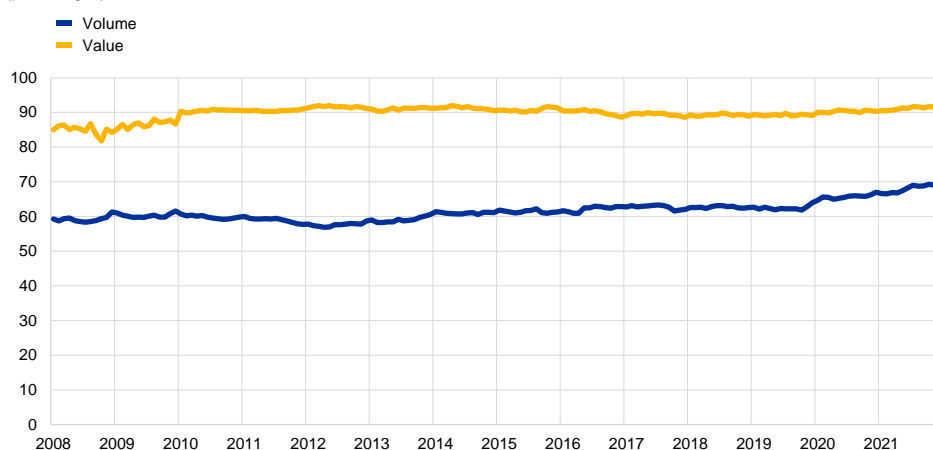
However, the traffic in the two systems is made up largely of interbank and customer payments. This helps to explain, in part, the relative share of TARGET2 vis-à-vis EURO1, which is calculated on the basis of only these two payment categories. In 2021 the share of TARGET2 increased in terms of both the value and the volume of payments processed, with 91% of the value and 68% of the volume settled by large-value payment systems in euro.

Chart 12 does not give a full picture of the banks' routing preferences vis-à-vis all systems, only a partial picture of the market's preferences in relation to the settlement of large-value euro-denominated transactions. In particular, it does not reflect the extent to which payments are channelled through ACHs or correspondent banking arrangements.

### Chart 12

#### Market share of volumes and values settled in TARGET2 vis-à-vis EURO1

(percentages)



Source: TARGET/Euro LVPS (ECB's website).

Note: This chart is not affected by the change in the statistical methodology implemented in 2013, since the calculations are based on interbank and customer payments only, and do not include transactions with central banks, which were most affected by the methodological change.

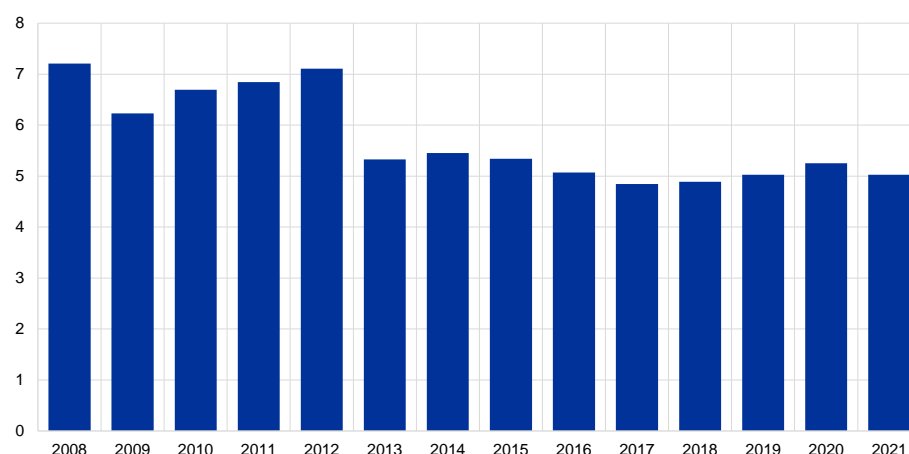
## 1.6 Value of TARGET2 payments

Chart 13 shows the evolution of the average value of a TARGET2 payment between 2008 and 2021.<sup>19</sup> The continuous decrease from 2015 to 2017 was largely related to the migration of securities settlement system traffic to T2S.<sup>20</sup> In 2021 the average value of a payment decreased slightly to €5.0 million, from €5.3 million in 2020.

**Chart 13**

Average value of a TARGET2 payment

(EUR millions)



Source: TARGET2.

Chart 14 illustrates the distribution of TARGET2 transactions per value band, indicating the shares, in terms of volume, that fall below a certain threshold. The picture remains similar to that of the previous year. Generally, about 70% of all TARGET2 transactions were for values of less than €50,000. Payments of more than €1 million accounted for only 9% of traffic.

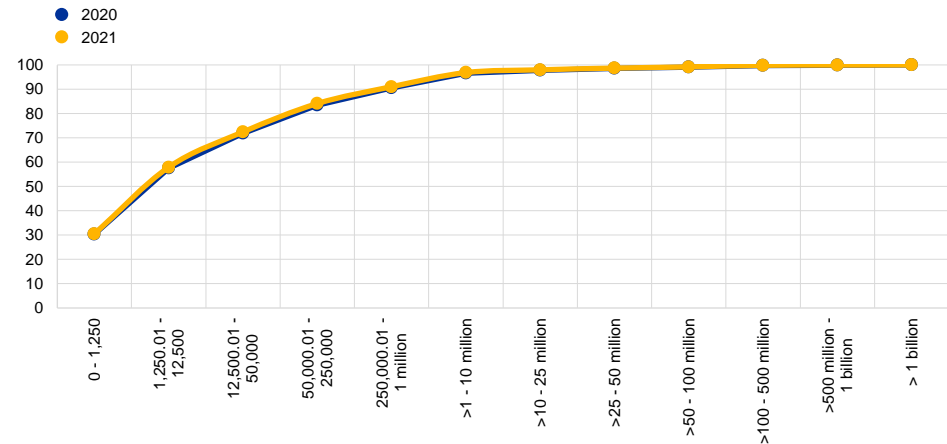
<sup>19</sup> As explained in Section **Error! Reference source not found.**, the sudden drop in the average value in 2013 can be attributed to the change in the statistical methodology.

<sup>20</sup> The cash legs of security transactions are typically high-value operations.

**Chart 14**

Distribution of TARGET2 transactions across value bands in 2021

(percentages)



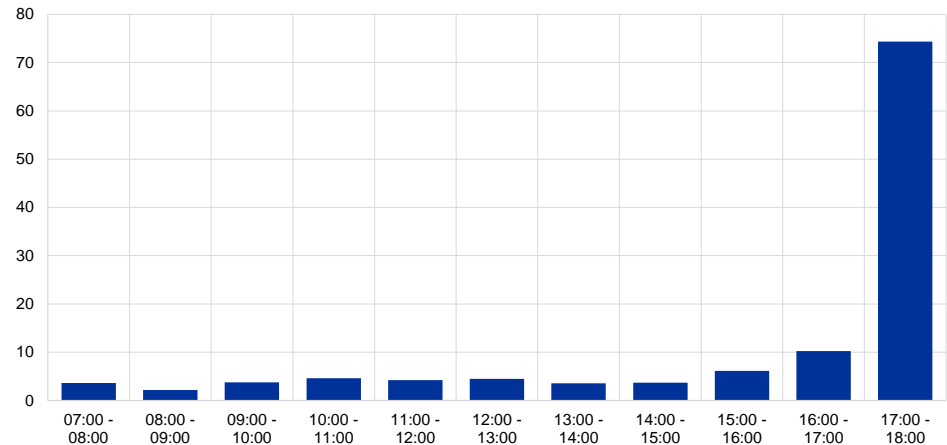
Source: TARGET2

On average, almost 189 payments with a value of more than €1 billion were made per day, accounting for 0.05% of payment flows. Given the wide distribution of transaction values, the median payment in TARGET2 is calculated as €6,500 which indicates that half of the transactions processed in TARGET2 each day are for a value lower than this amount. This figure confirms that TARGET2 offers a range of features attracting a large number of low-value transactions, especially those of a commercial nature. Although the picture has changed slightly since completion of the migration to SEPA, particularly with regard to commercial payments, TARGET2 is still widely used for low-value payments, in particular urgent customer transactions. This is not unusual in the field of large-value payments and is also observed in other systems worldwide. It remains to be seen whether the increased prominence of instant retail payments will have an impact on this in the future.

**Chart 15**

Intraday pattern: average value of a TARGET2 payment

(EUR millions)



Source: TARGET2.



Chart 15 depicts the average value of TARGET2 payments executed at different times of the day. The chart indicates that in 2021, as in previous years, TARGET2 settlement showed a strong intraday pattern. After the system opens at 07:00 CET, the hourly average value of transactions fluctuates minimally throughout the day. Between 09:00 CET and 13:00 CET, the average value increases slightly owing to the settlement of CLS and other ancillary system transactions. A more visible increase is recorded between 16:00 CET and 17:00 CET relating to an optional cash sweep from T2S DCAs to TARGET2 and ancillary systems such as EURO1 settling their cash balances in TARGET2. The last hour of operations, between 17:00 CET and 18:00 CET, is reserved for interbank transactions, while the cut-off time for customer payments is 17:00 CET. The average size of payments increases dramatically at this time, owing to banks squaring their balances and refinancing themselves on the money market. Overall, the last two hours of the TARGET2 operation are characterised by a limited number of transactions, albeit at very high values.

The average payment value in 2021 during the last TARGET2 opening hour was largely equivalent to that in 2020.

The chart does not take into account payments that take place before the start and after the end of the business day, since these transactions fall under the night-time settlement category (Section 1.7) and relate strictly to accounting practices, for example liquidity transfers from the local accounting systems of central banks or the fuelling of sub-accounts, as well as T2S DCAs.

## 1.7 Night-time settlement in TARGET2

TARGET2 operates during the day from 07:00 CET to 18:00 CET, and also offers the possibility of settling payments during the night. Although the system is open for regular payments from financial institutions and ancillary systems during the day-trade phase, night-time settlement is only for ancillary systems connecting via the Ancillary System Interface (ASI), as well as for liquidity transfers to/from T2S and TIPS.<sup>21</sup> Other operations, such as bank-to-bank transactions or customer payments, are only allowed during the day.

There are two night-time settlement windows: 19:30 CET to 22:00 CET and 01:00 CET to 07:00 CET. The two windows are separated by a technical maintenance window, during which no settlement operations are possible.

Since the system is closed during the night to any other form of payment processing, ancillary systems can take advantage of banks' stable and predictable liquidity situations, thereby settling their transactions efficiently and safely. In general, the night-time windows are used mainly by retail payment systems. In 2021 on average around 1,881 payments, representing a value of €18.53 billion, were settled every night in TARGET2. Compared with 2020, this constitutes an increase of about 9% in

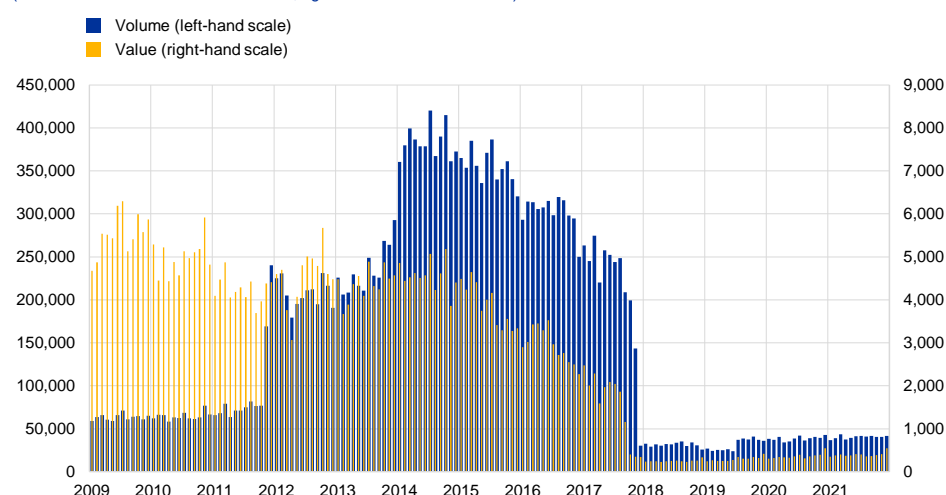
<sup>21</sup> As explained in the disclaimer at the beginning of the chapter, the figures for night-time settlement do not include liquidity transfers between TARGET2 and TIPS/T2S.

terms of value of payments and 4% in volume terms and is roughly in line with overall TARGET2 traffic developments.

Chart 16 shows how the volumes and values settled in TARGET2 during the night have evolved since 2009. The increase in volume in November 2011 occurred as a result of the SEPA Clearer ancillary system starting to make use of the night-time settlement service in TARGET2. From then on, the number of payments settled at night increased steadily, notably in 2014, while values remained fairly stable. The trend reversed in 2015, with night-time settlement values and volumes decreasing continuously. As indicated above, the changes in the night-time settlement pattern in this period can be attributed primarily to securities settlement systems that had migrated their operations to T2S. Since December 2018 night-time settlement values and volumes have reached historically low levels because some ancillary system TARGET2 night-time settlement activity has moved to the day-trade phase.

**Chart 16**  
Night-time settlement in TARGET2

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



Source: TARGET2.

## 1.8 Payment types in TARGET2

Charts 17 and 18 present a breakdown of TARGET2 volumes and turnover by type of transaction. Traffic is divided into four categories: payments to third parties (for example interbank transactions and customer transactions), payments related to operations with the central bank (such as monetary policy operations and cash operations),<sup>22</sup> ancillary system settlement, and liquidity transfers between participants belonging to the same group.

About 84% of the TARGET2 volume is made up of payments to third parties, i.e. payments between market participants. The volume of ancillary system settlement

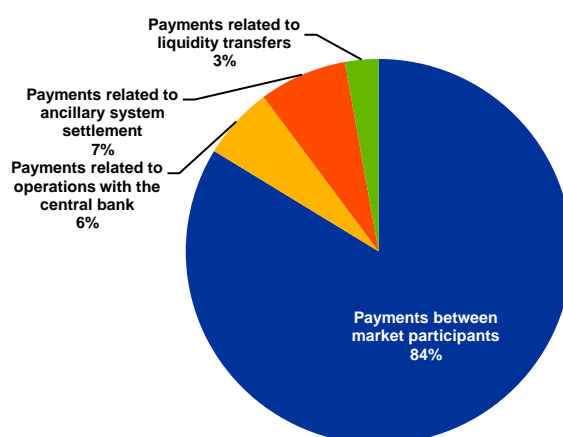
<sup>22</sup> For example, banknote/coin withdrawals and deposits.

represents 7% of the total, while 7% is generated through operations with the central bank and the remaining 3% is linked to liquidity transfers. Overall, these figures were similar to those for the previous year.

### Chart 17

#### Breakdown of TARGET2 volumes in 2021

(percentages)

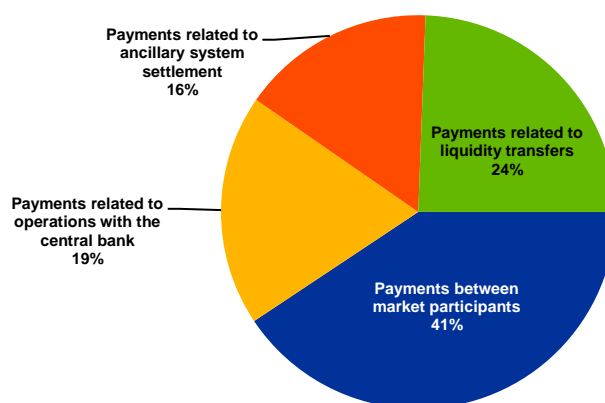


Source: TARGET2.

### Chart 18

#### Breakdown of TARGET2 turnover in 2021

(percentages)



Source: TARGET2.

With regard to turnover, payments between participants represent only 41% of total value. The value of ancillary system settlement represents 16% of the total volume, 19% is generated through operations with the central bank and the remaining 24% is linked to liquidity transfers. Overall, these figures were similar to those for the previous year.

The difference between volume-based and value-based indicators across payment categories stems from the fact that the average sums involved in monetary policy

transactions, ancillary system instructions and liquidity transfers are typically much larger than payments to third parties.

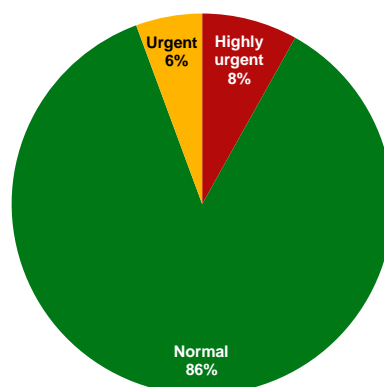
## 1.9 The use of prioritisation

Priority options help TARGET2 participants optimise their liquidity usage by allowing them to reserve a certain amount of liquidity for specific payment priorities. When submitting payments in TARGET2, participants can assign them a priority: “normal”, “urgent” or “highly urgent”. 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 “highly urgent” priority classes, and less urgent payments are made when excess liquidity is sufficient. This is a way of securing liquidity for more urgent payments. The priorities for pending transactions can be changed at any time via the information and control module (ICM).

Chart 19 gives an overview of the use of priorities in TARGET2 in terms of the overall TARGET2 volume in 2021. It shows that 86% of transactions were “normal” priority, 8% were “highly urgent” and the remainder were “urgent”. The distribution of the use of priorities when submitting payments to TARGET2 has been stable over the years.

**Chart 19**  
Use of priorities in TARGET2 in 2021

(percentages)



Source: TARGET2.

## 1.10 Non-settled payments

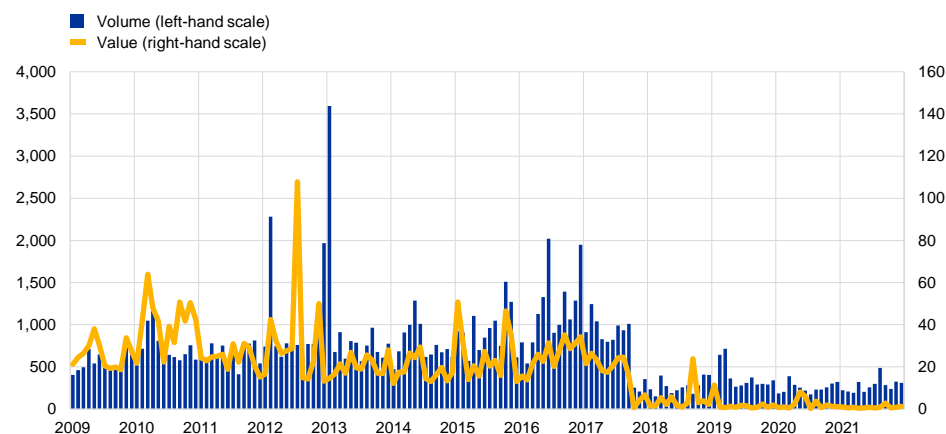
Non-settled payments in TARGET2 are transactions that have not been processed by the end of the business day, for example, owing to erroneous transactions made by participants, a lack of funds in the account to be debited, or a sender’s limit being breached. The transactions are ultimately rejected. Chart 20 shows the monthly

evolution of the daily average of non-settled payments in volume and value terms between 2009 and 2021.

In 2018 the average daily number and value of non-settled transactions fell sharply, driven mainly by the migration of one of the securities settlement systems to T2S at the end of 2017. As a result of its gross settlement model, some of its transactions were rejected, owing to either liquidity shortage or cancellation, and reported as non-settled TARGET2 payments. As in 2020, the average daily number of non-settled transactions in 2021 remained low, at 278. The average total value of these transactions decreased to €0.9 billion in 2021 compared with €2.2 in 2020.

**Chart 20**  
Non-settled payments in TARGET2

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



Source: TARGET2.

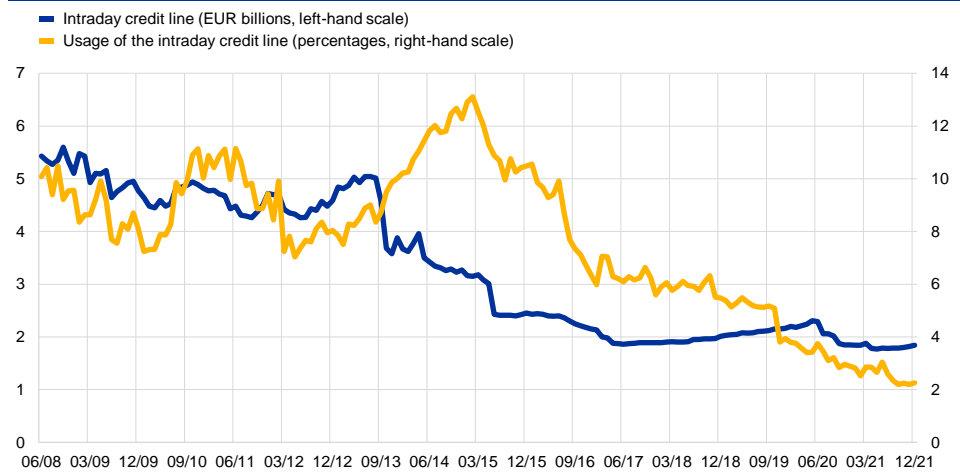
Non-settled payments in 2021 represented less than 0.1% of the total daily volume and about 0.05% of the total daily turnover in TARGET2. These levels may be considered very low and confirm that liquidity was appropriately distributed across participants throughout that period.

## 1.11 Use of credit lines in TARGET2

The intraday credit line is a facility in TARGET2 through which banks can overdraw their intraday account against eligible collateral. In 2021 the average maximum intraday credit line at participant level slightly decreased when compared with the previous year, with an average of €1.81 billion. Usage also declined, with 2.5% of payments settled using the intraday credit line in 2021, compared with 3.3% in 2020 (Chart 21). This trend has been observed since the start of the ECB's asset purchase programme (APP). It continued in 2020 and 2021 when additional stimulus was provided by the Eurosystem in response to the COVID-19 pandemic. With more central bank reserves available on their TARGET2 accounts, participants are less reliant on their intraday credit lines.

**Chart 21**

### TARGET2 intraday credit line and its usage

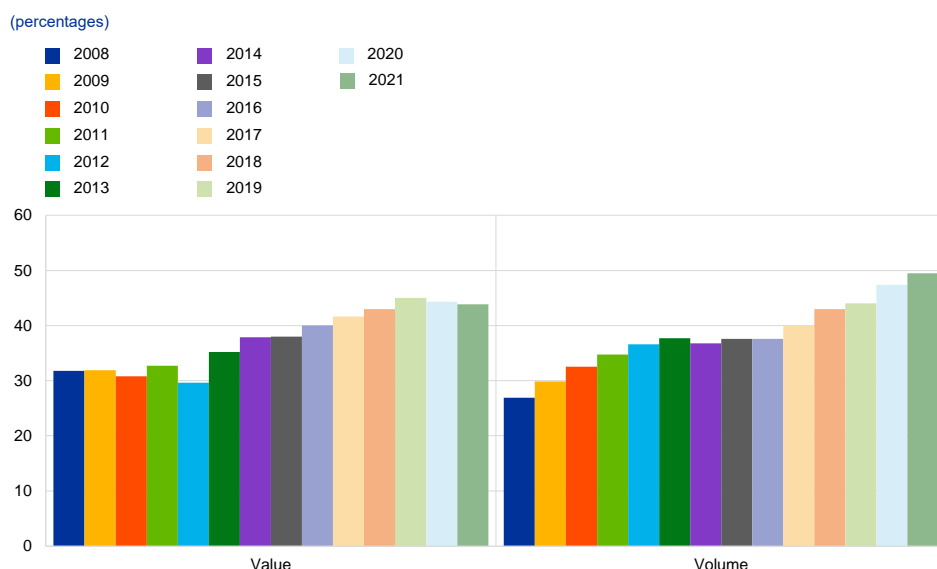


Source: TARGET2.

Notes: The chart covers the period from June 2008 to December 2021. Figures represent monthly averages. The intraday credit line is calculated as the maximum intraday credit that can be accessed, on average, by one bank during the day against collateral posted. The usage of the intraday credit line represents the percentage of payments that are settled using the intraday credit line. Calculations exclude TARGET2 accounts that do not have an intraday credit line set and follow McAndrews, J. and Rajan, S., "The timing and funding of Fedwire Funds transfers", *Economic Policy Review*, Federal Reserve Bank of New York, 2000.

## 1.12 Share of inter-Member State traffic

The share of inter-Member State traffic in TARGET2 indicates the percentage of traffic that is exchanged between participants belonging to different banking communities. Chart 22 shows that there has been a positive trend for both volume-based and value-based indicators since 2009. This trend reflects the increasing level of financial integration in the large-value payment segment, which is mainly supported by TARGET2. While this trend continued in 2021, with the share reaching 49% in volume terms, it decreased slightly in value terms to 43.8%.

**Chart 22****Share of inter-Member State traffic in TARGET2**

Source: TARGET2.

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 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. In contrast, banks located in European Economic Area (EEA) countries whose central banks do not provide TARGET2 services, such as the Czech Republic or Sweden, can participate in TARGET2 component systems provided by other central banks. For example, if a Swedish bank participating in TARGET2-Bank of Finland sends TARGET2 payments to banks in Finland that also participate in TARGET2-Bank of Finland, the payment flows will be considered to be domestic, even though they are taking place between entities located in different countries.

The inter-Member State payments depicted in Chart 22 were identified based on the national banking communities of the sending and receiving direct participants on the platform. Since it is also possible to connect to TARGET2 from a non-EEA country, for example, as an indirect participant or an addressable Bank Identifier Code (BIC) holder, changes in the cross-border share in terms of volume were also computed on the basis of the originator and the beneficiary of the payment, taking into account the full payment chain information (i.e. originator, sending settlement bank, receiving settlement bank and beneficiary). When calculating the inter-Member State shares based on the originator and beneficiary of the payment, the share of cross-border payments in 2021 stood at 62% in terms of volume and 40% in terms of value. Therefore, taking the full payment chain into account leads to a cross-border share that is significantly higher in volume but lower in value.

### Box 3

#### Cross-border payments in TARGET2: an international perspective

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As outlined in the Financial Stability Board's "G20 roadmap for enhancing cross-border payments",<sup>23</sup> drawn up in coordination with the Committee for Payments and Financial Market Infrastructures (CPMI), the G20 considers the enhancement of cross-border payments a priority, as they are instrumental to supporting economic growth, international trade, global development and financial inclusion. Cross-border payments typically take place via correspondent banking arrangements, which allow foreign banks to access the market for a certain currency via a direct participant of the payment system for that currency (i.e. the correspondent bank).<sup>24</sup> In Europe, a significant share of the payments originating from correspondent banking arrangements are channelled through Large-Value Payment Systems (LVPS), with the largest share of values settled via TARGET2.

So far, the analysis of cross-border traffic in TARGET2 has focused on the payments exchanged between two settlement banks directly connecting to TARGET2 via different central banks in Europe. In 2021 the share of inter-Member State traffic was 43.8% in value terms and 49.5% in volume terms.<sup>25</sup> However, by analysing the full payment chain, including the information on the indirect originator and beneficiary, it is also possible to identify the geographical area of the final counterparties involved in the transactions. This offers an international perspective on the role of TARGET2 in supporting cross-border activity and access to the euro market. In this case, the share of cross-border activity in TARGET2 reached 39.9% in value terms and 61.6% in volume terms in 2021 (see Section 1.12). The notable difference between these two methods of measuring cross-border activity deserves further investigation.

When considering the whole payment chain, TARGET2 traffic can be broken down into domestic traffic (i.e. within a euro area jurisdiction), traffic between different euro area jurisdictions, traffic between a euro area jurisdiction and a jurisdiction outside the euro area (also known as "one leg out transactions"), as well as traffic between extra-euro area jurisdictions. Domestic payments still represent the largest component of TARGET2 values, although, after the strong growth in the first four years of the system's operation, they dropped sharply between mid-2012 and the beginning of 2013,<sup>26</sup> and accounted for 51.0% of the total in 2021 (Chart A). The other categories have been relatively stable throughout the whole period, with shares lower than 20%. The picture is different for the volume of payments. Despite a significant drop in 2017, coinciding with the migration waves to T2S, domestic payments accounted for the highest share of TARGET2 volumes until the beginning of 2020 (46.0% on average), when they were surpassed by cross-border payments between euro area and non-euro area countries, which were the main component of TARGET2 payments in 2021, with a share of 37.6%.

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<sup>23</sup> See [FSB \(2021\)](#).

<sup>24</sup> See [Eleventh survey on correspondent banking in euro](#).

<sup>25</sup> Since the go-live, TARGET2 has contributed to fostering financial integration in Europe, as inter-Member State traffic represented only 31.8% and 26.9% of the total TARGET2 traffic in value and volume terms, respectively, in 2008.

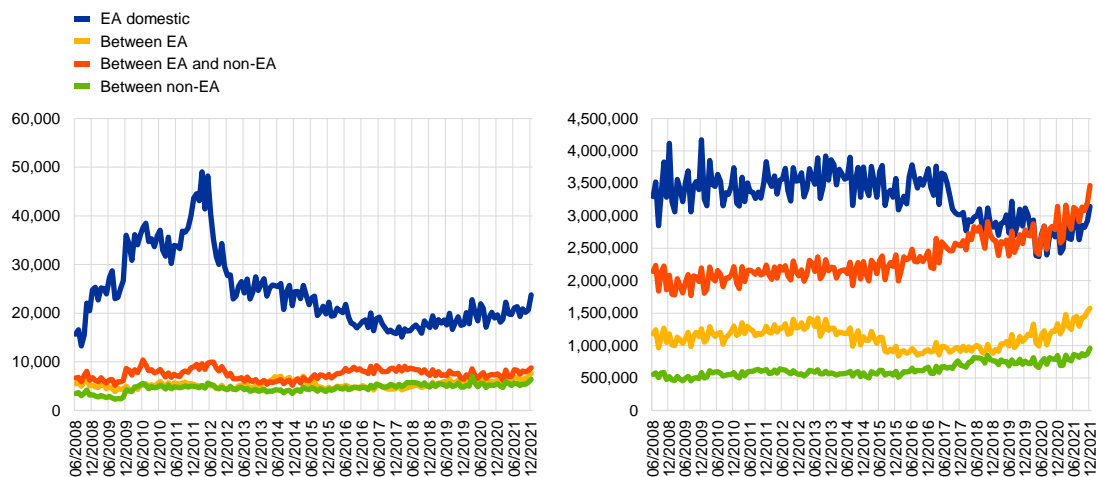
<sup>26</sup> The statistical framework of TARGET2 changed in 2013, leading to the exclusion of overnight deposits, which are mainly domestic transfers, from the reported statistics.



## Chart A

### TARGET2 traffic by counterparty location

(monthly totals; left panel: EUR billions; right panel: number of transactions)



Source: TARGET2.

Note: The category "EA domestic" comprises the traffic settled within the same euro area country, the category "between EA" comprises the traffic settled between two euro area countries, the category "between EA and non-EA" comprises the traffic settled between a euro area country and a non-euro area country and the category "between non-EA" comprises the traffic settled between two non-euro area countries.

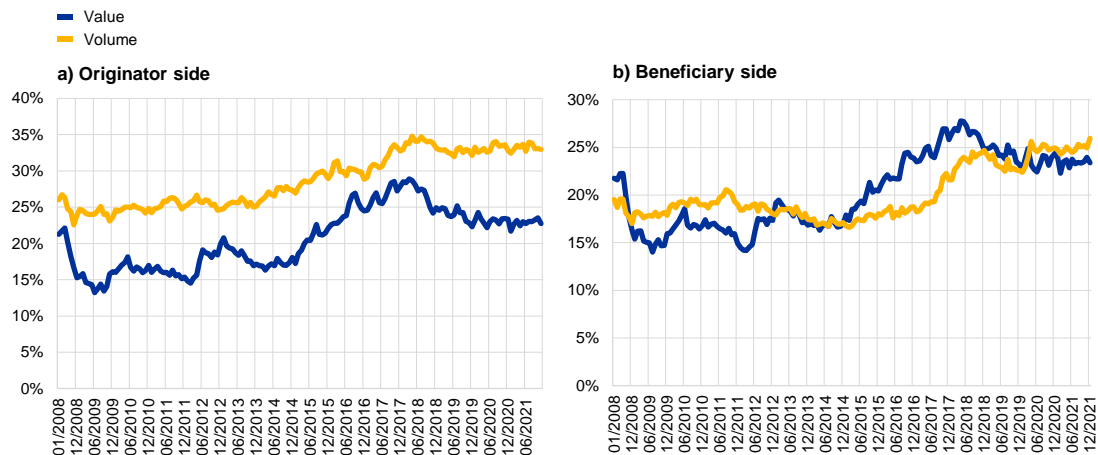
Focusing on one leg out transactions, there is a visible asymmetry on the originator and the beneficiary sides (Chart B). Payments from non-euro area originators represented on average 25.3% of the monthly TARGET2 volumes until 2014, then progressively increased to an average of 33.1% in the last two years. In value terms, this share was on average 17.0% until 2014, then it progressively increased until 2018 and stabilised at around 23.0% in 2021.<sup>27</sup> Conversely, payments received by non-euro area beneficiaries display a similar share in volume and value terms, accounting for 24.9% and 23.4% of TARGET2 traffic in 2021 respectively, and they also display similar growth patterns over time. This asymmetry suggests a lower average payment size on the sending side than on the receiving side, and thus that the business cases on the sending side differ partially from the business cases on the receiving side. For example, payments from outside the euro area could be used to a larger extent to purchase goods and services in the euro area from other jurisdictions, as a lower payment size is a typical indication of a higher presence of retail transactions. Historically, originators and beneficiaries of payments in TARGET2 have been located predominantly in the United Kingdom, the United States and Switzerland, although their relevance tends to be lower on the beneficiary side in volume terms.

<sup>27</sup> As a result of the decentralised implementation of the Asset Purchase Programme (APP), most of the purchases involve non-euro area counterparties, mainly located in the United Kingdom.

## Chart B

### Share of TARGET2 activity with non-euro area originators or beneficiaries

(monthly totals; percentages)



Source: TARGET2.

Note: The left panel shows the percentage of traffic with an originator located outside of the euro area, irrespective of the location of the beneficiary, whereas the right panel shows the percentage of traffic with a beneficiary located outside of the euro area, irrespective of the location of the originator.

The breakdown of interbank traffic by location of originator and beneficiary sheds light on the geographical distribution of payment flows in value terms, as these payments represent the main category contributing to TARGET2 turnover.<sup>28</sup> The shares have been relatively stable over time, with domestic and intra-euro area traffic only accounting for around half of the total interbank value (Chart C).<sup>29</sup> Conversely, in volume terms, customer payments, which can largely be considered retail payments, make up most of TARGET2 traffic. Between 2008 and 2021 the domestic share decreased, in line with the traffic between euro area countries, with an acceleration towards the end of the SEPA migration period (see Section 1.2). Over the same period one leg out customer payments grew from an average of 29.3% to 45.0% and customer payments between non-euro area countries increased from 3.7% to 9.0%. This indicates a greater use of TARGET2 to settle euro-denominated retail transactions involving counterparties outside the euro area. Overall, the breakdown by payment type suggests that TARGET2 has been facilitating the access of non-euro area actors to the euro market for both financial and commercial flows.

<sup>28</sup> This was different before the migration of CSDs to T2S, as the contribution of ancillary systems transactions and interbank payments to TARGET2 traffic in value terms was similar.

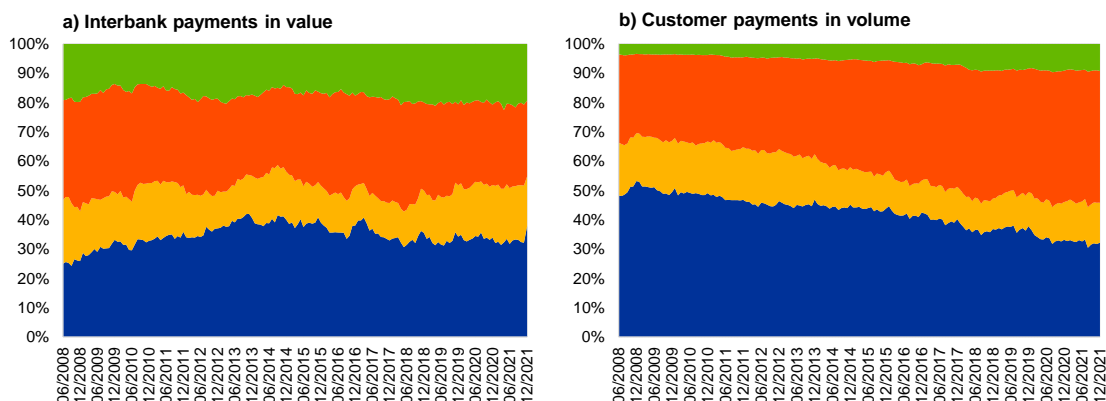
<sup>29</sup> Compared with the overall results shown in Chart A, the lower share of domestic traffic for interbank payments can be mainly explained by the higher weight of ancillary system traffic in the past, which was largely domestic.

## Chart C

### Selected TARGET2 payment categories by counterparty location

(monthly totals; percentages)

- EA domestic
- Between EA
- Between EA and non-EA
- Between non-EA



Source: TARGET2.

Note: The category "EA domestic" comprises the traffic settled within the same euro area country, the category "between EA" comprises the traffic settled between two euro area countries, the category "between EA and non-EA" comprises the traffic settled between a euro area country and a non-euro area country and the category "between non-EA" comprises the traffic settled between two non-euro area countries. Interbank payments do not include intragroup transactions.

Looking at the originator and beneficiary of a payment makes it possible to identify the geographical area of the final counterparties involved in the transaction. In value terms, payments exchanged within the euro area, either domestically or between different countries, account for most of the TARGET2 traffic. However, interbank traffic alone accounts for a share of around 50%. In volume terms, the picture is different. The share of cross-border payments involving non-euro area counterparties has gradually increased over time and represented half of TARGET2 payments in 2021. Cross-border payments originating from outside the euro area typically display a lower average value compared with those received by non-euro area institutions, suggesting a growing share of transactions of a commercial nature coming into the euro area from the outside. Overall, these results show that TARGET2 has not only contributed to financial integration in Europe, but also substantially facilitates cross-border payments worldwide and access to the euro market, thus supporting the euro area economy and the international role of the euro.

## 1.13 Tiering in TARGET2

Tiered participation arrangements occur in a payment system 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, i.e. indirect participants and addressable BIC holders, benefit from the 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 overall credit, liquidity or

operational risks for the payment system, its participants or the stability of the banking system. Close monitoring of the tiering level in TARGET2 is thus of paramount importance. It is also an oversight requirement under Article 17 of the SIPS Regulation.<sup>30</sup>

The image below shows the map of TARGET2 flows based on the location of the payment originators and final beneficiaries. The institutions at both ends of the payment chain are a reflection of the global reach of TARGET2.

**Figure 1**

TARGET2 transfers based on the location of the originator and final beneficiary banks



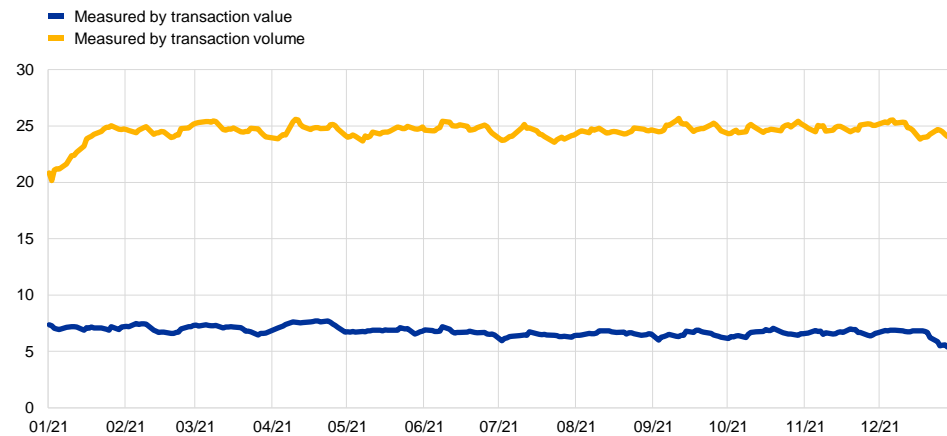
Source: TARGET2.

In 2021 the aggregate level of tiering by sender in TARGET2 reached around 6.78% in terms of value and 24.54% in terms of volume (Chart 23). This meant that, on average, for every euro sent by direct participants in TARGET2 during the year, only 6.78 cents were settled on behalf of indirectly connected parties outside their banking group perimeter. More than 75% of the tiered business (consolidated at banking group level) comes from outside the EEA, showing that TARGET2 makes it possible for institutions around the world to access the euro market.

<sup>30</sup> Regulation of the European Central Bank (EU) No 795/2014 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).

**Chart 23****Tiering by sender in TARGET2**

(x-axis: ten-day moving averages; y-axis: percentages)



Source: TARGET2.

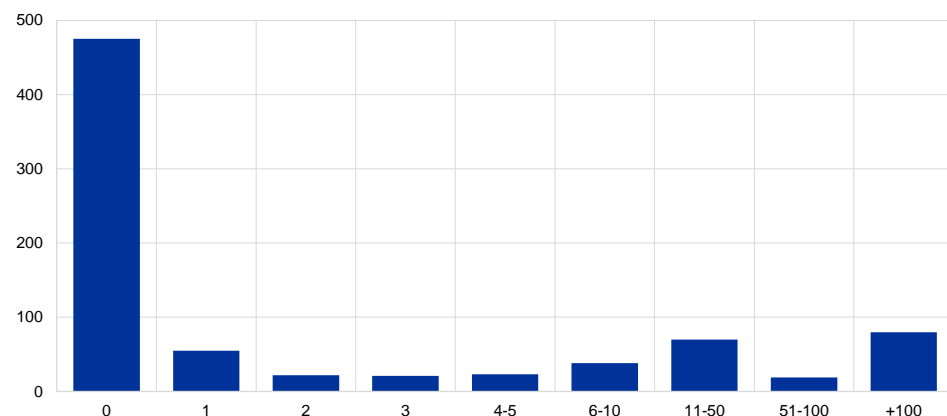
The largest indirect participant in terms of value sent (consolidated at banking group level) was ranked approximately 40th out of all TARGET2 participants in 2021.

Further analysis reveals that 59.15% of all direct participants in TARGET2 (consolidated at banking group level) did not conduct any business during the year on behalf of indirect parties. Overall, these statistics for 2021 point to a relatively stable and contained level of tiered participation in TARGET2.

Chart 24 shows that around 475 direct participants do not send or receive any tiered payments while 55 send or receive payments on behalf of only one tiered banking group. At the other end of the spectrum, around 80 direct participants act as a settlement bank for more than 100 tiered banking groups.

**Chart 24****Tiered groups per direct participant group**

(x-axis: tiered participants; y-axis: direct participants)



Source: TARGET2.

## Box 4

### Indirect participation in TARGET2

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Direct participants can send and receive payments on behalf of indirectly connected institutions in TARGET2 via tiered participation arrangements in the context of the correspondent banking business.<sup>31</sup> Indirectly connected institutions may be located within or outside the EEA and listed in the TARGET2 directory (see Section 3.2). However, they can be reached via TARGET2 even if they are not registered. One reason for this is that, in terms of its BIC, an institution can only be listed once as “indirect” in the TARGET2 directory, although it may, in practice, rely on multiple direct participants. There may also be other reasons why an indirect participant is not registered in the TARGET2 directory. This box looks into the traffic sent to TARGET2 by direct participants on behalf of registered and non-registered indirectly connected institutions.

Total tiered traffic sent to TARGET2 in 2021 stood at €32.5 trillion, corresponding to 23.5 million payments, and registered indirectly connected institutions accounted for 35.2% and 52.6% of the traffic in value and volume terms respectively. In other words, non-registered institutions accounted for a very significant share of indirect traffic, sending almost two-thirds of the tiered payments in value terms and almost half of the tiered payments in volume terms. This asymmetry suggests that the average payment size was higher for non-registered indirectly connected institutions than for registered ones.

The share of TARGET2 traffic sent by registered and non-registered institutions was different across geographical areas and in value and volume terms (Chart A). Most of the payments sent by non-registered institutions originated in Europe (55.2% in value terms and 55.8% in volume terms), the Americas (29.3% in value terms) and Asia (17.4% in volume terms). Non-registered institutions accounted for more than half the tiered traffic in all geographical areas in value terms, ranging between 50.1% in Asia and 92.7% in the Americas, and volume, except for Asia and Europe, where they represented 44.7% and 43.1% of tiered traffic in volume terms respectively.

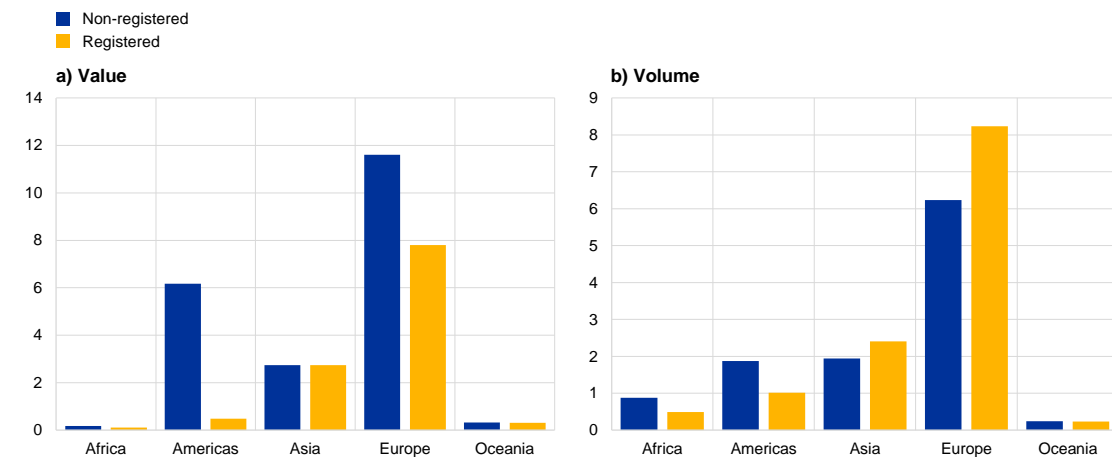
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<sup>31</sup> With a tiered participation arrangement, a participant in a payments system offers institutions that are not participants in the payment system themselves the possibility of settling their transactions on its account. Indirect participants can be banks, central banks and international institutions, among others.

## Chart A

### TARGET2 tiered traffic by registration status and geographical area

(yearly totals; left panel: EUR trillion; right panel: number of transactions, millions)



Source: TARGET2.

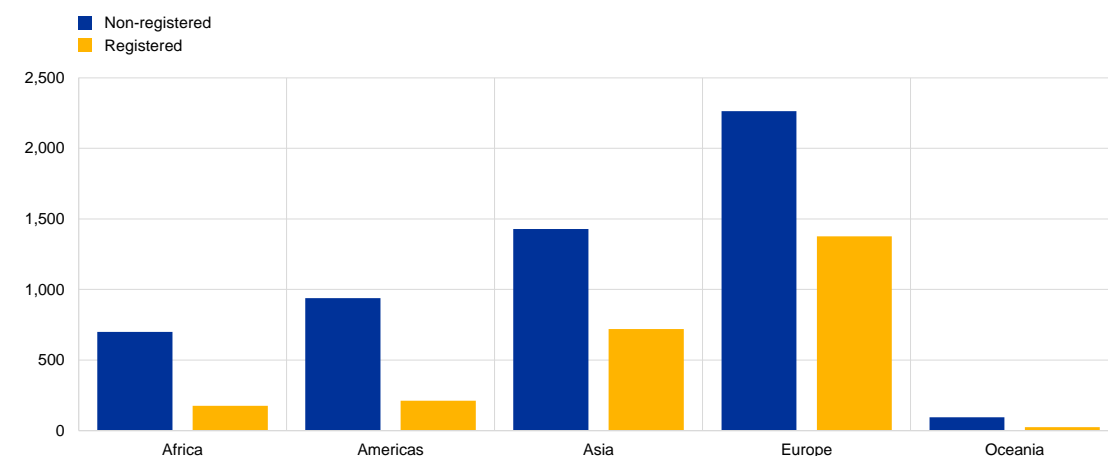
Note: The geographical area is assigned based on the country code of the institution's BIC.

Of the 7,931 indirectly connected institutions<sup>32</sup> that sent at least one tiered payment to TARGET2 in 2021, 2,508 institutions were registered in the TARGET2 directory and 5,423 were not (see Chart B). The share of non-registered institutions as a percentage of the total number of indirect institutions was high across all geographical areas, ranging from 62.2% in Europe to 81.6% in the Americas. At the same time, in 2021 each registered institution sent an average of 4,935 payments, while each non-registered institution sent an average of 2,059 payments. This suggests that registered institutions sent payments to TARGET2 more frequently than non-registered ones.

## Chart B

### TARGET2 indirectly connected institutions by registration status and geographical area

(number of BICs)



Source: TARGET2.

Note: The geographical area is assigned based on the country code of the institution's BIC.

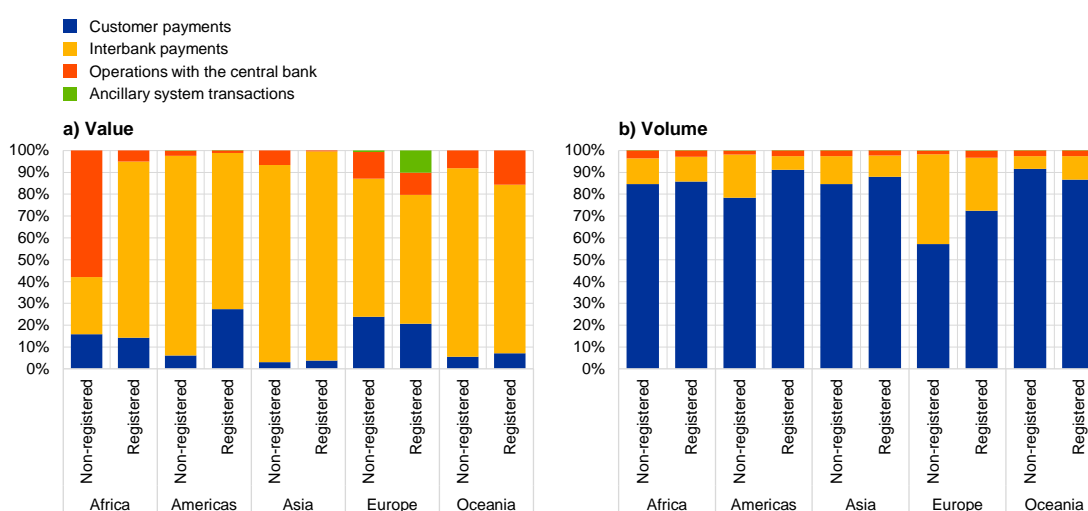
<sup>32</sup> Considered at BIC8 level with no banking group consolidation applied.

Payments sent by registered and non-registered institutions had a similar breakdown by payment type across geographical areas in 2021. In line with the statistics at system level, interbank payments were the main contributors to tiered TARGET2 traffic in value terms, whereas customer payments were the leading category in volume terms. Interbank payments represented 71.4% or more of the total values sent by registered and non-registered institutions in each geographical area, except for non-registered institutions in Africa (26.2%) and registered and non-registered institutions in Europe (58.9% and 63.2% respectively).<sup>33</sup> Customer payments accounted for a notably larger share of the volumes sent by registered institutions compared with non-registered ones in Europe (+15.3 percentage points) and in the Americas (+12.7 percentage points).

## Chart C

### TARGET2 payment categories by registration status and geographical area

(monthly totals; percentages)



Source: TARGET2.

Note: The geographical area is assigned based on the country code of the institution's BIC. The category "interbank payments" also includes intragroup payments.

Overall, in 2021 a significant share of tiered traffic in TARGET2 was sent by indirectly connected institutions that were not registered in the TARGET2 directory. These institutions accounted for almost two-thirds of all tiered payments in volume terms and almost half of all tiered payments in value terms. Non-registered institutions represented the highest share of indirect participants across all geographical areas. These findings suggest that the number of counterparties reachable via TARGET2 is much higher than the number in the TARGET2 directory and hence the TARGET2 network is broader. At the same time, the lower average number of payments sent by non-registered institutions suggests that these institutions act less frequently compared with registered ones.

<sup>33</sup> Operations with the central bank represented almost 60% of the value sent by non-registered institutions in Africa in 2021. Since this payment type comprises any transaction in which a central bank appears as either the sender or the receiver, it does not necessarily refer to monetary policy operations and can also include foreign reserve management.



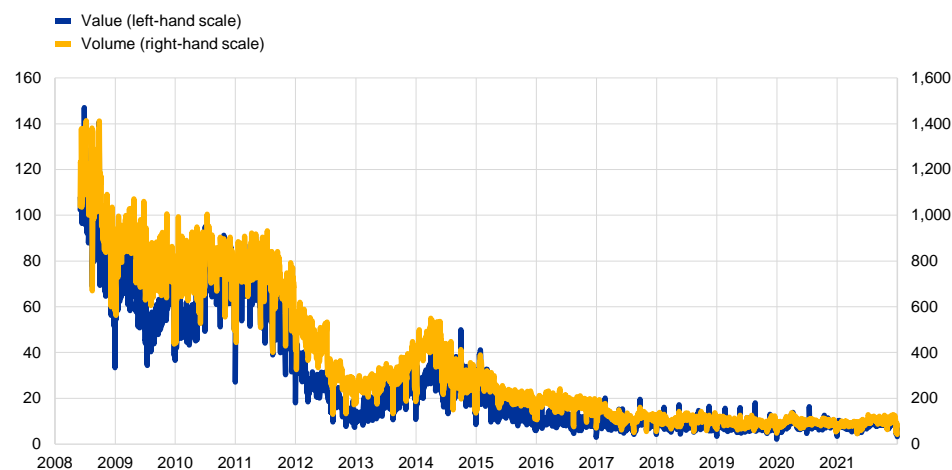
## 1.14 Money market transactions in TARGET2

Market participants use TARGET2 for settling unsecured money market transactions in central bank money. By applying the Furfine algorithm<sup>34</sup> it is possible to identify TARGET2 transactions which are related to money market loans, or, more precisely, to the unsecured overnight money market.<sup>35</sup> This unique dataset is updated regularly to obtain the latest information about the money market. Overall, TARGET2 transaction data provide a rich source of information for both the analysis of monetary policy implementation and TARGET2 operations. The importance of the money market is thus twofold: (i) it is an important vehicle for the redistribution of liquidity among TARGET2 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.

The dataset has been developed using the TARGET2 Simulator environment and comprises data from June 2008 onwards.<sup>36</sup> In 2021 around 24,510 money market loans, with a total value of about €2.14 trillion, were identified. Overall, the amount of unsecured funds traded on the overnight market remained at low levels compared with the period before the financial and sovereign debt crises. Activity in 2021 was in line with 2020 and higher compared with 2019 (Chart 25).

**Chart 25**  
Unsecured overnight money market activity in TARGET2

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



Source: TARGET2.

Chart 26 complements this analysis by showing the cumulative distribution in value of all money market transactions during the day in 2021. On the lending leg, 50% of the total value is settled by around 15:35 CET, while 98% is settled by around 17:00

<sup>34</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.

<sup>35</sup> For further 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.

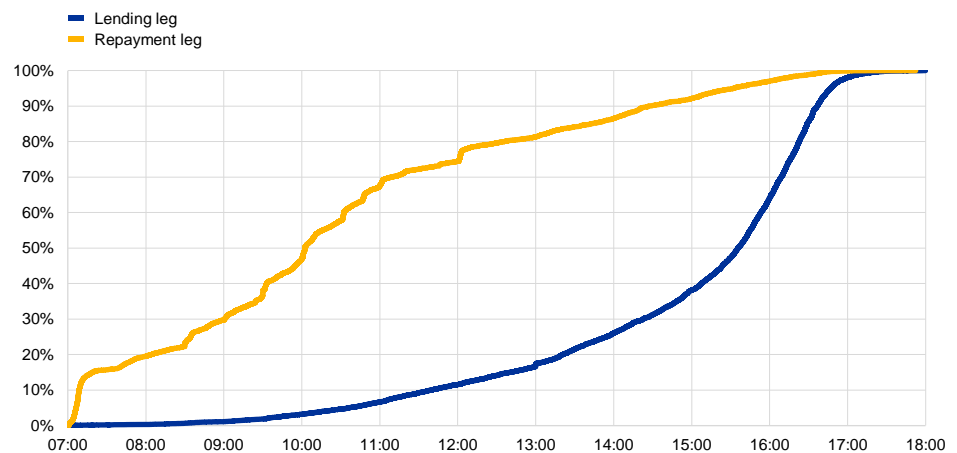
<sup>36</sup> See Box 2 entitled “The TARGET2 Simulator”, *TARGET Annual Report 2013*, ECB, May 2014.

CET. This confirms the assumption that the last few hours of TARGET2 operations are particularly important for the interbank market. In terms of repayment, three-quarters of the loans are repaid by around 12:00 CET and 90% by around 14:30 CET. These patterns ensure that the repaid liquidity can be reused for payment purposes later that day.

### Chart 26

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

(percentages)



Source: TARGET2.

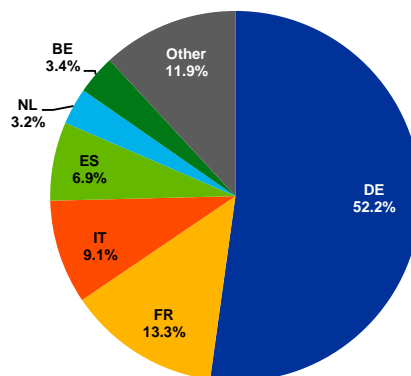
## 1.15 Shares of national banking communities

The following two charts break down TARGET2 volumes and turnover according to the share of the biggest national banking communities contributing to its traffic.

### Chart 27

Country contributions to TARGET2 volume

(percentages)

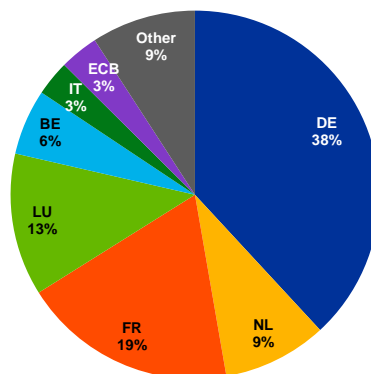


Source: TARGET2.

**Chart 28**

**Country contributions to TARGET2 value**

(percentages)



Source: TARGET2.

As in previous years, in 2021, the largest contributor to TARGET2 traffic in volume terms was Germany, which accounted for more than half of the transactions settled in the system. The addition of France, Italy, Spain, the Netherlands and Belgium increases the share of transactions to 88%, which is on a par with previous years. The shares of the biggest contributors to TARGET2 volumes remained stable.

Germany is also the main contributor by turnover, followed by France, Luxembourg and the Netherlands. The top four countries by turnover generated over three-quarters of the total value settled in TARGET2 in 2021. The concentration of turnover remained stable compared with the previous year.

It should be noted that the high concentration of both TARGET2 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 since November 2007 the TARGET2 system has allowed the activities of banking groups to be consolidated in a single RTGS account held by the group's head office, thereby increasing concentration in countries where a large number of these groups are incorporated.

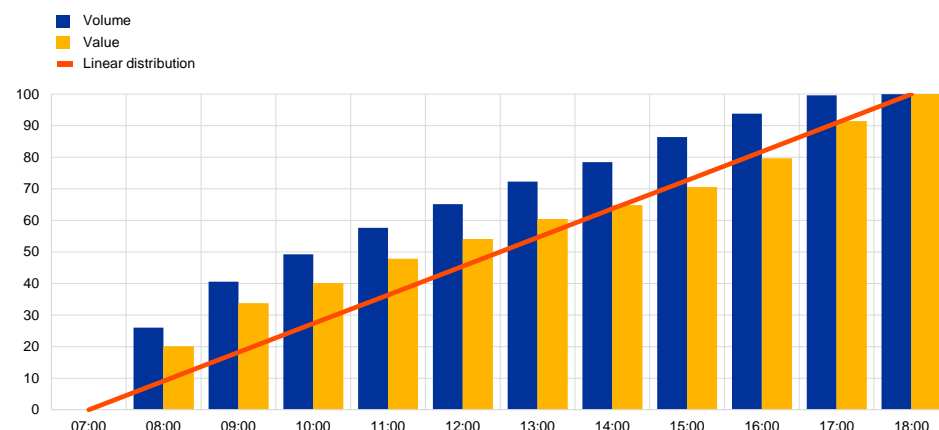
## 1.16 Pattern of intraday flows

Chart 29 shows the intraday distribution of TARGET2 traffic, i.e. the percentage of daily volumes and values processed at different times of the day in 2021. This indicator is significant for the operator of TARGET2 as it represents the extent to which settlement is evenly spread throughout the day or concentrated at certain peak times. Ideally, the value/volume distribution should be as linear as possible to avoid liquidity and operational risk.

**Chart 29**

**Intraday distribution of TARGET2 traffic in 2021**

(percentages of daily volumes and values)



Source: TARGET2.

In value terms, the path is typically very close to linear distribution, indicating an even spread throughout the day, which, in turn, ensures the smooth settlement of TARGET2 transactions.

In volume terms, the curve is well above the linear distribution, with over one-fifth of transactions submitted to the system within one hour of the start of operations – including transactions sent at night by participants and warehoused payments – and almost half submitted within three hours of the start. One hour before the system closes, almost 100% of the TARGET2 volume has already been processed. A comparison with previous years shows no significant deviations.

**Box 5**

**External review carried out by Deloitte on the incidents that affected TARGET services in 2020**

In December 2020 the ECB appointed Deloitte GmbH to conduct an independent review of five major information technology-related incidents (not cyber incidents) which occurred in 2020, affecting payment transactions and securities processing of TARGET services. The review aimed to identify the root causes of the incidents, draw more general lessons and propose recommendations in the following six key areas: (i) change and release management, (ii) business continuity management, (iii) failover and recovery tests, (iv) communication protocols, (v) governance, and (vi) data centre and IT operations.

On 28 July 2021 the ECB published Deloitte's independent review. The report included a detailed description of the relevant incidents, the impact that each had on TARGET services participants and the respective root causes. Deloitte also performed a thorough review of the procedures followed during the incidents, highlighting the weaknesses identified and issuing recommendations to address them.

In its response, the Eurosystem accepted Deloitte's general conclusions and recommendations, and committed to decisively address them.

In the second half of 2021 the Eurosystem prepared an action plan to address in a timely manner the issues and recommendations raised by Deloitte. The action plan was broadened to include recommendations issued by the Eurosystem oversight function and the Internal Audit Committee in relation to the TARGET services incidents that took place in 2020. In addition, for the recommendations related to a specific TARGET Service, the Eurosystem sought to design response actions that would apply holistically across the different TARGET services and the T2-T2S consolidated system due to go live in November 2022.

Measures addressing several recommendations were agreed or implemented in 2021, while most of the remaining measures will be implemented in 2022. For some recommendations, market participants were also involved to ensure that their views were taken into account. For that purpose, dedicated sessions with the Advisory Group on Market Infrastructures for Payments (AMI-Pay), the Advisory Group on Market Infrastructures for Securities and Collateral (AMI-SeCo) and the T2S CSD Steering Group (CSG) were organised. These groups will also be regularly updated on the implementation of the action plan until its completion.

On 17 December 2021 the ECB published a summary of the action plan, which also indicates the respective deadlines for the implementation of the measures.

The action plan has been structured according to the six workstreams of the Deloitte review, i.e. (I) change and release management; (II) business continuity management; (III) failover and recovery tests; (IV) communication protocols; (V) governance; and (VI) data centre and IT operations, and the actions listed below were implemented in 2021.

#### **Workstream I: change and release management**

Strengthening the local technical change management with training sessions offered to external staff and ensuring strict application of the instructions included with the relevant changes. In addition, unsupervised work in secure areas is avoided by following a well-defined process that governs access to such areas.

#### **Workstream II: business continuity management**

A new technical procedure for activating the Enhanced Contingency Solution (ECONS I) was implemented by the 4CB in the fourth quarter of 2021 and included in the relevant processes and testing activities. The 4CB have also ensured that operational staff are fully trained and knowledgeable about the ECONS I activation procedures in all situations.

#### **Workstream III: failover and recovery tests**

The technical documentation supporting the operational recovery tests and the test calendar have already been amended. With regard to the improvement of contingency procedures testing, all TARGET2 central banks are required to perform monthly checks of their technical ability to connect to ECONS I and to the contingency network.

#### **Workstream IV: communication protocols**

The external communication protocols have already been improved following discussions with market participants held in February 2021. It is now, for example, easier for participants to access the RSS feed notification service, and the TARGET services section of the ECB website has been

streamlined to show the operational status of the three services (TARGET2, T2S and TIPS) clearly on a single page along with a link to past communications (historical overview).

#### **Workstream V: governance**

The second line of defence has been fully implemented. The TARGET services risk management framework will ensure that specific criteria for the necessary independence, transparency and information sharing and participation in decision-making are implemented in line with the expectations set out in Annex 1 to the TARGET2 Guideline (ECB/2012/27).<sup>37</sup>

#### **Workstream VI: data centre and IT operations**

The recruitment process at 4CB, which encountered difficulties in recruiting new staff owing to the outbreak of the coronavirus (COVID-19) pandemic, has been restarted and aims to ensure that there is a suitable number of qualified staff across all functions of the 4CB, with a special focus on day-to-day operations.

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<sup>37</sup> Guideline of the European Central Bank of 5 December 2012 on a Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET2) (ECB/2012/27) (OJ L 30, 30.1.2013, p. 1).

## 2 TARGET2 service level and availability

In 2021 99.99% of all payments settled in the payments module of TARGET2 were processed in less than five minutes. This indicator shows clear progress compared with 2020, when it was negatively affected by three major incidents (Box 5).

Service delivery times and payment processing times generally remained stable in 2021, confirming the high performance level of TARGET2's SSP. This excellent performance is advantageous for the banking community, particularly for its real-time liquidity management.

Payment processing times are measured for all the payments settled in TARGET2, with the exception of: (i) ancillary system settlement transactions using the ASI, (ii) payments settled during the first hour of operations (see the "morning queue effect" below) and, (iii) payments that have not been settled owing to a lack of funds or a breach of limit. In practice, around 30% of all TARGET2 payments fall into these three categories, meaning that the statistics on processing times apply to around 70% of the system's traffic.

99.98%<sup>38</sup> of requests or enquiries were processed in less than one minute and only 0.02% in one to three minutes, with levels remaining the same as in 2020.

Chart 30 helps to better quantify the system's performance by showing the distribution of processing times on the SSP, 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 recorded by the SSP, namely 6 April 2021, when 580,290 payments were settled. The chart shows that on this day 50% of transactions were settled within 26 seconds and 90% within 38 seconds, thereby confirming the system's high level of performance.

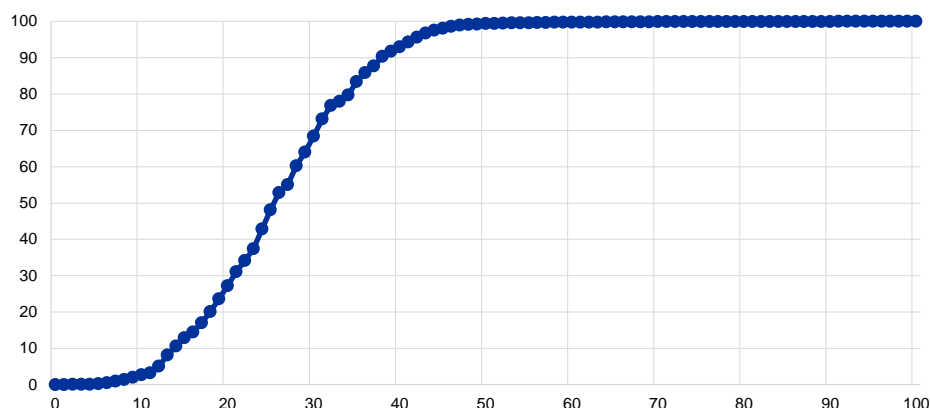
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<sup>38</sup> This figure covers the InterAct messages received by the SSP, in both U2A and A2A mode.

**Chart 30**

Processing times on 6 April 2021, excluding the first hour

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



Source: TARGET2.

A phenomenon worth reporting in the context of TARGET2 performance is the “morning queue effect”. When TARGET2 starts daylight operations at 07:00 CET, a large number of transactions (about 20% of the daily volume on peak days) are already waiting for settlement. They are either payments submitted by banks on previous days with a future value date (i.e. “warehoused payments”) or payments released by banks via SWIFT in the hours preceding the opening of the system. On peak days more than 100,000 transactions may be processed in the first hour, which affects the average settlement time during this period. This huge volume of transactions normally takes around 30 to 45 minutes to process. In order to neutralise this effect, the first hour of operations is excluded when TARGET2 processing times are calculated.

Specifically, in the first hour the use of urgency flags (“urgent” and “highly urgent”) is still recommended for payments that are considered to be time-critical (such as CLS pay-ins). The use of urgency flags circumvents settlement delays by using different queues (one queue for each type of priority). In addition, attention should be drawn to the possibilities offered in TARGET2 to reserve funds for highly urgent and urgent payments (see Section 1.9. The use of prioritisation).

## 2.1 Technical availability

In the light of TARGET2’s importance for the functioning of the financial system and the knock-on effects that any potential malfunctions could have on other market infrastructures, the Eurosystem pays particular attention to ensuring its smooth operation. This is clearly underlined by the fact that the SSP of TARGET2 achieved 100% technical availability in 2021.

Technical availability is measured on TARGET2 business days during the day-trade phase (including end-of-day processing), from Monday to Friday between 07:00 CET and 18:45 CET (19:00 CET on the last day of the minimum reserve period), including



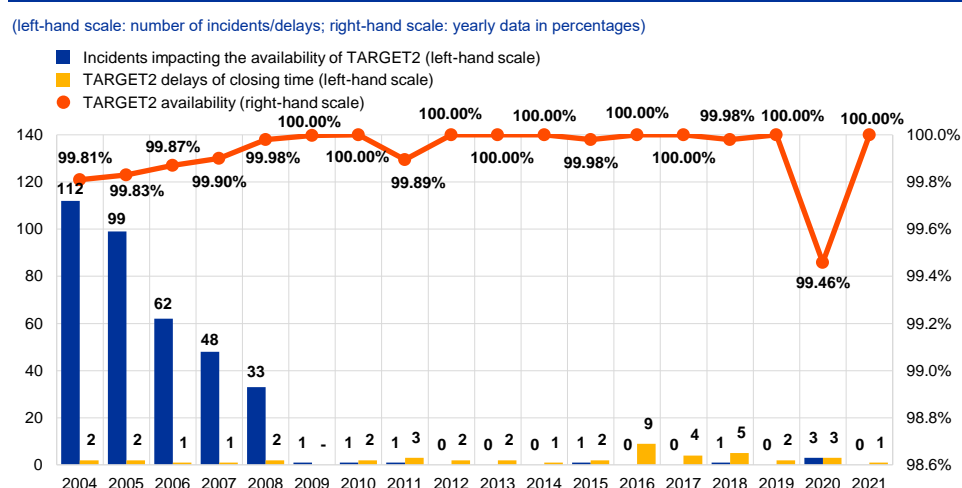
extensions required to complete the operational day (e.g. delayed closing owing to a technical problem in TARGET2 – or in T2S, which has an effect on TARGET2 – or to major problems in ancillary systems settling in TARGET2). The availability measurement does not include systems or networks not directly managed by TARGET2 (in particular, the availability of the SWIFTNet services). Incidents occurring during night-time settlement are not included either.

Technical availability is not intended to measure the impact of partial outages involving TARGET2's SSP. For example, incidents affecting only the processing of ancillary system transactions without any effect on other payment processing activities cannot be measured in this figure, although they have an overall impact on TARGET2 and are taken into account when assessing the system's performance. However, such incidents are considered when measuring processing times, where applicable, and, in addition, they are reported transparently and followed up accordingly.

## 2.2 Incidents in TARGET2

The ECB publishes up-to-date information about the availability of TARGET2 via the Market Information Dissemination tool.<sup>39</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 of the incident or incidents of a similar nature.

**Chart 31**  
TARGET2 incidents and delays in closing the system



Source: TARGET2.

In 2021 TARGET2 experienced minor technical issues which, in one case (on 22 December), led to a delay in the sending of settlement confirmation messages to participants, although this did not affect the settlement of payments.

<sup>39</sup> For further information, see [Market Information Dissemination](#).

In addition, the closing of the interbank payment cut-off at 18:00 CET was delayed on 29 June owing to problems in T2S, which prevented the timely repatriation of funds from T2S to TARGET2 RTGS accounts.

## **Box 6**

### **Operational communication to TARGET2 participants**

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Clear, timely and reactive communication to participants is a key success factor for all financial market infrastructures. Communication is not only important in crisis situations, it is also important for less critical events that may occur throughout the operational day. For TARGET2, this communication relies on a number of tools, which are at the disposal of TARGET2 central banks. These tools may be used to inform participants about matters such as the operational status of the system, any cut-off changes, the insolvency of participants or ongoing disruptions.

#### **Broadcasts via TARGET2 Information and Control Module**

The TARGET2 Information and Control Module (ICM) can be used to disseminate information from the SSP Service Desk/TARGET services coordination desk and central banks to all TARGET2 participants via broadcasts.

#### **TARGET services operational status page**

The TARGET2 Market Information Dissemination (MID) tool allows up-to-date information about the operational status of TARGET2 to be made available via the ECB website. This information refers to normal operations as well as abnormal situations. In the latter case, the information provided includes the type of failure, its impact and the measures to be implemented to resolve the issue, including the time of the next update.

#### **RSS feed**

The [TARGET services operational status](#) page reports on the operational status of TARGET2, T2S and TIPS on one single page. Participants, news agencies and the general public can access the operational status via an RSS feed. The RSS feed allows polling for new information and the retrieval of new data published. All information published is collected in one feed, accessible via the following URL: <http://mid.ecb.europa.eu/rss/mid.xml>.

#### **History functionality**

Historical information on the operational status of TARGET2, T2S and TIPS is available on the [TARGET services operational status](#) page on the ECB website. By clicking on “See historical information”, users are able to verify the entire history of communications published on the ECB website, loaded by year and service. Historical information on the operational status of the TARGET services is available as of 5 October 2021.

#### **TARGET Crisis Communication Group**

In order to strengthen the communication to key market participants and make it more direct, as well as providing an additional channel for crisis managers to receive valuable information directly from participants during major incidents, the TARGET Crisis Communication Group (TC2) became operational on 31 March 2022. The TC2 includes all TARGET2 crisis managers as well as

representatives from TARGET2 critical participants. Depending on the nature of the crisis scenario (i.e. if incidents relate to or affect connectivity), the network service providers could also be involved (i.e. SIA-COLT and SWIFT).

#### **Teleconference systems**

TARGET2 Settlement and Crisis Managers' calls, and TC2 teleconference calls take place via a teleconference system. The teleconference system is used for bilateral/multilateral, ad hoc and regular teleconferences, both within and outside business hours.

#### **TIPS email notification tool**

The TIPS operator has also developed a new email notification tool that can be used by subscribed central banks and their participants to receive email notifications in the event of a TIPS incident. The incident notification is sent via email to all subscribed participants. This feature has been operational since 1 January 2022.

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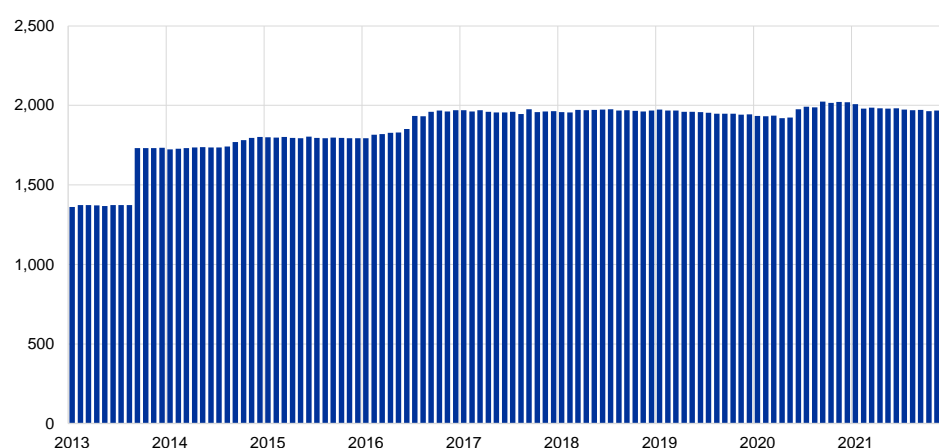
## 3 TARGET2 participants

### 3.1 RTGS accounts

In December 2021 the total number of RTGS accounts active in TARGET2 (encompassing direct participants, technical accounts, ancillary system accounts and special-purpose accounts) was 1,958, i.e. slightly lower than at the end of 2020 (2,020).

**Chart 32**

Number of RTGS accounts in TARGET2



Source: TARGET2.

### Internet-based participation

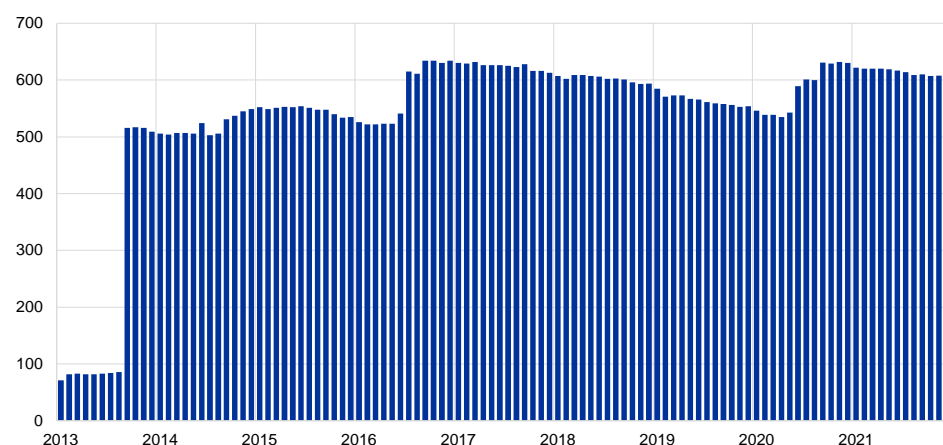
In November 2010 internet-based participation was introduced to allow small banks to obtain a direct connection to TARGET2 without necessarily being connected to the SWIFT network. The service, which is subject to a monthly fee of €70, is designed mainly for low-volume participants that wish to hold an account directly with their central bank: either an RTGS account<sup>40</sup> or a home accounting module account (provided the respective central bank has opted for this module).

While the initial number of internet-based participants was relatively modest (68 at the end of 2012), it increased significantly in 2013 (to 509 participants by the end of 2013), with the phasing out of the last proprietary home accounts still offering payment settlement services. Another increase during the second half of 2016 (to 634 participants by September 2016) was caused by some banks opening TARGET2 accounts via internet-based access solely for settling long-term refinancing operations. While the total amount of internet-based participation gradually declined from then on, a third increase took place from mid-2020 (to 630 participants by

<sup>40</sup> An RTGS account for an internet-based participant will also incur additional monthly fees for the account itself and a flat rate fee of €0.80 per transaction.

December 2020). This increase was also caused by some banks opening TARGET2 accounts via internet-based access solely for settling long-term refinancing operations. In December 2021 the overall number of internet-based participants was 606, which portrays a gradual decline in this type of participation. The largest share of internet-based participants is in Germany, followed by France and Italy.

**Chart 33**  
Internet-based participants



Source: TARGET2.

## 3.2 Participation types

At the end of December 2021 998<sup>41</sup> direct participants held an account on the SSP of TARGET2 and were registered as such in the TARGET2 directory. Through these direct participants, 538 indirect participants from the EEA and 4,272 correspondents worldwide were able to settle their transactions in TARGET2.

**Table 2**  
Participation types

	Number of participants
Direct participation	998
Indirect participation	538
Multi-addressee – credit institution	42
Multi-addressee – branch of direct participant	1,198
Addressable BIC – correspondent (including central bank customers)	4,272
Addressable BIC – branch of direct participant or entity that is part of the same group	22,432
Addressable BIC – branch of indirect participant or entity that is part of the same group	435
Addressable BIC – branch of correspondent or entity that is part of the same group	12,614

<sup>41</sup> This figure represents the number of direct participants with at least one account in TARGET2. Direct participants may have more than one account, which is why the figure is lower than the number of RTGS accounts reported in Section 3.1.

Including the branches of direct and indirect participants, a total of 42,528 BICs around the world (58% of which are located in the EEA) were accessible via TARGET2 at the end of 2021. Compared with the number of reachable BICs at the end of 2020, 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 and indirect participants.

Participants and institutions addressable via TARGET2 are listed in the TARGET2 directory, which is available to all direct participants for information and routing purposes. In addition to the direct participants that hold an RTGS account for sending payments to and receiving payments from all other direct participants, a number of banks have opted to open special-purpose RTGS accounts, which are not reported as direct participants in the TARGET2 directory. These special-purpose accounts are used, among other things, for the settlement of a specific business (for example, Eurosystem open market operations) or to fulfil reserve obligations in countries where reserves are computed on RTGS accounts. There were 435 of these accounts, which are also known as “unpublished BICs”, at the end of 2021 (compared with 512 in 2020).

### 3.3 Ancillary systems

At the end of 2021 a total of 78<sup>42</sup> ancillary systems were using the TARGET2 SSP for settlement purposes, including 31 retail payment systems, 22 securities settlement systems and 19 clearing houses (including four central counterparties).

Of the 78 ancillary systems using the SSP for settlement purposes, 59 made use of the ASI, a feature which was developed to facilitate and harmonise the cash settlement of these systems in TARGET2.<sup>43</sup> Table 3 shows the number of times each of the available ASI models was used at the end of the year.

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<sup>42</sup> From a technical perspective, TARGET2 has 82 ancillary systems (five less than in 2020). However, this figure also includes, for example, central banks making use of the ASI for settling monetary policy operations. At the end of 2021 a total of 78 ancillary systems that are legally recognised as separate ancillary systems were using TARGET2 SSP for settlement purposes.

<sup>43</sup> Ancillary systems not using the ASI alternatively hold a regular RTGS settlement account and exchange normal credit transfers with their settlement banks.

**Table 3****ASI settlement model**

	Usage*
Model 1 – liquidity transfer <sup>1</sup>	0
Model 2 – real-time settlement	16
Model 3 – bilateral settlement	10
Model 4 – standard multilateral settlement	13
Model 5 – simultaneous multilateral settlement	11
Model 6 – interfaced	13
Model 6 – real-time	7

Notes: \*An ancillary system may make use of more than one ASI settlement model.

1 As a result of the migration to T2S, model 1 (which supports the integrated model) is no longer used.

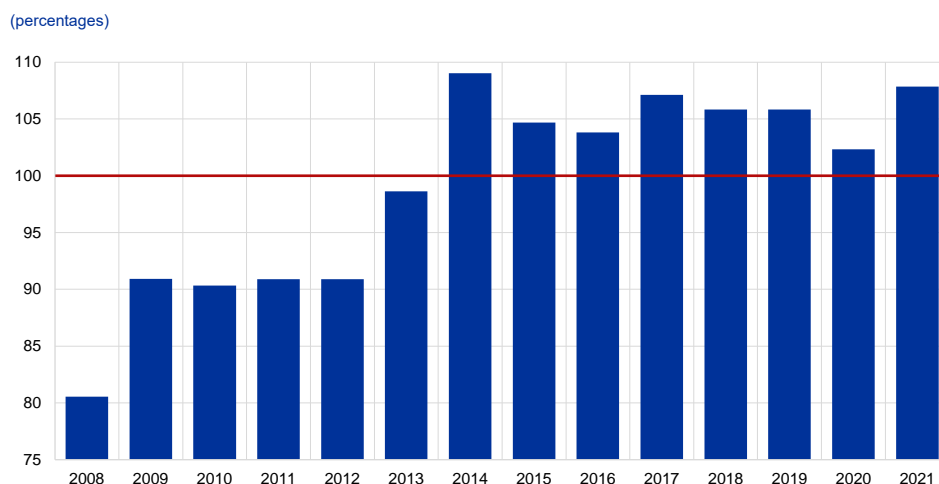
## 4 TARGET2 financial performance

### 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>44</sup> over the six-year amortisation period, i.e. between May 2008 and April 2014. This included its 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 34.

**Chart 34**  
TARGET2 annual cost recovery rate



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

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>44</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.



Since TARGET2's launch, the system has seen an average annual decrease in billed traffic of 0.7%, which largely explains why cost recovery, for the first few years of operation, was only around 90%.

In July 2012, acknowledging this underperformance, the Eurosystem decided to amend TARGET2's single pricing scheme as of January 2013. The fixed periodic fee for users was increased, while transaction fees remained unchanged. The new pricing scheme represents an acceptable compromise, with a limited increase in participants' fees and a reasonable extension of the system's payback period. In 2013 the amended pricing scheme helped to bring cost recovery close to 100%.

In 2014 most<sup>45</sup> of the investment costs were amortised, which substantially reduced the costs still to be recovered and lifted cost recovery to more than 100%. These annual profits are used to offset the losses accumulated over the first few years of operation.

While TARGET2 has generated annual profits since 2014, the level of cost recovery has fluctuated considerably on an annual basis. The reasons for this are, first, that the SEPA migration end-date resulted in a one-off drop in the total amount of customer payments settled in TARGET2. Second, T2S migration had an effect on TARGET2 from both a cost and a 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 are passed on to system participants in the form of a specific fee.<sup>46</sup> Furthermore, the successful migration of the respective CSDs to T2S from June 2015 onwards reduced the total amount of ancillary system transactions settled in TARGET2.

The total amount of billable traffic in TARGET2 increased by 7.7 million transactions, in 2021 and overall revenues increased to €45.3 million. Annual cost recovery also increased to 107.9%.

## 4.2 Financial performance of TARGET2 in 2021

In 2021 the total annual costs to be recovered for the provision of the core services of TARGET2 amounted to €42.0 million. On the revenue side, TARGET2 participants were billed for 94.3 million transactions, which, together with the fixed monthly fees, generated total revenues of €45.3 million. This resulted in a cost recovery rate of 107.9% and an annual profit of €3.3 million. At the end of 2021 the loss accumulated since the launch of TARGET2 had therefore decreased by the same amount, and stood at €3.8 million.

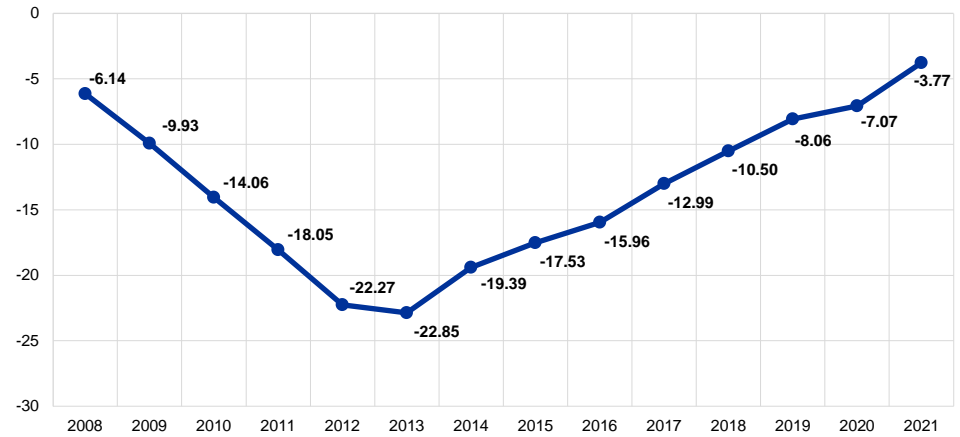
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<sup>45</sup> This part corresponds to the initial development costs (i.e. Release 1.0). Only the costs corresponding to the development of annual releases that had not yet been fully amortised (i.e. Release 2.0 and beyond) were still to be recovered.

<sup>46</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.

**Chart 35**  
Accumulated profit

(EUR millions)



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

## 4.3 Analysis of revenues collected in 2021

Based on 2021 figures, the following observations can be made.

- 94% of direct participants in the SSP opted for the flat fee option (i.e. option A), while 6% opted for the degressive fee option (i.e. option B).<sup>47</sup> This shows that TARGET2 is capable of attracting both major market players and a large number of small and medium-sized institutions.
- Participants that opted for pricing option B generated, in total, around 89% of billed traffic.<sup>48</sup> As a result of this concentration effect, 35% of all billed transactions were priced at the lowest pricing band, i.e. €0.125. This demonstrates that key participants, particularly multi-country banks, benefited from the attractive degressive fee option offered by TARGET2 and from the competitive group pricing offers.<sup>49</sup>
- Transactions between credit institutions generate around 94% of TARGET2 volumes, with the remaining 6% attributable to ancillary system transactions.
- 73% of TARGET2 revenues were variable, i.e. came from transaction fees, while fixed subscription fees accounted for 27%.

<sup>47</sup> Option A (i.e. a monthly fee of €150 and a flat transaction fee of €0.80) is intended for small and medium-sized institutions submitting fewer than 8,625 TARGET2 transactions per month. For institutions making greater use of TARGET2, option B (i.e. a monthly fee of €1,875 and a degressive transaction fee of between €0.60 and €0.125) is proposed.

<sup>48</sup> These are accounted for by core pricing participants, central banks using the ASI for "other purposes", ancillary systems and liquidity pooling.

<sup>49</sup> Some specific features of TARGET2 (e.g. liquidity pooling or multi-addressee access) offer the possibility of applying the degressive transaction fee to all payments initiated from accounts belonging to the same group.

- Measured from the start of the system, the total cost recovery of TARGET2 stands at 99.2%.

## 5 TARGET2 risk management and oversight activities

### 5.1 TARGET2 risk management

The management of operational risks is key for ensuring the resilience of the TARGET2 service. In December 2021 the Governing Council approved a new TARGET services risk management framework (TS RMF) applicable to all TARGET services (TARGET2, TARGET2-Securities and TIPS). The TS RMF follows up the recommendation from the TARGET2 overseer to establish and document a three-line model.<sup>50</sup> In particular, the TS RMF clarifies the roles and responsibilities of the TARGET services stakeholders (most significantly for the first and second lines of defence) in the context of identifying, assessing and managing operational risks. The second line that reports to the Market Infrastructure Board (MIB) was initially established mid-2020. Following the MIB's endorsement of the TS RMF, the resourcing of a fully-fledged second line was completed in December 2021.

The TS RMF consolidates the link to the particular information security risk management processes which are described in the TARGET services risk management manual and designed to: (i) monitor developments to ensure that progress on the implementation of security checks in response to issues resulting from risk assessments is satisfactory; (ii) enable those involved to learn from operational experience, thereby ensuring that appropriate measures are taken to prevent an incident from recurring; and (iii) proactively identify new threats and vulnerabilities that could emerge from the changing environment in which the TARGET2 system operates and, if needed, initiate deliberations on the implementation of additional security checks to prevent these threats from materialising.

In 2018 the Governing Council approved three cyber resilience enhancements as part of the Eurosystem action plan on Cyber Resilience established in 2017. These three enhancements aimed at further improving the Eurosystem's capabilities in relation to the identification and detection of cyber-attacks, as well as protection against and recovery from cyber-attacks, particularly in the areas of security services, security testing, data recovery and restart capabilities. These enhancements have been fully implemented in TARGET2 and further (already agreed) refinements to the security services are due when the T2-T2S consolidation project goes live. The cyber resilience enhancement to prevent and detect software integrity issues and reconstruct affected software was approved by the Governing Council in December 2019 and will be implemented for the new T2-T2S consolidation project.

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<sup>50</sup> See "The three lines of defense in effective risk management and control", *IIA Position Paper*, Institute of Internal Auditors, January 2013.

## 5.2 Oversight activities

In 2021, as part of the continuous oversight cycle, the ECB oversight function organised a number of bilateral meetings at different levels between the TARGET2 operator and the ECB as the competent authority, as well as at the level of the respective European System of Central Banks Committee and working group. The regular meetings allowed for discussion of developments and risks of the system, and enabled the overseer to effectively monitor the system's risk profile. They also allow overseers to assess TARGET2's continued compliance with the SIPS regulation and other oversight requirements.

The oversight function continued to monitor the impact of the COVID-19 pandemic on TARGET2 operations through continuous dialogue with the TARGET2 operator.

In July 2021 the Governing Council approved the TARGET2 gap assessment report and the TARGET2 cyber resilience oversight expectations (CROE) assessment. In addition to the three infringements and eight recommendations issued as part of the gap assessment, 39 recommendations stemming from the CROE assessment were issued to the operator. The oversight function follows up on their remediation based on action plans requested and provided by the TARGET2 operator to address the infringements and recommendations.

On 24 July 2020 the ECB's Governing Council took decisions on the deployment of instant payments across the euro area through a pan-European reachability package (Box 2). To implement these measures, the operator made changes in TIPS that were implemented as part of TIPS Release 4.0 in November 2021. The oversight function reviewed these changes and submitted its findings to the operator for remediation. Furthermore, in 2021 Eurosystem oversight reviewed a change made to support the Mobile Proxy Lookup (MPL) service in TIPS, as well as other changes aimed at adapting the TIPS to Sveriges Riksbank requirements and necessary to support the settlement on TIPS of instant payments in Swedish kronor (see Section 1.4). As a result of all the above-mentioned reviews of changes in TIPS, eight recommendations were issued and the necessary action plans have been requested.

To ensure the resilience of TARGET2, the oversight function continued to follow up the remediation actions for the three major incidents that occurred in TARGET2 in 2020, on 16 March, 11 August and 23 October (Box 5).

In July 2020 the Governing Council decided to extend the timeline of the T2-T2S consolidation project by one year, postponing the scheduled go-live and the adoption of ISO 20022 to November 2022. The oversight function has been carefully monitoring and analysing the developments related to the project with the aim of identifying risks at an early stage, particularly those that might have an impact on a successful implementation of the project and the smooth operation of the future platform. The project will be subject to Eurosystem oversight review in 2022.

## 6 System evolution

### 6.1 Release 15.0

Release 15.0 was implemented on 22 November 2021. Owing to the limited remaining lifetime of TARGET2, the Eurosystem decided not to seek any change request from TARGET2 participants. Furthermore, no adaptations were required as part of the SWIFT Standards Release 2021.

TARGET2 Release 15.0 only contained changes to the software that will support the migration to the T2-T2S consolidated platform and mandatory bug fixes.

#### **Box 7**

##### **Update on T2-T2S consolidation project and future RTGS services (including CLM)**

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The T2-T2S consolidation project will replace the current TARGET2 with a new RTGS system and apply a centralised liquidity management (CLM) tool across all TARGET services (T2, T2S, TIPS and ECMS).

The functional specification phase of the project ended in 2020 following the publication of stable User Detailed Functional Specifications (UDFS) and User Handbooks (UHBs).

In 2021 the focus was on the update of these user specifications and preparing them for testing by incorporating change requests approved after the publication of the previous UDFSs and UHBs. UDFS v2.2 was published in April and the different books of UHB v2.0 were published between May and December 2021.

The T2-T2S consolidation project has also published explainers and examples to help market participants better understand certain concepts by gathering information spread across different chapters or specifications books into single documents.

The next versions of the user specifications are expected to be published throughout 2022 before the go-live.

#### **Migration, testing and readiness**

The T2-T2S consolidation project will go live in November 2022 following a “Big Bang” migration approach. This means that the current TARGET2 SSP will be discontinued at the time of the launch of the new T2 service. Transition in stages is not possible because the current SWIFT FIN Y-copy message flow used in TARGET2 cannot co-exist with the V-shape message flow that will be employed by the new T2 service. The V-shape set-up provides for network-agnostic connectivity and enhanced information security.

Following the Eurosystem Acceptance Testing conducted up until early 2021, for the rest of the year the focus was on user testing. Central Bank Testing started in June 2021 and User Testing began in December 2021.

In 2022, testing will be stepped up and the migration process will be intensively practised in a set of go-live rehearsal tests, some of which will include the whole TARGET community. T2 participants will be invited to take part in dedicated testing campaigns, e.g. billing, ancillary system procedures. T2 participants will need to successfully perform the mandatory test cases in order to access the new platform.

The Community Readiness Reporting process follows the Community Readiness Framework which is outlined in the Migration, Testing and Readiness strategy document. The readiness of the community to migrate in November 2022 will continue to be assessed against these milestones throughout the year in quarterly cycles.

Further details are available on the [T2-T2S consolidation project page](#) on the ECB's website.

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## Additional data

**Table**

Distribution of payment flows in TARGET2

	2021				2020			
	Value (EUR billions)	%	Volume	%	Value (EUR billions)	%	Volume	%
<b>AT</b>	6,813	1%	1,955,143	2%	6,498	1%	1,882,169	2%
<b>BE</b>	27,921	6%	3,314,876	3%	28,571	6%	3,109,346	4%
<b>BG</b>	837	0%	262,431	0%	651	0%	249,975	0%
<b>CY</b>	77	0%	126,627	0%	81	0%	140,930	0%
<b>DE</b>	184,621	38%	50,285,284	52%	187,151	40%	48,107,950	54%
<b>DK</b>	2,496	1%	257,910	0%	2,578	1%	216,166	0%
<b>EE</b>	148	0%	82,004	0%	127	0%	83,564	0%
<b>ES</b>	14,961	3%	6,622,520	7%	13,979	3%	5,868,141	7%
<b>EU</b>	16,450	3%	248,697	0%	14,776	3%	235,533	0%
<b>FI</b>	10,285	2%	933,853	1%	11,086	2%	661,936	1%
<b>FR</b>	91,111	19%	12,846,950	13%	89,820	19%	10,673,646	12%
<b>GR</b>	952	0%	947,750	1%	928	0%	787,509	1%
<b>HR</b>	130	0%	99,560	0%	100	0%	90,850	0%
<b>IE</b>	3,009	1%	760,837	1%	2,998	1%	741,427	1%
<b>IT</b>	14,975	3%	8,753,238	9%	15,900	3%	7,872,360	9%
<b>LT</b>	225	0%	226,037	0%	167	0%	141,857	0%
<b>LU</b>	60,598	13%	2,239,988	2%	41,694	9%	1,906,293	2%
<b>LV</b>	272	0%	227,484	0%	264	0%	247,674	0%
<b>MT</b>	624	0%	90,406	0%	399	0%	84,695	0%
<b>NL</b>	44,286	9%	3,081,689	3%	44,555	10%	2,859,132	3%
<b>PL</b>	1,153	0%	1,240,485	1%	945	0%	1,071,011	1%
<b>PT</b>	1,150	0%	769,405	1%	1,174	0%	739,751	1%
<b>RO</b>	119	0%	123,757	0%	141	0%	109,363	0%
<b>SI</b>	360	0%	695,801	1%	368	0%	639,107	1%
<b>SK</b>	677	0%	161,883	0%	841	0%	146,159	0%
<b>Total</b>	<b>484,252</b>	<b>100%</b>	<b>96,354,615</b>	<b>100%</b>	<b>465,794</b>	<b>100%</b>	<b>88,666,544</b>	<b>100%</b>



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