



EUROPEAN CENTRAL BANK

EUROSYSTEM

TARGET2-Securities Annual Report

2023

April 2024



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Introduction

Financial market infrastructures (FMIs) are the backbone of the financial system. They provide the networks through which financial institutions and financial markets connect with each other and through which financial transactions are cleared and settled. It is therefore essential to ensure that market infrastructures are safe and efficient and that they underpin a stable and well-functioning economy. The Eurosystem plays a key role, given that the conduct of monetary policy relies on the availability of reliable and effective FMIs such as T2 (the real-time gross settlement system), TARGET2-Securities (the securities settlement platform) and TIPS (TARGET instant payment settlement).

The TARGET2-Securities (T2S) initiative was aimed at addressing the highly fragmented European securities settlement landscape. It was launched in June 2015 as an integrated platform used to process securities transactions against central bank money. T2S revolutionised securities settlement in Europe by offering a solution which simplified cross-border settlement procedures and eased the difficulties caused by different countries following different settlement practices.

T2S provides harmonised and commoditised securities settlement to central securities depositories (CSDs) and applies a single set of rules, standards and tariffs to all of them. This allows the securities settlement platform to lay the foundations for a single market for securities settlement and, as a result, contributes to greater integration in Europe's financial market. Today, the T2S platform connects 24 CSDs across 23 markets and processes, on average, around 700,000 securities transactions per day against both the euro and the Danish kroner.

The report and its structure

This is the 13th edition of the TARGET2-Securities Annual Report, which now covers a sixth full year since the end of the T2S migration period. The first edition was published in 2011, a pivotal year for the finalisation of the legal and technical documentation of T2S and for the CSDs' preparation of their T2S adaptation plans. This year the report presents the changes in T2S settlement data and confirms the continuing operational stability and efficiency of T2S. It describes the developments which took place in 2023, as well as some of the main incidents that had an impact on the platform throughout the year. The report's target audience is mainly decision-makers, practitioners, lawyers and academics wishing to acquire an in-depth understanding of T2S and how it works. In addition, it will be of interest to members of the public who have an interest in market infrastructure, in particular T2S.

In addition to the core content, four boxes are included in this year's publication. These provide in-depth information on the migration of five CSDs to T2S, initiatives aimed at improving settlement efficiency, the go-live of the T2-T2S consolidation, as well as the strategic evolution of the platform.

1 Evolution of T2S traffic in 2023

Table 1 provides an overview of changes in T2S traffic between 2022 and 2023. In 2023 T2S settled 177,766,588 transactions, with a total value of €200.75 trillion.¹ This corresponded to a daily average volume of 699,868 transactions, with a daily average value of €790.34 billion. To put this in perspective, the equivalent of the annual euro area GDP is settled on average roughly every 18 operating days.

Compared with the previous year, there was an increase of 8.99% in the value settled, and a decrease of 2.29% in the volume settled. Settlement efficiency in 2023 was 95.71% in terms of value and 94.32% in terms of volume. This represented an increase of 2.59% in terms of value and 0.62% in terms of volume compared with 2022.

Table 1
Variations in T2S settlement data and settlement efficiency

	Value (EUR billions)			Volume (number of transactions)		
	2022	2023	Change (%)	2022	2023	Change (%)
Total	184,184.50	200,746.61	8.99	181,924,855	177,766,588	-2.29
Daily average	716.67	790.34		707,879	699,868	
Settlement efficiency (EOD)	93.29%	95.71%	2.59	93.74%	94.32%	0.62

Source: T2S.

Notes: There were 257 operating days in 2022 and 255 operating days in 2023. However, due to the migration of five new CSDs to T2S on 11 September 2023, this day is excluded from the reported statistics, bringing the total number of operating days to 254.

Box 1

The migration of five CSDs to T2S

Another significant milestone for T2S was reached on 11 September 2023, when five new CSDs successfully migrated to the platform: the Bulgarian National Bank Government Securities Settlement System (BNBGSSS) and Central Depository AD (CDAD) in Bulgaria, Središnje klirinško deponitarno društvo d.d. (SKDD) in Croatia, Euroclear Finland and Euroclear Bank. The number of CSDs connected to T2S therefore increased to 24, and the number of European countries with CSDs relying on T2S increased from 20 to 23.

SKDD joined in the context of Croatia's changeover plan for adopting the euro, while BNBGSSS and CDAD joined as part of Bulgaria's integration process to join the Eurosystem.

Euroclear Finland brought all its 2.3 million end-investor accounts to T2S as part of its migration. This approach contrasts with the "layered mode" used by some other direct holding markets and the successful migration underscores the flexibility of T2S to accommodate various CSD business models.

¹ Five new CSDs joined T2S on 11 September 2023 (see Box 1). As a result of the migrations, a total of 5,993,115 transactions, mainly free-of-payment (FOP), were settled in T2S on that day. To avoid distortions, the T2S operator decided to remove this day from the statistics included in this report.

Euroclear Bank, one of the largest international CSD in terms of asset value, provides post-trade services globally. Its migration is further testimony to the attractiveness of the T2S service offering for CSDs.

Although pre-migration activities resulted in some performance issues at the T2S level that had not been identified during the testing phases², the T2S operator successfully addressed these issues by the time the migration took place, ensuring a successful transition to the new platform. The smooth migration reflected the excellent preparatory work, diligent testing efforts and collaboration between all parties involved.

1.1 Volume of settlements in T2S

Chart 1 shows the changes in the volumes settled in T2S and settlement efficiency at the end of the day since the first migration wave was completed in 2015. As a result of the migration waves, the monthly total T2S settlement volumes increased from 1,815,790 transactions in September 2015 to 11,804,649 transactions in October 2017. Between November 2018 and December 2019, total T2S settlement volumes averaged 12,819,952 transactions per month. In March 2020, following the outbreak of the coronavirus (COVID-19) pandemic, total monthly traffic peaked at 20,232,528 transactions. Monthly volumes reached over 20 million transactions in March 2022, due to market turmoil following Russia's invasion of Ukraine, although this was lower than the peak in March 2020. T2S settled an average of 14,813,882 transactions per month in 2023, ranging between a low of 12,164,431 in April (owing to the fact that there were only 18 operating days) and a high of 17,314,155 in March.

As traffic in T2S stabilised in its first few years of operation, settlement efficiency in volume terms became less volatile and averaged 96.85% between November 2018 and December 2019. Following the introduction of the new T2S statistical framework,³ and consequently a new calculation method, settlement efficiency in volume terms decreased to 94.81% in January 2020. The particularly high volumes settled in March 2020 affected settlement efficiency, which declined to 92.81%. Since mid-2022, settlement efficiency in volume has experienced a steady increase, from 92.11% in July 2022 to 95.03% in December 2023.

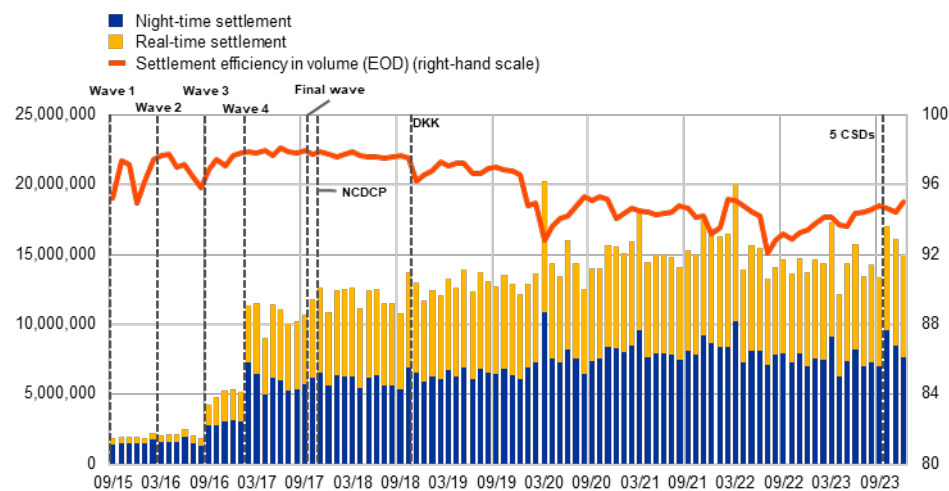
² See [18 August incident](#).

³ See Box 1, "Changes in the T2S statistical framework" in the [T2S Annual Report 2019](#).

Chart 1

Variation in volumes settled in T2S and settlement efficiency at end of day

(left-hand scale: number of transactions, monthly totals; right-hand scale: settlement efficiency, percentages)



Source: T2S.

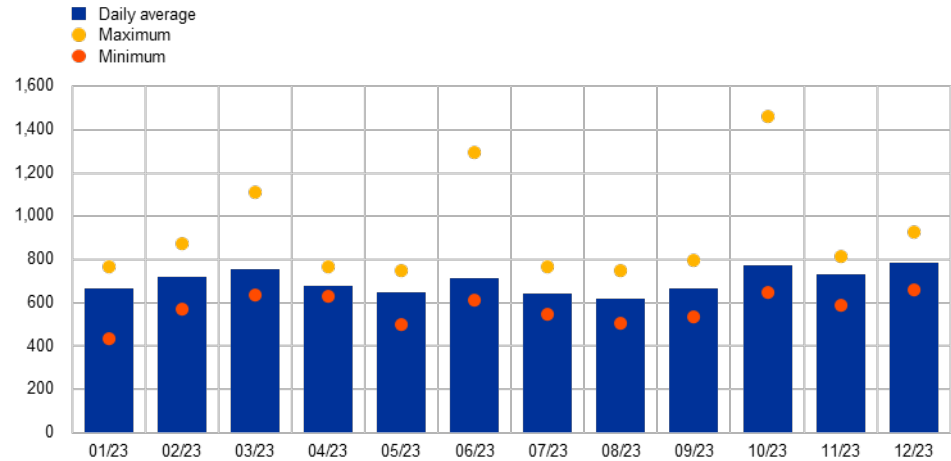
Notes: Migration wave 1: 22 June-31 August 2015; wave 2: 29 March 2016; wave 3: 12 September 2016; wave 4: 6 February 2017; final wave: 18 September 2017; NCDPC: 27 October 2017; DKK: 29 October 2018; Five new CSDs: 11 September 2023. The migration day of 11 September 2023 is excluded from the statistics reported.

In 2023 T2S settled on average 699,868 transactions per day. Chart 2 shows the change in daily average T2S traffic in volume terms. The daily average volume per month ranged from 619,293 transactions (in August) to 785,845 (in December). The highest daily volume settled was on 2 October (1,463,872 transactions) and the lowest was on 3 January (437,796). The maximum was reached because of an exceptionally high volume of corporate actions in the Finnish market, which was supported by additional settlement cycles in T2S. The minimum occurred in a period of lower traffic owing to seasonality; the closure of the German stock market on 31 December was a key driver for the volumes settled two business days later. Overall, the number of transactions settled in T2S on a daily average basis in 2023 was slightly lower than in 2022 (707,879).

Chart 2

Volumes of T2S transactions settled in 2023

(number of transactions in thousands, daily averages)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

1.1.1 Night-time settlement and real-time settlement

In T2S, the new business day starts at 18:45 CET with preparation for night-time settlement (NTS). NTS processing starts at 20:00 CET and is on average completed before 22:00 CET. It consists of two cycles: the first cycle is subdivided into five sequences and the second cycle into four sequences. Within each sequence, a pre-defined set of transaction or instruction types is settled. At the end of the second cycle, T2S submits for partial settlement all eligible transactions for which settlement failed during an earlier attempt made the same evening.

Once NTS ends, there is a short preparation period for real-time settlement (RTS), followed by the actual RTS phase. RTS is concluded at 18:00 CET, although it may be interrupted by the optional maintenance window which, when activated, starts at 03:00 CET and ends at 05:00 CET. The mandatory weekly maintenance window is activated every weekend from Saturday 02:30 CET to 02:30 CET on Monday. During the maintenance window T2S is closed for all settlement activities.

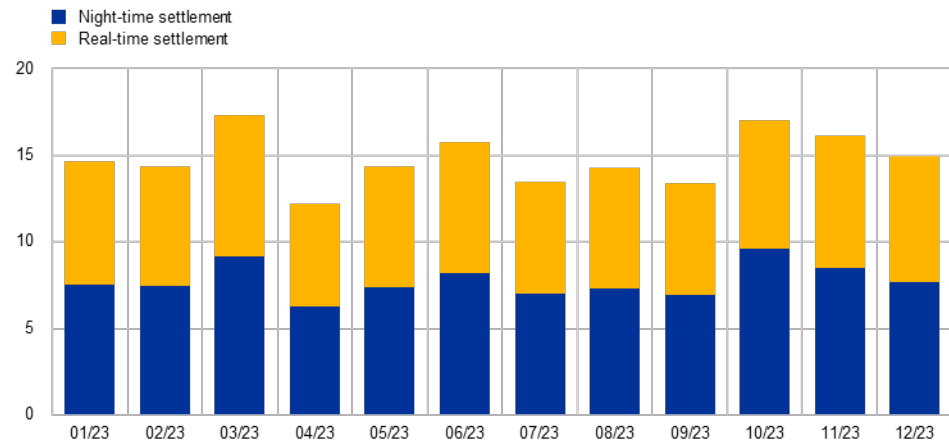
RTS includes five partial settlement windows at 08:00 CET, 10:00 CET, 12:00 CET, 14:00 CET and 15:30 CET. In each of these T2S partially settles new settlement instructions arriving in T2S that are eligible for partial settlement, as well as previously unprocessed or partially processed settlement instructions that are likewise eligible. The first and the last partial settlement windows have a duration of 30 minutes each, while the others have a duration of 15 minutes each. The RTS closure period starts with the delivery versus payment (DVP) cut-off, which is harmonised at 16:00 CET for all currencies.

Although monthly traffic ranged between 12,164,431 and 17,314,155 transactions in 2023, there was little variation in the share of the total volume settled in NTS and RTS each month. Chart 3 shows the breakdown of total monthly volumes by NTS

and RTS. NTS accounted for 52.35% of the overall volume (7,755,423 transactions on average each month), while RTS accounted for 47.65% (7,058,459), which is in line with the 2022 statistics (52.52% and 47.48% respectively). In absolute terms, monthly volumes settled in NTS peaked in October, at 9,604,061 transactions, while the monthly volumes settled in RTS peaked in March, at 8,191,677 transactions. Similarly, in percentage terms, the peak volume settled in NTS was seen in October (56.32%), while the peak volume settled in RTS was seen in August (48.65%). In volume terms, DVP transactions, which account for the majority of the T2S traffic, were largely settled during the NTS cycles (62.63%), in line with 2022.

Chart 3
NTS and RTS volumes in 2023

(number of transactions in millions, monthly totals)



Source: T2S.
Note: The migration day of 11 September 2023 is excluded from the reported statistics.

1.1.2 Settlement volume by transaction type

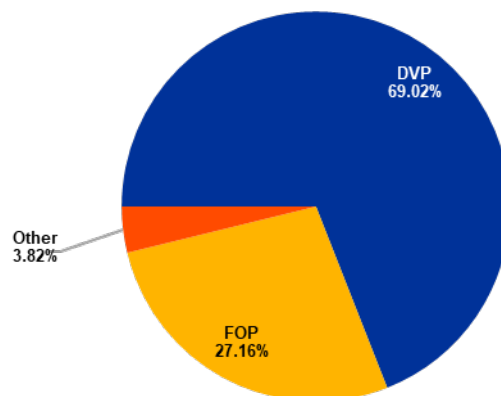
Five transaction categories make up T2S volumes: DVP, free-of-payment (FOP), payment-free-of-delivery (PFOD), settlement restrictions on securities (SRSE) and delivery-with-payment (DWP).⁴ Chart 4 displays total T2S traffic broken down by transaction type.

⁴ Liquidity transfers are excluded from the statistics reported, following the changes to the T2S statistical framework. See Box 1 of the T2S Annual Report 2019 for further details.

Chart 4

Settlement volume by transaction type in 2023

(percentages, yearly totals)



Source: T2S.

Note: The category "Other" includes PFOD, SRSE and DWP. The migration day of 11 September 2023 is excluded from the statistics reported.

In 2023 DVP and FOP transactions were the largest contributors to T2S traffic, together representing around 96.18% of the total settled volume, compared with 96.13% in 2022. DVP transactions accounted for most of the total T2S volumes, with 69.02% (corresponding to a daily average of 483,080 transactions). FOP transactions represented 27.16% of the total T2S volumes (corresponding to a daily average of 190,063 transactions). PFOD transactions, SRSE transactions and DWP transactions together accounted for 3.82% of the total volumes (corresponding to a daily average of 26,725 transactions). The percentage contribution of each transaction type relative to the overall volume is consistent with the pattern observed in previous years.

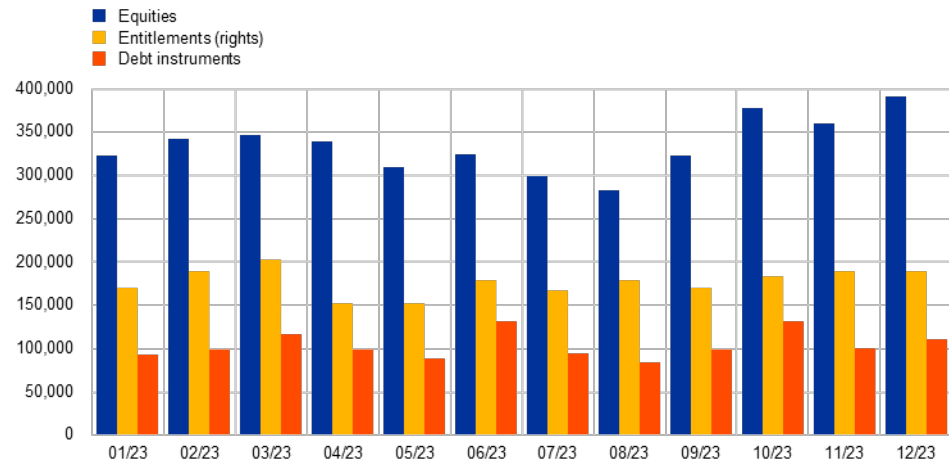
1.1.3 Settlement volume by transaction category

The three largest securities categories contributing to T2S traffic in terms of volume are equities, entitlements (rights) and debt instruments. Chart 5 shows the daily average volume settled for each of these three categories. In line with previous years, in 2023 equities represented the largest share of overall T2S traffic, with a daily average volume of 334,270 transactions (47.76%), followed by entitlements (rights) with 177,438 transactions (25.35%) and debt instruments with 104,159 transactions (14.88%). The remaining share (12.01%) is attributable to other types of securities. In 2022 the weight of equities and entitlements (rights) was higher (48.68% and 28.22% respectively), whereas the weight of debt instruments was lower (10.69%).

Chart 5

Volume by securities category in 2023

(number of transactions, daily averages)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

The daily average volume of equity transactions in 2023 ranged between a low of 282,265 (in August) and a high of 391,905 (in December). The daily average volume of entitlements (rights) ranged between 152,855 transactions (in May) and 202,898 (in March). The daily average volume of debt instruments ranged between 84,469 transactions (in August) and 132,058 (in October). Throughout the year, equities consistently accounted for the largest volume, followed by entitlements and then debt instruments.

1.2 Value of settlements in T2S

Chart 6 shows the variation in the value settled in T2S and settlement efficiency at end of day since the first migration wave was completed in 2015. Following the migration waves, monthly total T2S settled values increased from €10.14 trillion in September 2015 to €19.14 trillion in October 2017. Between November 2018 and December 2019, total T2S settled values averaged €22.98 trillion per month. The introduction of the new T2S statistical framework considerably affected settled values, which dropped to €14.76 trillion in January 2020 (i.e. a decrease of 32.38% compared with December 2019).⁵ Like volumes, values increased notably in March 2020, reaching €16.74 trillion. Compared with 2020, average monthly volumes were 3.16% higher in 2021. In March 2021 values reached a new peak, standing at €17.06 trillion, higher than at the outbreak of the COVID-19 pandemic. Average monthly values reached €15.35 trillion in 2022 and €16.73 trillion in 2023, with a new peak at €19.21 trillion in March 2023.

Settlement efficiency in value terms averaged 97.52% between November 2018 and December 2019, largely in line with the average of 97.95% observed between

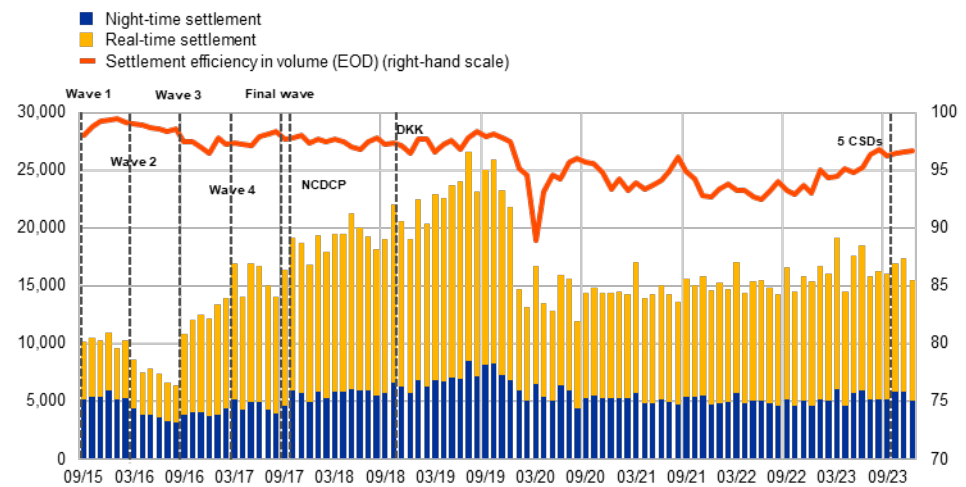
⁵ See Box 1, “Changes in the T2S statistical framework” in the [T2S Annual Report 2019](#).

September 2015 and October 2018. Following the methodological changes, the decrease in settlement efficiency between December 2019 and January 2020 was slightly larger in value terms than in volume terms (-2.33 percentage points compared with -1.73 percentage points). In line with volumes, settlement efficiency in value terms also dropped, falling to 88.95% in March 2020. Since mid-2022 settlement efficiency in value has followed an increasing trend, rising from 93.29% in July 2022 to 96.77% in December 2023.

Chart 6

Variation in value settled in T2S and settlement efficiency at end of day

(left-hand scale: monthly totals, EUR billions; right-hand scale: settlement efficiency, percentages)



Source: T2S.

Notes: Migration wave 1: 22 June-31 August 2015; wave 2: 29 March 2016; wave 3: 12 September 2016; wave 4: 6 February 2017; final wave: 18 September 2017; NCDPC: 27 October 2017; DKK: 29 October 2018; Five new CSDs: 11 September 2023. The migration day of 11 September 2023 is excluded from the statistics reported.

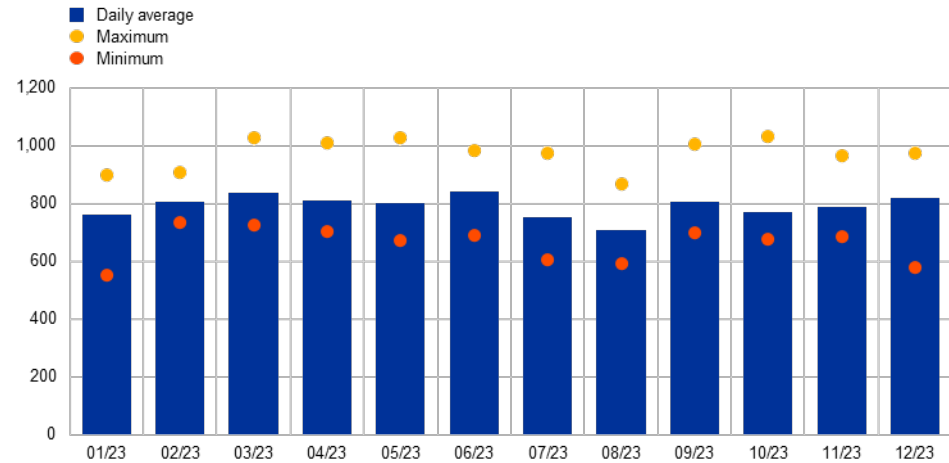
In 2023 T2S settled an average of €790.34 billion per day. Chart 7 shows the variation in daily average T2S traffic in value terms.⁶ The daily average value ranged from €708.24 billion (in August) to €842.92 billion (in June). The highest daily value was recorded on 2 October (€1,032.19 billion), owing to an exceptionally high volume of corporate actions in the Finnish market, and the lowest on 3 January (€553.83 billion), because of seasonal effects, in line with the daily average volume. Overall, the daily average value settled in T2S in 2023 was higher than in 2022 (€716.67 billion).

⁶ From 29 October 2018 all the charts related to settled value include transactions settled in Danish kroner. The traffic in Danish kroner is converted into euro at an exchange rate of DKK 1 to EUR 0.13.

Chart 7

Values of settled T2S transactions in 2023

(EUR billions)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

Comparing Chart 7 with Chart 2, the highest daily traffic is seen in different months for volume (December) and value (June). This is not the case for the lowest daily traffic (which was recorded in August for both volume and value). There is also lower fluctuation across the different months in the values of transactions compared to volumes.

1.2.1 Night-time settlement and real-time settlement

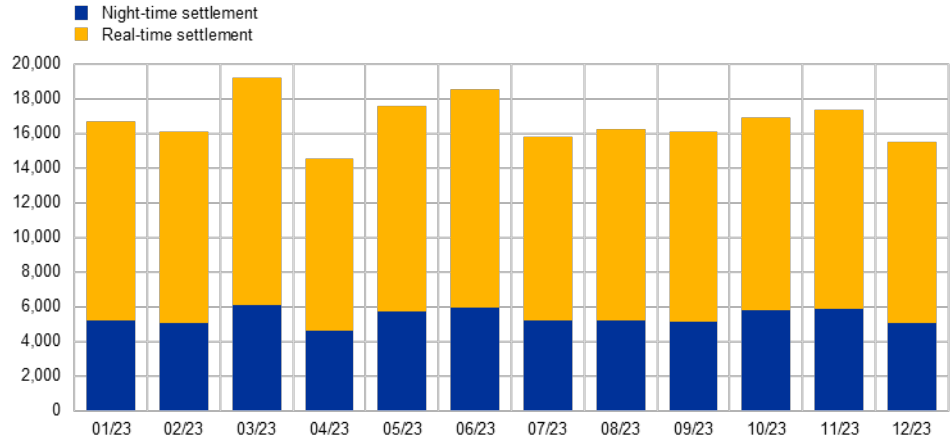
In 2023 T2S settled transactions with an average monthly value of €16.73 trillion. Chart 8 depicts the breakdown of total monthly traffic in terms of value by NTS and RTS. On average, RTS accounted for 67.61% of overall traffic in value terms in 2023 (€11.31 trillion per month), compared with 32.39% settled in NTS (€5.42 trillion). This compares with 67.56% settled in RTS and 32.44% in NTS in 2022. As shown in Chart 3, settlement was more evenly balanced between RTS and NTS in volume terms (47.65% and 52.35% respectively). This indicates that, in line with previous years, the RTS phases were more value-intensive than volume-intensive and featured transactions with a higher average value than in the NTS cycles. By contrast, the NTS cycles were more volume-intensive than value-intensive.

In absolute terms, the monthly values settled in NTS and RTS in 2023 both peaked in March, at €6,109.78 billion and €13,098.58 billion respectively. As a percentage of the total monthly value, the peak value settled in NTS was in October (34.41%), while the peak value settled in RTS was in January (68.91%). 67.89% of the total value of DVP transactions, which represented the majority of overall T2S traffic, was settled in RTS.

Chart 8

Night-time settlement and real-time settlement in 2023

(EUR billions, monthly totals)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

1.2.2

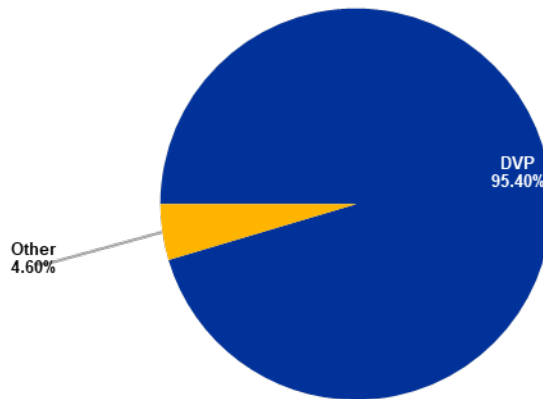
Settlement value by transaction type

Three transaction categories make up settlement values in T2S, namely DVP, DWP and PFOD, compared with five categories for volumes.⁷ Chart 9 illustrates the total value settled in T2S by transaction type in 2023.

Chart 9

Settlement value by transaction type in 2023

(percentages, yearly totals)



Source: T2S.

Notes: The category "Other" includes PFOD and DWP. The migration day of 11 September 2023 is excluded from the statistics reported.

DVP transactions were on average the largest contributor to T2S traffic, accounting for 95.40% (corresponding to a daily average of €753.97 billion), compared with

⁷ As SRSE and FOP transactions do not imply a cash movement on a dedicated cash account, these two transaction types do not contribute to the calculation of value-based statistics. Moreover, liquidity transfers are excluded from the statistics reported, following the changes to the T2S statistical framework. See Box 1 of the T2S Annual Report 2019 for further details.

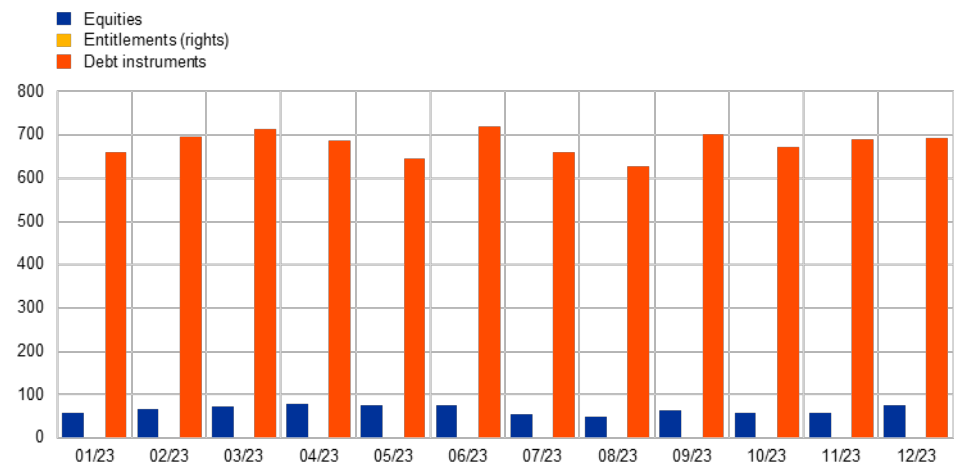
95.44% in 2022. PFOD and DWP transactions together accounted for only 4.60% (corresponding to a daily average of €36.37 billion) of the total value settled, compared with 4.56% in 2022.

1.2.3 Settlement value by transaction categories

As in the case of volumes, the three largest securities categories contributing to T2S traffic in terms of value are equities, entitlements (rights) and debt instruments. Chart 10 shows the daily average value settled for these three types of securities in 2023. Debt instruments were by far the largest securities category in overall T2S traffic in value terms, with a daily average of €679.93 billion (86.03%), followed by equities with €65.56 billion (8.30%) and entitlements (rights) with €0.98 billion (0.12%). The remaining share (5.55%) is attributable to other types of securities. In 2022 the weight of debt instruments was slightly lower (84.02%), whereas the weights of equities and entitlements (rights) were slightly higher (9.21% and 0.17% respectively).

Chart 10
Value by securities category in 2023

(EUR billions, daily averages)



Source: T2S.

Notes: Owing to the much lower values of entitlements (rights) settlements compared with the other two categories, such amounts are barely visible on the chart. The migration day of 11 September 2023 is excluded from the statistics reported.

In contrast to Chart 5, where equities are the largest securities category in volume terms, in Chart 10 they are the second largest in value terms, while debt instruments are by far the largest category in value terms but only the third largest in volume terms. This suggests that equity transactions have a much lower average value than debt instrument transactions. Like equities, entitlements (rights) contribute more to settlement volumes than to values.

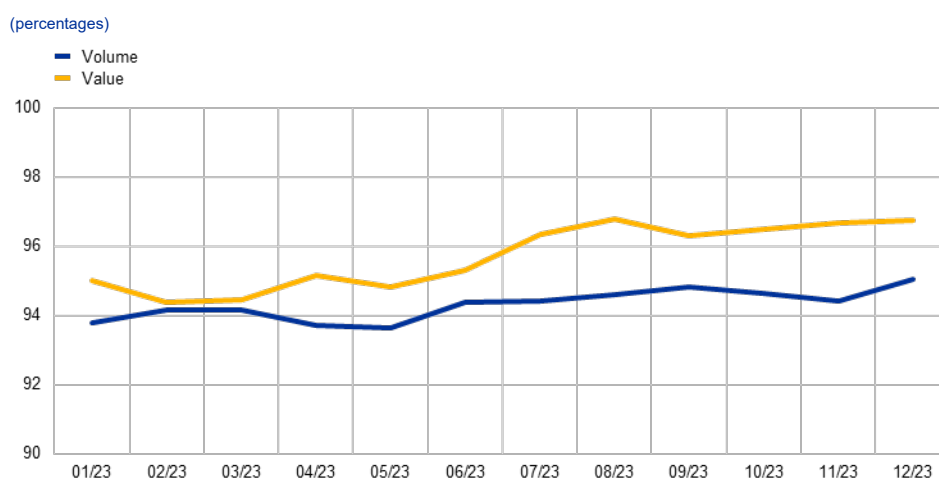
1.3 Settlement efficiency

Settlement efficiency in T2S is measured as the efficiency of its participants and their behaviour in the platform.⁸ It compares the volume (or value) of transactions that are settled on a given day with the total volume (or value) of transactions eligible for settlement on that day.

Charts 11 and 12 show the variations in settlement efficiency in T2S in 2023, at end of day and after NTS respectively.

Chart 11

Settlement efficiency at end of day in 2023



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

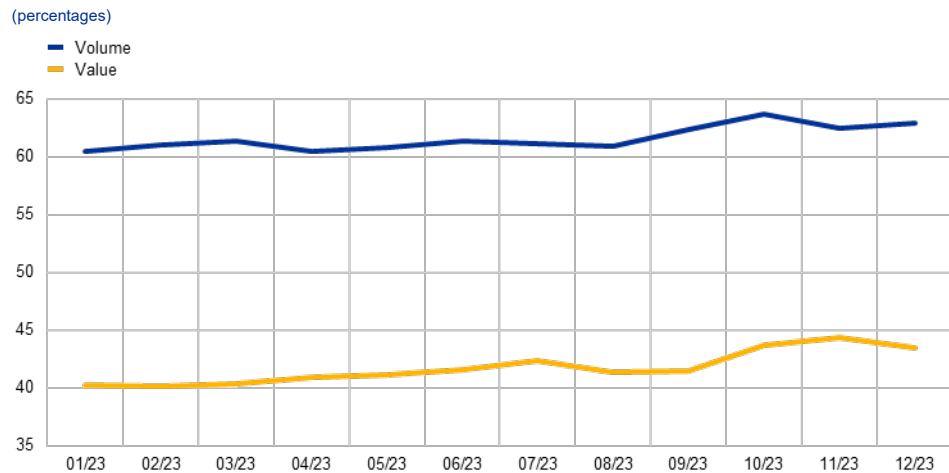
In 2023 settlement efficiency at end of day reached on average 94.32% in volume terms and 95.71% in value terms. Compared to 2022, when it averaged 93.74% in volume terms and 93.29% in value terms, settlement efficiency was higher in 2023. In 2023 settlement efficiency in volume terms ranged between 93.65% and 95.03%, as illustrated in Chart 11. In value terms, it displayed more volatility, ranging between 94.38% and 96.80%. The minimum level was reached in May in volume terms and in February in value terms. Conversely, the maximum level was reached in December in volume terms and in August in value terms.

In 2023 average settlement efficiency after NTS reached 61.59% in volume terms and 41.77% in value terms (Chart 12), compared with a higher level of 64.20% in volume terms and a lower level of 38.65% in value terms in 2022. In line with end of day, settlement efficiency after NTS displayed more volatility in value than in volume terms. The minimum level was reached in April in volume terms (60.49%) and in

⁸ Until December 2019 settlement efficiency was computed in terms of platform settlement efficiency, i.e. the ability of the T2S platform to process transactions. It comprised all settlement activities, including those automatically generated by T2S. Since January 2020 settlement efficiency has been computed in terms of market settlement efficiency, which aims to capture the behaviour of T2S participants. As a consequence, it excludes transactions that are internally generated by T2S, transactions related to corporate actions and liquidity transfers from the calculation. It does, however, include party-on-hold transactions.

February in value terms (40.20%), whereas the maximum level was reached in October in volume terms (63.68%) and in November in value terms (44.33%).

Chart 12
Settlement efficiency after NTS in 2023



Source: T2S.
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

At the end of 2023 settlement efficiency was between 1 and 2 percentage points higher in value, and between 2 and 3 percentage points higher in volume. It is important to emphasise that settlement efficiency is in line with market expectations and its trend is discussed with the key stakeholders via dedicated market settlement efficiency (MSE) workshops (see Box 2).

Box 2
Market settlement efficiency workshops

Settlement efficiency remains a key topic for the T2S community, with dedicated workshops being organised under the remit of the T2S CSD Steering Group (CSG). The group held two market settlement efficiency (MSE) workshops in 2023. The first discussed a set of indicators on T2S settlement efficiency in line with the requirements of the CSD Regulation (CSDR) and use of partial settlement. The second focused on specific points that emerged during the first workshop.

At each workshop, three main measures of settlement efficiency in T2S are presented, as a way of monitoring and comparing trends from different perspectives. The first measure looks at the platform’s ability to process transactions and aims to determine whether T2S is performing as expected from an operational perspective; it therefore covers all settlement activities. The second measure aims to capture the behaviour of T2S participants, i.e. the market. It therefore excludes certain types of transactions that are not the result of settlement activities, such as those automatically generated by T2S. The third measure was developed in 2020 specifically to support CSDs in their preparations for the CSDR settlement discipline regime and the entry into force of the penalty mechanism. It was designed following the CSDR guidelines on which transactions count as settlement fails.⁹ Typically, the settlement efficiency of the platform is the highest and most stable of

⁹ Please note that, since FOP transactions do not imply a cash movement on a dedicated cash account, the indicator in value is not fully aligned to the CSDR guidelines.

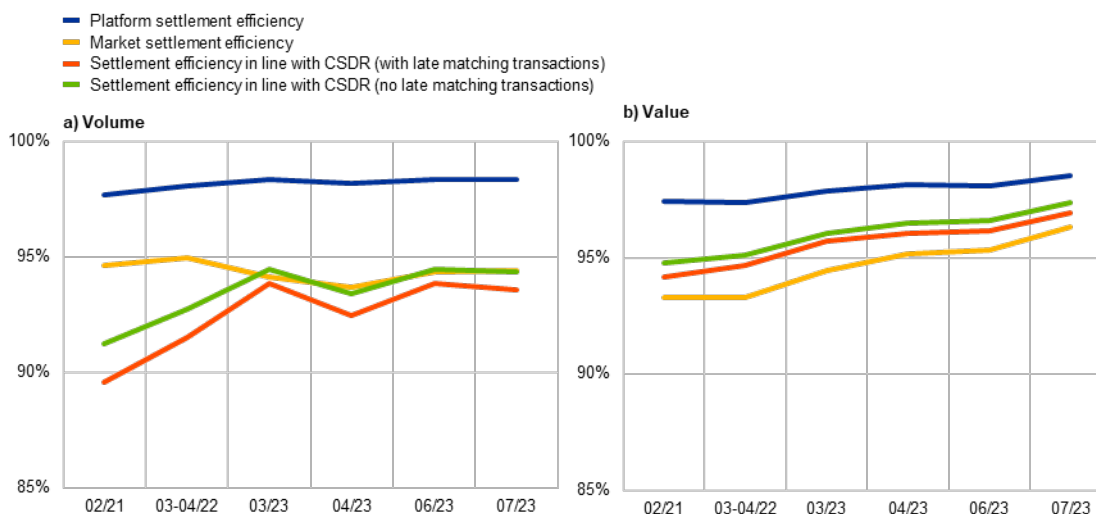
the three measures, suggesting that settlement fails are most likely driven by market behaviour. Between 2021 and 2023 the platform's settlement efficiency stood on average at 98.2% in volume terms and 97.9% in value terms (Chart A, both panels). The market settlement efficiency and CSDR-like settlement efficiency are closer and more volatile, as they cover slightly different sets of transactions.

Between 2021 and 2023 the CSDR-like settlement efficiency visibly improved. The indicator including late matching transactions (i.e. transactions that are matched after their intended settlement day) improved by 4.0 percentage points in volume, increasing from 89.6% in February 2021 to 93.6% in July 2023 (Chart A, panel A). When excluding late matching transactions from the fails (Chart A, panel A), the indicator stood at a higher level of 91.3% in February 2021, and improved by 3.1 percentage points. The gap between the two indicators narrowed over time, from 1.7 percentage points to 0.8 percentage points. In value terms, the CSDR-like settlement efficiency with late matching transactions improved steadily by 2.8 percentage points, from 94.2% in February 2021 to 97.0% in July 2023 (Chart A, panel B). The gap between the indicator with and without late matching transactions was smaller in value than in volume, hovering around 0.4 percentage points (Chart A, panel B). The general improvement in the CSDR-like indicators appears to be connected to a contraction in the amount of transactions set on-hold (and thus unsettled at the end of the day) by participants in the system.

Chart A

T2S average settlement efficiency

(percentages)



Source: T2S.

Note: The statistics reported for 2022 are calculated as a mean of the observations in March and April.

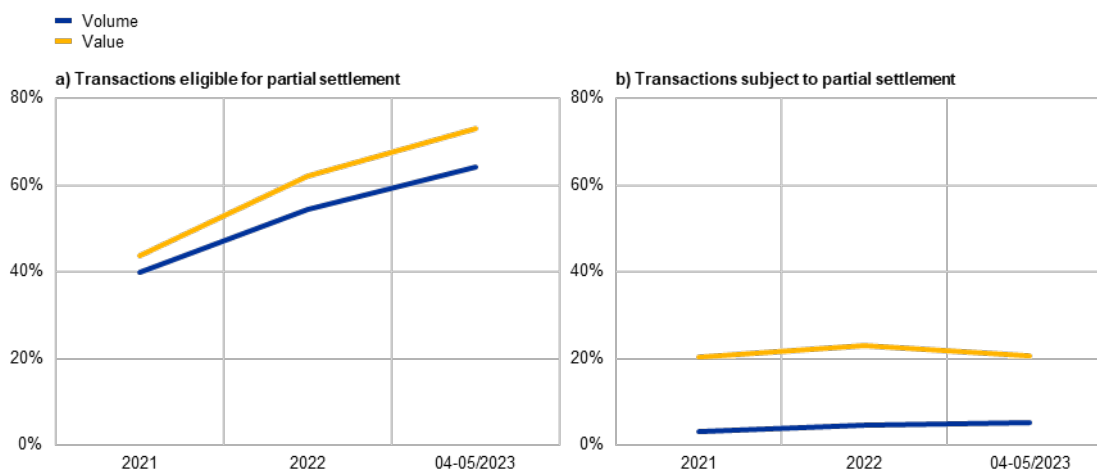
Although the share of transactions that are in principle eligible for partial settlement in T2S has increased over time, only a minority is subject to partial settlement. The share of transactions that were set as eligible for partial settlement by both counterparties stood at 39.8% in volume and 43.9% in value in 2021. By 2023 it had steadily increased to 64.3% and 73.1% respectively. At the same time, only a fraction of all settled transactions was actually subject to partial settlement, with a more significant share in value than in volume. On average, between 2021 and 2023, 4.2% of settled transactions in volume and 21.4% in value were subject to partial settlement. Additional investigations revealed that in most cases transactions ineligible for partial settlement were flagged

as such by both sides, with no notable differences between buying and the selling institutions. Use of partial settlement is seen as a valid way of enhancing settlement efficiency.

Chart B

Partial settlement in T2S

(percentages)



Source: T2S.

Overall, T2S works well when resources are available, and fails are likely driven by market behaviour. While the settlement efficiency of the platform remains high, the CSDR-like settlement efficiency has improved in recent years. This suggests that the entry into force of the penalty mechanism has had a positive medium-term effect, although it is acknowledged that other market conditions and factors may have also played a role. CSDs continue to make efforts to educate and promote best practices such as use of partial settlement in their markets to further improve settlement efficiency. The MSE workshops will continue to provide a forum where the T2S operator and the market can discuss this key topic.

1.4 Unsettled transactions

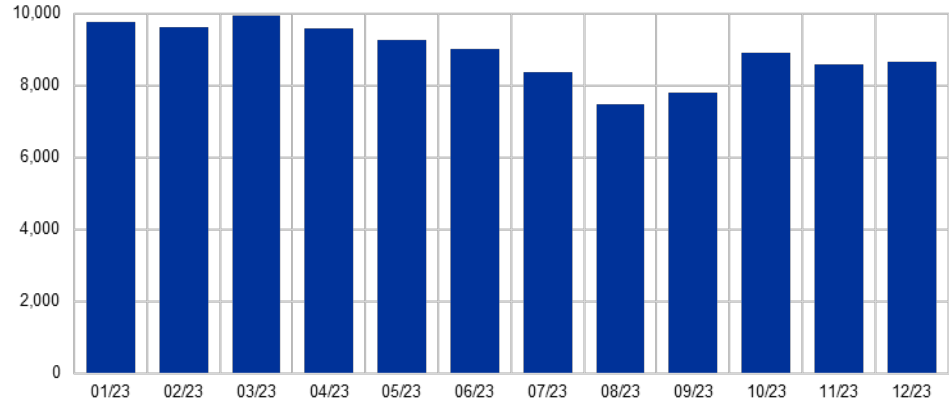
Not all transactions submitted for processing in T2S are settled on the intended settlement day. This may be because the resources (cash and/or securities) needed for settlement are not available, or because one of the two instructions underlying the transaction is set to on-hold or the instruction is submitted late. This section focuses on the first case; it does not look at transactions set on-hold or submitted late. Unsettled transactions have a negative impact on settlement efficiency (see Section 1.3).

Chart 13 illustrates the daily average volume of unsettled transactions in T2S at the end of day in 2023. The calculations comprise DVP, DWP, PFOD, FOP and SRSE transactions.

Chart 13

Volume of unsettled transactions in 2023

(number of transactions, daily averages)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

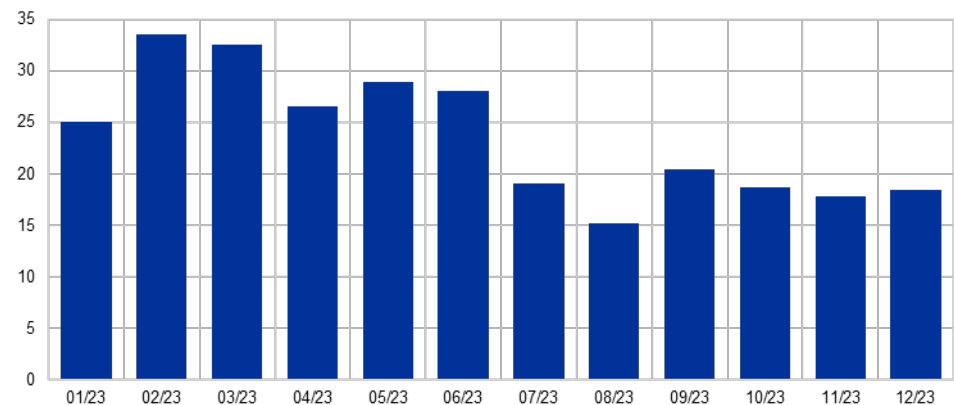
In 2023 the daily average number of unsettled transactions was 8,907, which is lower than the 11,457 transactions reported in 2022. This means that, on a daily average basis, of the total number of transactions processed by T2S, 5.68% were unsettled at the end of day. Unsettled transactions reached a high of 9,937 in March and a low of 7,491 in August. In line with the results observed for settled transactions, DVP and FOP represented around 97.76% of all unsettled transactions in volume terms.

Chart 14 shows the daily average value of unsettled transactions in T2S in 2023. The transaction types contributing to the value are DVP, DWP and PFOD.

Chart 14

Value of unsettled transactions in 2023

(EUR billions, daily averages)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

The daily average value of unsettled transactions in T2S in 2023 ranged between €15.29 billion in August and €33.63 billion in February. These figures are significantly lower than in 2022, when they ranged between €25.24 billion in August and

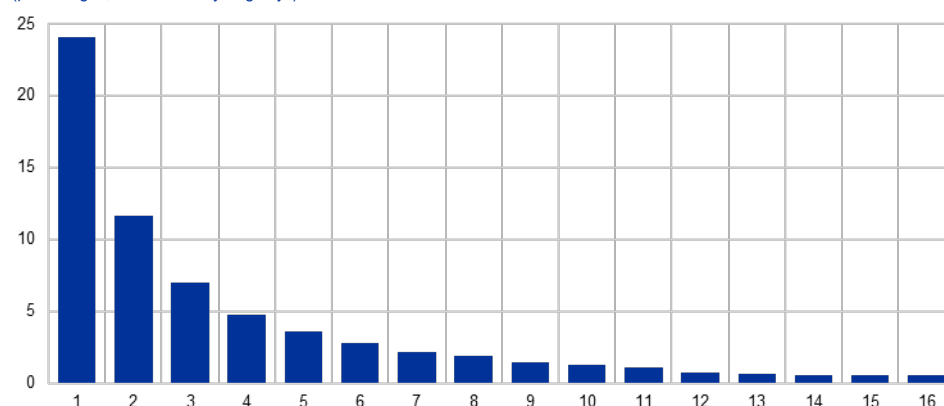
€36.28 billion in September. In 2023 DVP represented 99.27% of all unsettled transactions in value terms, followed by PFOD with 0.73%. Once again, these results reflect the composition of settled traffic in value terms.

At the end of each day, unsettled transactions are not deleted but are instead automatically postponed by T2S (“recycled” in technical terms) to the following business day(s). T2S attempts to recycle them for a period of time referred to as the “recycling period” (set at 60 business days for matched instructions) before they are automatically cancelled. In other words, the recycling period is defined as the number of days during which a transaction remains unsettled. Chart 15 shows the share of unsettled transactions and the recycling days required before settling.

Chart 15

Average unsettled transactions per number of recycling days in 2023

(percentages, number of recycling days)



Source: T2S.

Notes: The maximum recycling period for matched settlement instructions is 60 business days. The migration day of 11 September 2023 is excluded from the statistics reported.

Chart 15 shows that in 2023, on average, 24.06% of unsettled transactions sent for recycling were settled on the following business day (first column) and less than half of those (11.65% in total) were pending for two days before settlement. Only 0.59% were pending for 16 days (last bar). In 2022 these averages stood at 24.62%, 11.78% and 0.80% respectively.

1.5 Penalty mechanism

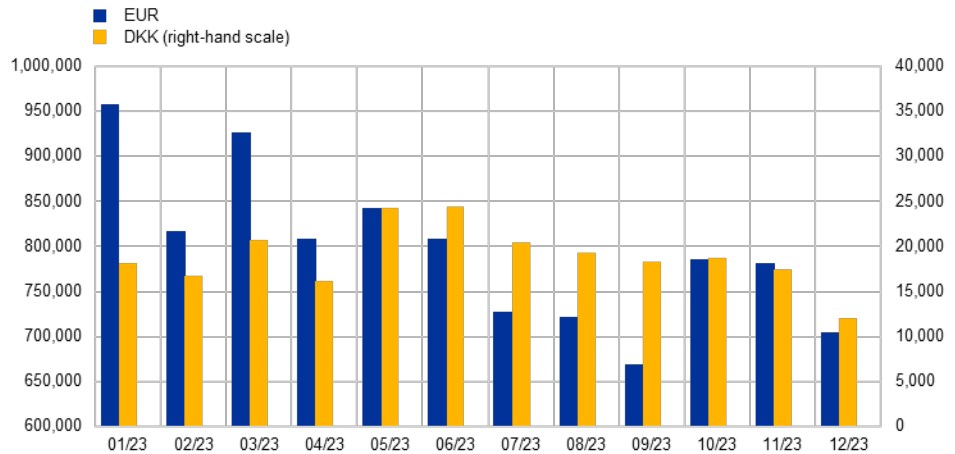
The entry into force of the CSDR settlement discipline regime on 1 February 2022 introduced cash penalties for late matching and settlement fails for trades settled in the EU to promote efficiency. Accordingly, T2S implemented a penalty mechanism that provides for (1) the daily calculation and reporting of cash penalties for settlement fails, and (2) monthly reporting of the aggregated amounts of cash penalties computed for a given month.

In 2023 T2S participants paid an average of 795,654 cash penalties for late matching and settlement fails related to their activity in euro per month (Chart 16). The monthly volume ranged between 668,655 (recorded in September) and 957,690

(in January). The number of cash penalties related to settlement in Danish kroner was significantly lower, in line with its lower contribution to T2S traffic. Cash penalties for settlement in Danish kroner were on average 18,877 and ranged between 12,027 (in December) and 24,461 (in June).

Chart 16
Volume of cash penalties in 2023

(number of transactions related to activities in euro, monthly totals (left-hand scale); number of transactions related to activity in Danish kroner, monthly totals (right-hand scale))

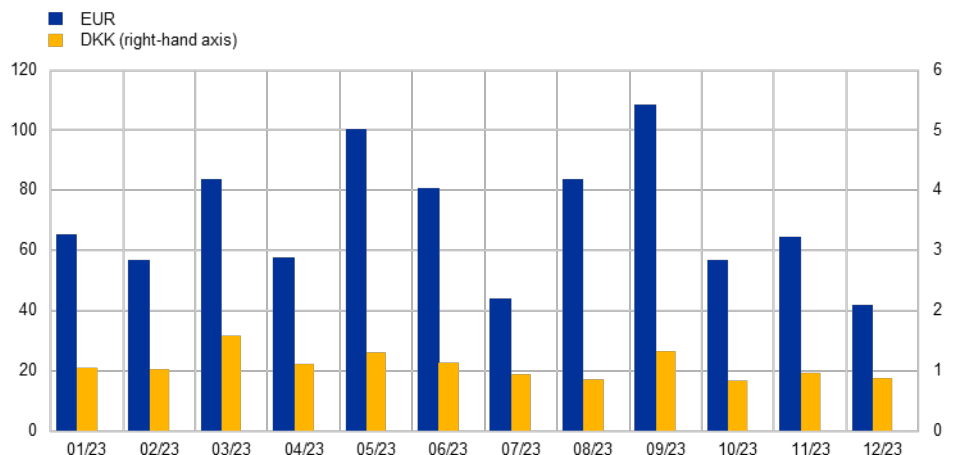


Source: T2S.

In value terms, the cash penalties for settlement in euro amounted to an average of €70.43 million per month in 2023 (Chart 17), ranging between €42.06 million (recorded in December) and €108.70 million (in September). As regards the Danish kroner, the monthly value of the cash penalties was €1.09 million on average, fluctuating between €0.84 million (in October) and €1.60 million (in March).

Chart 17
Value of cash penalties in 2023

(related to activity in euro, EUR millions (left-hand scale); related to activity in Danish kroner, EUR millions (right-hand scale))



Source: T2S.

Note: The values related to activity in Danish kroner is converted into euro at an exchange rate of DKK 1 to EUR 0.13.

The average value of cash penalties can be computed by comparing volumes and values. In 2023 the average value of a cash penalty related to settlement in T2S stood at €88.52 for settlement in euro and €57.87 for settlement in Danish kroner.

1.6 Use of auto-collateralisation in T2S

Auto-collateralisation in T2S is an intraday credit operation granted by a central bank triggered when a T2S dedicated cash account (DCA) holder does not have enough funds to settle securities transactions. Its ultimate purpose is to improve the buyer's cash position and secure the funds necessary to settle the transaction. Auto-collateralisation is an automatic process aimed at facilitating smooth real-time DVP settlement in central bank money.

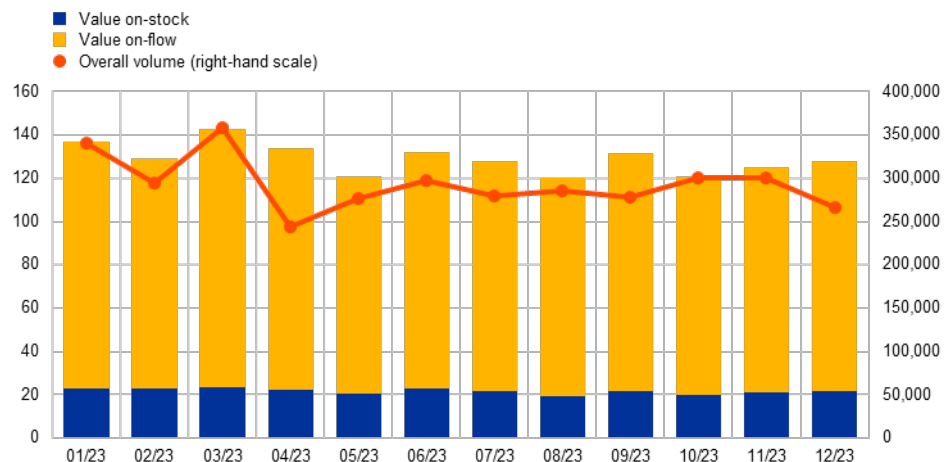
Two types of auto-collateralisation are available in T2S:

- auto-collateralisation on-flow is the use of the securities which are about to be purchased as collateral to secure the credit needed to complete the transaction;
- auto-collateralisation on-stock is the use of other securities already held by the buyer as collateral to complete the transaction.

In 2023 the overall use of auto-collateralisation reached a daily average value of €128.96 billion, compared with €123.90 billion in 2022. Chart 18 shows the daily average value of auto-collateralisation per month, broken down by type. The daily average use of auto-collateralisation ranged between €120.16 billion in August and €142.92 billion in March. The use of auto-collateralisation largely follows a similar pattern to that observed for daily DVP transactions settled throughout the year.

Chart 18
Auto-collateralisation use by type in 2023

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



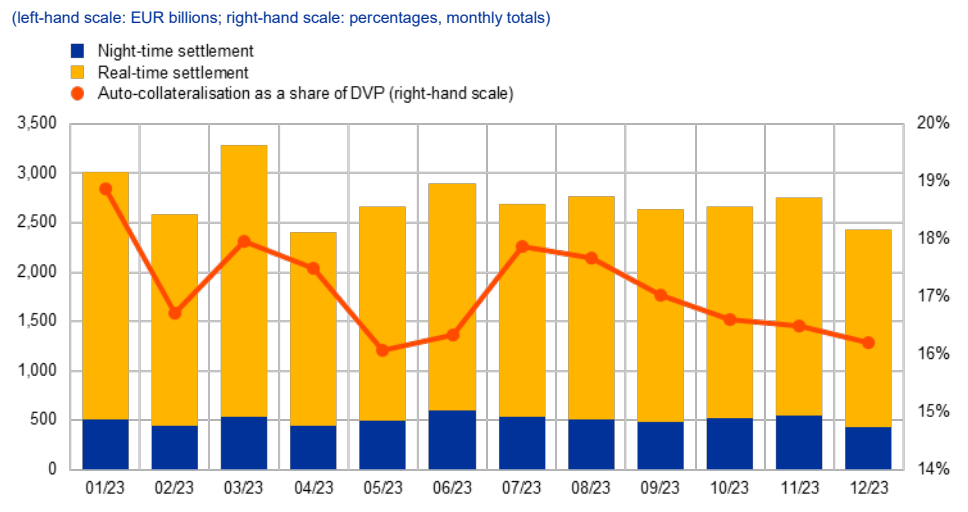
Source: T2S.

Notes: The chart shows use of auto-collateralisation by national central banks. The migration day of 11 September 2023 is excluded from the statistics reported.

On average, 83.23% of the total value of auto-collateralisation was represented by auto-collateralisation on-flow (corresponding to €107.33 billion) and 16.77% by auto-collateralisation on-stock (corresponding to €21.62 billion). As in 2022, the use of auto-collateralisation on-stock remained relatively stable in 2023. By contrast, the use of auto-collateralisation on-flow displayed a more volatile pattern, reaching a peak of €119.43 billion in March. The total monthly number of auto-collateralisation transactions ranged between 244,439 (in April) and 357,638 (in March).

In 2023 the overall use of auto-collateralisation on a monthly basis ranged between €2,405.98 billion in April and €3,287.21 billion in March. Chart 19 shows the monthly total value of auto-collateralisation, broken down by RTS and NTS, and the value of auto-collateralisation as a share of DVP transactions.

Chart 19
Night-time and real-time use of auto-collateralisation in 2023



Source: T2S.
Notes: The chart shows use of auto-collateralisation by national central banks. The migration day of 11 September 2023 is excluded from the statistics reported.

On average, 18.50% of monthly total auto-collateralisation transactions took place during NTS (corresponding to €504.94 billion) and 81.50% during RTS (€2,224.62 billion) in 2023. This compares to 15.81% and 84.19% respectively in 2022. The use of auto-collateralisation in NTS and RTS follows a similar pattern to that of the daily average value of transactions settled in T2S (Chart 8). Auto-collateralisation use during NTS peaked in June (at €599.82 billion), while its use during RTS peaked in March (at €2,747.06 billion).

In 2023 the value of auto-collateralisation as a share of DVP transactions stood on average at 17.10%, with a peak at 18.88% in January. This represents a slight decrease compared with 2022, when auto-collateralisation as a share of DVP transactions averaged 18.11%.

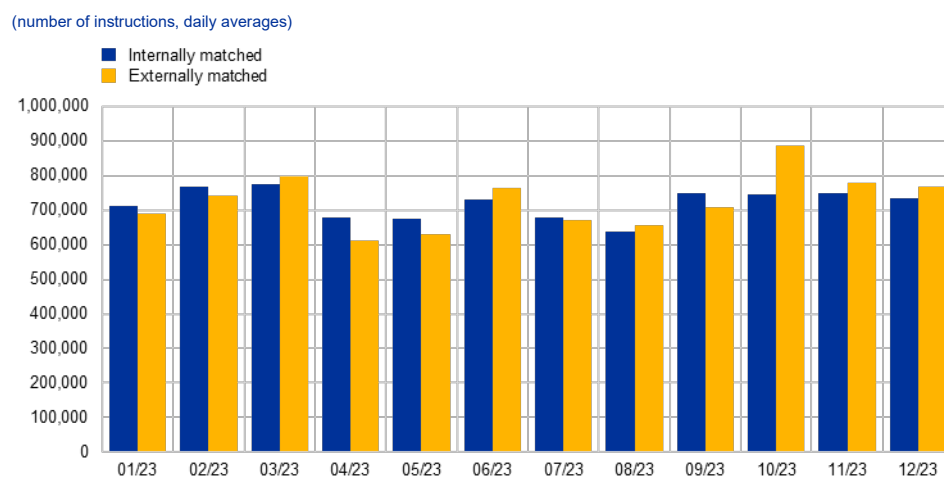
1.7 Other aspects related to settlement in T2S

1.7.1 Internally and externally matched settlement instructions

In order to settle a securities transaction, the delivering and receiving parties provide the necessary details in the form of settlement instructions. The two settlement instructions have to be compared to ensure that both parties agree on the terms of the transaction. If the comparison is successful, the two settlement instructions are matched, generating a new settlement transaction in T2S. This process can take place either inside T2S in the module performing the validation and matching of individual settlement instructions (life cycle management and matching – LCMM) or outside T2S, such as within a CSD. In the first case, the settlement instructions are defined as internally matched. In the second case, they are referred to as externally matched.

In 2023, on average 718,751 settlement instructions were matched daily in T2S, compared with an average of 724,859 daily settlement instructions matched outside T2S. This represents an increase of 2.00% and a decrease of 6.68% respectively compared with 2022. Chart 20 compares the daily average number of instructions internally and externally matched each month.

Chart 20
Internally and externally matched settlement instructions in 2023



Source: T2S.
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

Overall, 49.79% of settlement instructions were internally matched, while 50.21% were already matched when they reached T2S.

1.7.2 Intra-CSD, cross-CSD and external-CSD settlement

Investors can access different markets linked to T2S through multiple technical channels. Depending on the number of CSDs involved, it is possible to distinguish between intra-CSD, cross-CSD and external-CSD traffic.

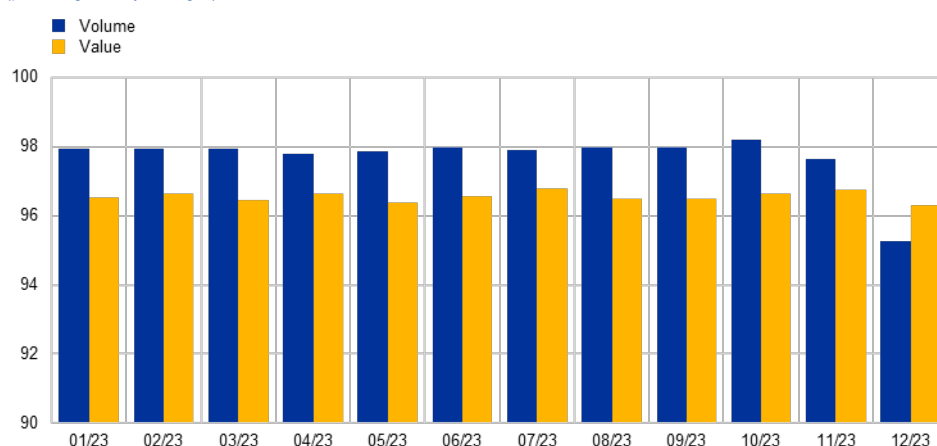
- Intra-CSD traffic refers to securities transfers where the delivering and receiving parties belong to the same CSD;
- Cross-CSD traffic takes place when the delivering and receiving parties belong to different CSDs;
- External-CSD traffic occurs when the delivering and receiving parties belong to different CSDs, one of which is not in T2S.

In T2S, intra-CSD transactions represent the majority of all transactions settled in terms of both volume and value.

As illustrated in Chart 21, in 2023 the daily average volume of intra-CSD transactions represented 97.69% of total T2S settlement volume (compared with 98.20% in 2022), while the daily average value of intra-CSD settlement represented 96.55% of the total T2S settlement value (compared with 96.37% in 2022). Intra-CSD settlement was stable in both volume and value terms until November and then dropped in value terms to 95.26% in December 2023. The fall was due to a reorganisation of clearing activities via one of the CSDs, which resulted in a part of the traffic that was previously considered intra-CSD being reclassified as cross-CSD.¹⁰

Chart 21
Intra-CSD settlement in 2023

(percentages, daily averages)



Source: T2S.

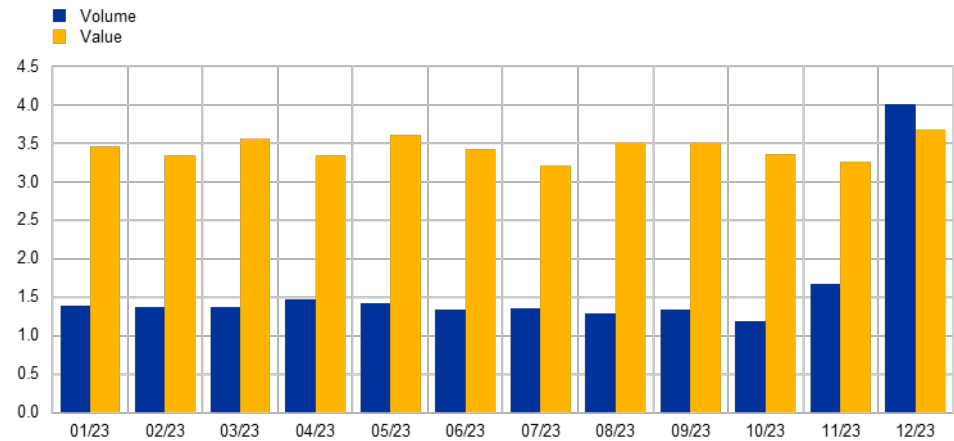
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

¹⁰ Please see the relevant [press release](#) published on the Euronext website.

Only a small percentage of settlements is attributable to cross-CSD traffic. Chart 22 shows the share of cross-CSD transactions compared with total value and volume of all transactions settled in terms of daily average volume and value in 2023.

Chart 22
Cross-CSD settlement in 2023

(percentages, daily averages)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

In 2023 the daily average volume of cross-CSD settlement transactions represented 1.61% of total T2S settlement volume (1.25% in 2022), while the daily average value of cross-CSD settlement transactions represented 3.45% of total T2S settlement value (3.63% in 2022). The drop in intra-CSD value observed in December 2023 was mirrored by an increase in cross-CSD value, where the share reached 4.01%, for the reason outlined above.

Considering that intra-CSD and cross-CSD transactions together accounted for 99.30% of total volume and 100.00% of total value, the share of external-CSD settlement was negligible in 2023, in line with 2022.

1.8 Interaction between T2S and connected RTGS systems

At the start of each day, liquidity in euro and Danish kroner is sent from the accounts of connected RTGS systems to the DCAs in T2S. In the case of the euro, until the launch of T2-T2S consolidation on 20 March 2023 any remaining liquidity had to be returned from T2S to the corresponding RTGS accounts towards the end of RTS. Since that date, however, it can also be left in T2S overnight. In the case of the Danish kroner, all liquidity has to be repatriated back to the RTGS system at the end of the day. During the day, liquidity can be freely transferred from the RTGS systems to T2S and vice versa.

Box 3

T2-T2S consolidation

The Eurosystem embarked on a significant project to consolidate the TARGET2 and T2S platforms, aligning both their technical and functional aspects to meet evolving market demands. The primary objective was to replace TARGET2 with a more advanced real-time gross settlement (RTGS) system called T2, while also optimising liquidity management across all TARGET Services.

Initiated in December 2017 and launched in March 2023, the consolidation aimed to harmonise and integrate TARGET services, enhancing efficiency, safety, and adaptability in European payments amidst technological advancements, regulatory changes and shifting consumer preferences. It facilitated the adoption of the ISO 20022 message standard for T2, which had already been in use by T2S since its inauguration, and introduced common components shared by the TARGET services to facilitate harmonisation and cost savings. The system is also designed to accommodate payments in multiple currencies.

The migration to T2 passed without any notable issues and continued to operate smoothly on the day of its inauguration. A minor delay in closure was addressed promptly. This issue aside, the system's performance served as a testament to its reliability and resilience. The collaborative effort between the four national central banks serving as service providers for TARGET services throughout the project – the Deutsche Bundesbank, Banco de España, Banque de France and Banca d'Italia – was remarkable.

The initiative reflects the Eurosystem's commitment to modernising market infrastructure to ensure it is resilient, adaptable and aligned with participants' needs. By leveraging advanced technologies and collaborative efforts, the consolidation of T2 and T2S aims to further enhance the efficiency and effectiveness of Europe's financial markets so they remain future-proof and responsive to evolving demands.

1.8.1 Interaction between T2S and the TARGET Services

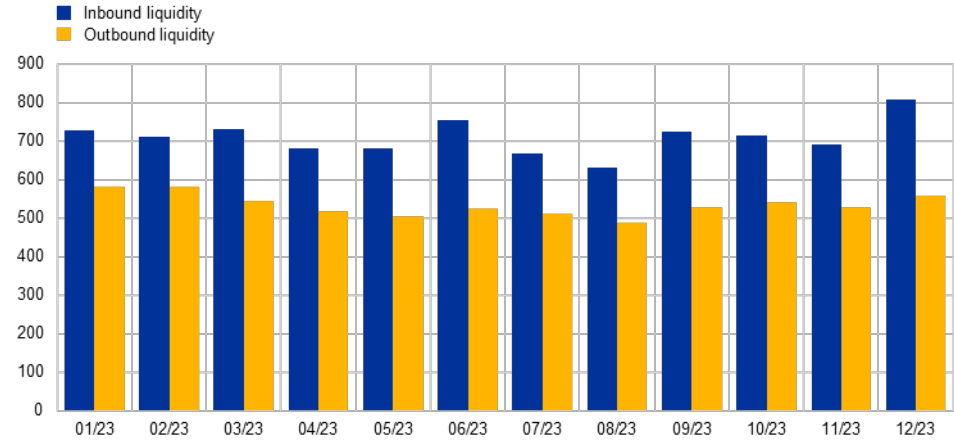
Inbound liquidity transfers are transfers from the T2 CLM and RTGS accounts or TIPS DCAs to the T2S DCAs, while outbound liquidity transfers are transfers from the T2S DCAs to the T2 CLM and RTGS accounts or TIPS DCAs.

Chart 23 shows the daily average volumes of liquidity to and from T2S DCAs in 2023. The daily average volume of inbound liquidity transfers was 710, while the daily average volume of outbound liquidity transfers was 534.

Chart 23

Volume of liquidity transfers to and from T2S DCAs in 2023

(number of transactions, daily averages)



Source: T2S.

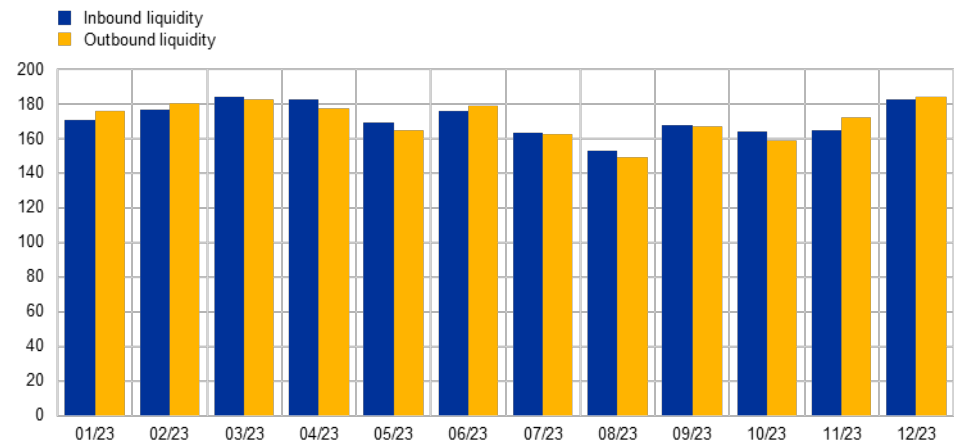
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

Chart 24 shows the daily average value of liquidity transfers to and from T2S DCAs in 2023. The daily average value of inbound liquidity transfers was €171.29 billion, while the daily average value of outbound liquidity transfers was €171.19 billion.

Chart 24

Value of liquidity transfers to and from T2S DCAs in 2023

(daily averages, EUR billions)



Source: T2S.

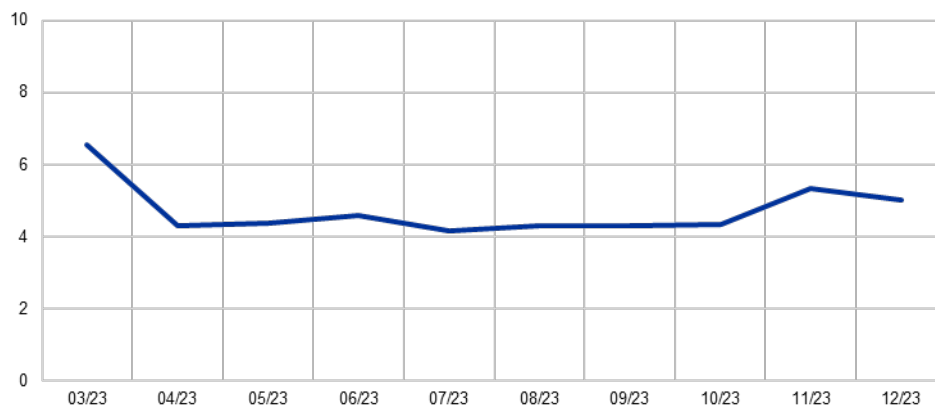
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

Now that the T2-T2S consolidated platform has gone live, euro liquidity can stay in T2S overnight. Chart 25 shows the daily average liquidity remaining in the DCAs in T2S overnight from 20 March 2023. On average, €4.64 billion remained in T2S each day. The month with the highest average balance was March, with €6.57 billion, while the month with the lowest average balance was July, with €4.17 billion. Except for March, liquidity held by participants in their T2S DCAs remained largely stable throughout the rest of the year.

Chart 25

Overnight liquidity in T2S DCAs from 20 March 2023

(daily averages, EUR billions)



Source: T2S.

Notes: The migration day of 11 September 2023 is excluded from the statistics reported. Only liquidity held on T2S DCAs is considered; liquidity held on T2S central bank accounts is not included.

1.8.2 Interaction between T2S and Kronos2

Inbound liquidity transfers are transfers from the Kronos2 RTGS accounts to the T2S DCAs, while outbound liquidity transfers are transfers from the T2S DCAs to the Kronos2 RTGS accounts.¹¹

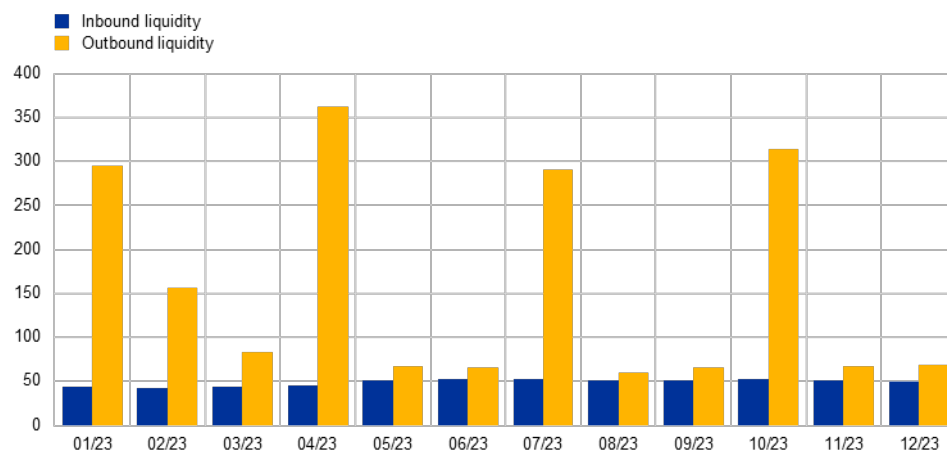
Chart 26 shows the daily average volumes of liquidity transfers between Kronos2 RTGS accounts and T2S DCAs in 2023. The daily average volume of inbound liquidity transfers from Kronos2 was 49, while the daily average volume of outbound liquidity transfers to Kronos2 was 156. A high number of outbound liquidity transfers occur quarterly, which is attributed to corporate actions taking place in T2S that are then transferred to Kronos2.

¹¹ Kronos2 is the RTGS system of Danmarks Nationalbank. The traffic in Danish kroner is converted into euro at an exchange rate of DKK 1 to EUR 0.13.

Chart 26

Volume of liquidity transfers between Kronos2 accounts and T2S DCAs in 2023

(number of transactions, daily averages)



Source: T2S.

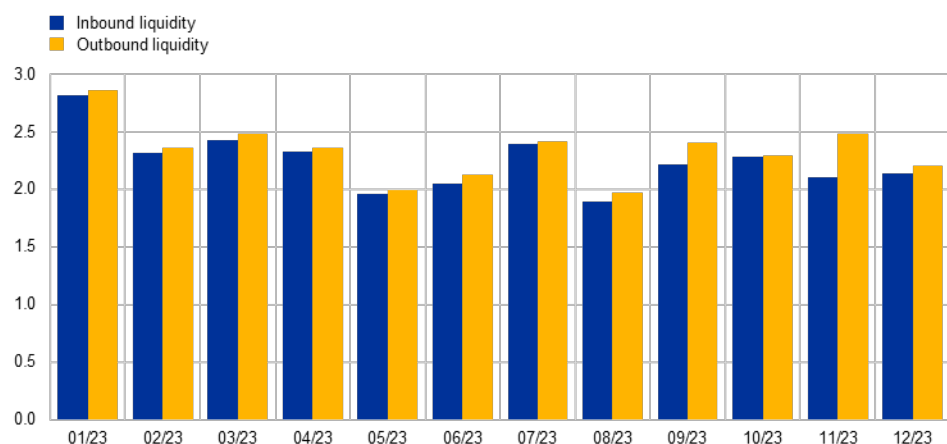
Note: The migration day of 11 September 2023 is excluded from the statistics reported.

Chart 27 shows the daily average value of liquidity transfers between Kronos2 RTGS accounts and T2S DCAs in 2023. The daily average value of inbound liquidity transfers from Kronos2 was €2.25 billion (corresponding to DKK 17.31 billion), while the daily average value of outbound liquidity transfers to Kronos2 was €2.34 billion (corresponding to DKK 18.00 billion). Any remaining balance on T2S DCAs stemming from the discrepancy between inbound and outbound liquidity transfers is automatically transferred back to Kronos2 as part of the RTS closure activities (i.e., the so-called EOD debits).

Chart 27

Value of liquidity transfers between Kronos2 accounts and T2S DCAs in 2023

(daily averages EUR billions)



Source: T2S.

Note: The migration day of 11 September 2023 is excluded from the statistics reported.

2 T2S service level and availability data

2.1 Technical availability

The Eurosystem pays particular attention to the proper functioning and operation of the T2S platform. The availability of services is measured continuously and objectively at pre-defined components of T2S throughout each settlement day, excluding the maintenance window.

The use of key performance indicators (KPIs) is one of the measures implemented to demonstrate how effectively T2S is achieving its punctuality objectives. The punctuality of T2S is measured by calculating the real duration of the following three phases of the business day and comparing these against the expected target durations:

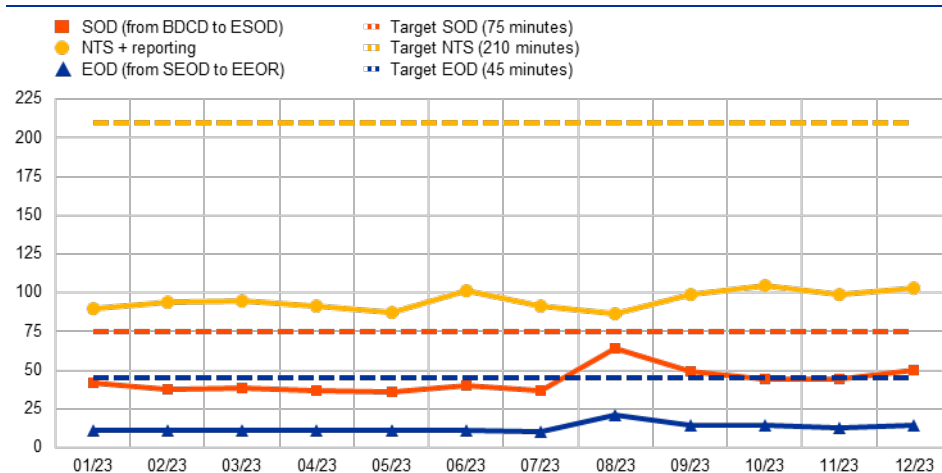
Start of day (SOD) measures the time elapsed between the start of day phase (event BDCD) and the end of start of day (event ESOD).

NTS including reporting (NTS + reporting) measures the time elapsed between the start of NTS (event C1P0) and the end of NTS reporting (event ENTS).

End of day (EOD) measures the time elapsed between the start of the end of day phase (event SEOD) and the end of day reports (event EEOR).

Chart 28 compares the average monthly durations of the different phases of a business day against the respective target durations. The figures show that the platform consistently met targets.

Chart 28
Punctuality



Source: T2S.

2.2 Incidents in T2S

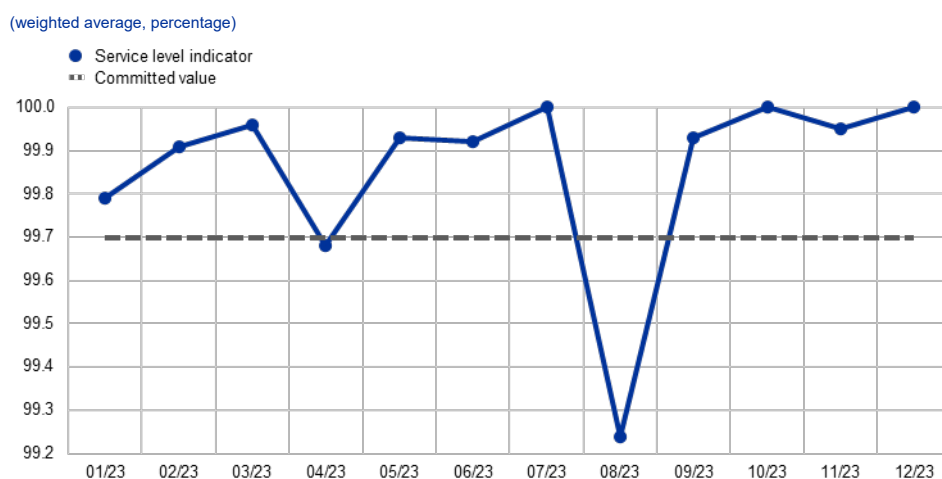
The Eurosystem is dedicated to ensuring the T2S system runs smoothly during normal operations and guiding activities to restore services when incidents occur.

In 2023 the T2S platform experienced two major incidents of internal origin, defined as unplanned interruptions or reductions in the quality of an agreed service for which a Crisis Managers' conference call was required. Each incident was followed up with a detailed report which serves as input for continuously improving the service and enhancing the ability to prevent or mitigate them in the future. Paragraphs 2.2.1-2.2.2 provide more details of these incidents.

By way of comparison, in 2022 the T2S platform experienced three major incidents.

As Chart 29 shows, in 2023 the overall service level indicator, computed as the weighted average of the platform services, twice fell below the committed KPI value of 99.7%. This was as a result of the two incidents described below.

Chart 29
Service level indicator in 2023



Source: T2S.

2.2.1 28 April incident

Starting around 16:30 on 28 April ESMIG was unable to generate the necessary unique IDs; this stopped both incoming and outgoing messages from being processed, and they were stored in a back-out queue. To fix the issue the Support Team reset a parameter, allowing ESMIG to start processing messages again. The messages stored in the back-out queue were successfully re-injected and processed. As a result of the incident and by Crisis Managers' decision the IFOP cut-off was delayed from 18:00 to 19:00, and consequently the change of the business day from 18:45 to 19:45. The decision was also taken to postpone the start of the NTS from 20:00 to 21:00.

2.2.2 18 August incident

Shortly after 18:00 on August 18, an unavailability of a temporary index, which is normally automatically recovered by the DB2 Web Application Server, did not occur due to a significant increase in timeout and retry attempts. This automatic process had resolved a similar issue the previous business day. This resulted in a high number of messages, including end-of-day report files and single messages, becoming stuck. With the help of the support teams, the T2S Service Desk initiated the reinjection of all messages. The timing and duration of the incident prompted consultation with the T2S Crisis Managers at 21:35 to update them for a decision on notifying the competent authorities. While this was happening DB2 was manually restarted, ultimately resolving the incident. Handling of the incident was therefore returned to the T2S Settlement Managers. As a result of the incident NTS started with a three-hour delay at 23:00.

3 T2S financial performance

3.1 Cost recovery objectives

The financial position of T2S is determined by cost and revenue trends. The platform operates on a full cost recovery basis, meaning that all costs incurred should be covered by the revenues generated. The T2S pricing structure is defined in Schedule 7 of the [T2S Framework Agreement](#) and is also available in the TARGET Services Pricing Guide. T2S cost recovery is driven by four factors:

1. the transaction volumes that are settled in T2S;
2. the fees that are charged to T2S actors for using its services;
3. the pre-defined T2S cost recovery period;
4. the variation of T2S costs over time.

3.2 Financial performance of T2S

The overall financial position of T2S is detailed in the annual T2S financial statements, which are prepared in accordance with specific accounting policies established by the Market Infrastructure Board (MIB). In the interests of clarity, the financial information is presented similar to that in a profit and loss report (T2S operating statement) and a balance sheet report (T2S financial situation report). The T2S operating statement shows yearly accumulated revenues (collected on a monthly basis) and yearly operational costs (paid on a quarterly basis).

The T2S financial situation report provides a snapshot of relevant items in the asset and liability accounts.

For more information on the T2S financial position, see the latest [T2S financial statement for 2022](#).¹²

3.3 Analysis of revenues collected in 2023

Chart 29 shows the relative split (in percentage terms) in T2S revenues between settlement services (SETT) and information services (INSV). The SETT revenue derives from the core settlement services that are available continuously during the night-time and real-time settlement periods, except for a short period during the maintenance window. Information services include services related to T2S

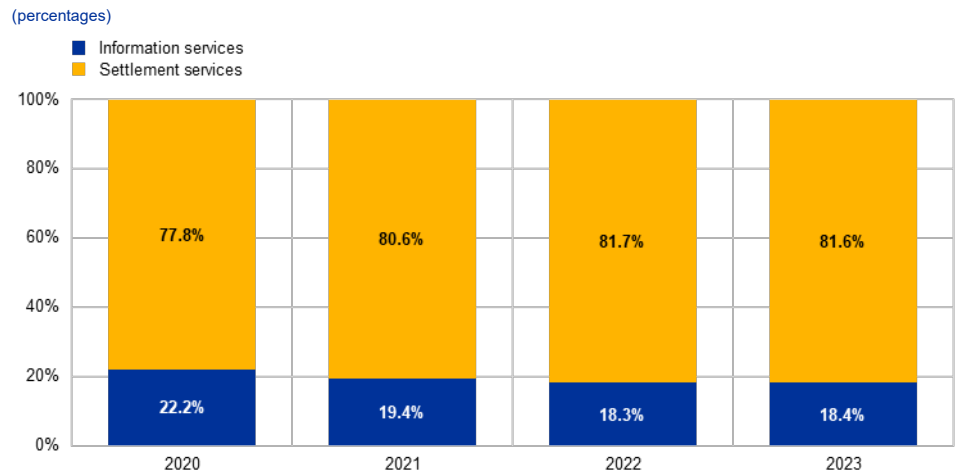
¹² The T2S financial statement for 2023 will be made public in June 2024. Once this has been released the T2S Annual Report will be updated to include the link to the latest financial statement.

information items such as queries and reports. As a part of this service, a CSD or national central bank (NCB) may query any of its assigned accounts.

As Chart 30 shows below, in 2023 approximately four-fifths (81.6%) of T2S revenues stemmed from settlement services, while approximately one-fifth (18.4%) of T2S revenues stemmed from information services. The increase in the settlement services portion of T2S revenues in recent years (with a concomitant reduction in the information services portion) is mainly because of the gradual migration of some of the largest T2S markets in the platform’s first years of operation, as well as the increase in T2S prices which became effective in January 2019.

Chart 30

Share of T2S revenue split between settlement and information services



Source: T2S.

Table 3 displays the share (as a percentage) of T2S revenues split between SETT and INSV, per tariff item. In 2023 the tariff items that contributed most to the settlement services portion of T2S revenues were DVP (53.0%) and FOP (10.2%), while the tariff items that contributed most to the information services portion of T2S revenues were charges related to messages bundled into file (9.7%) and transmissions (4.7%).

Table 3

Share of T2S revenue split between settlement and information services tariff items

(percentages)

Tariff Item	Billing date			
	2020	2021	2022	2023
INSV				
A2A queries	0.09	0.10	0.10	0.09
A2A reports	3.35	3.07	3.33	3.40
Messages bundled into file	4.17	5.97	9.53	9.73
Transmission	14.40	10.12	4.76	4.67
U2A queries	0.17	0.15	0.55	0.46
Total	22.18	19.43	18.27	18.35
SETT				
Account allocation	0.06	0.10	0.11	0.10
Auto-collateralisation	0.44	0.12	0.10	0.11
Daytime settlement	4.05	4.36	4.53	4.57
Delivery versus payment	49.09	51.90	53.19	53.04
Fail on ISD	7.35	6.55	5.88	5.70
Free of payment	9.77	9.85	10.04	10.17
Internal liquidity transfer	0.00	0.00	0.00	0.00
Intra-balance movements	0.00	0.00	0.00	0.00
Intra-position movements	0.16	0.19	0.18	0.18
Matching	6.07	6.36	6.30	6.37
Payment free of delivery	0.82	1.14	1.39	1.37
Total	77.80	80.57	81.72	81.63
Grand total	100.00	100.00	100.00	100.00

Source: T2S

4 T2S risk management and compliance

4.1 Risk management

Managing operational and information security risk is a key element of the governance structure of T2S.

T2S governance is based on the ECB Guideline on T2S, which lays down the responsibilities of the Governing Council and of the MIB concerning T2S, including risk management-related responsibilities.¹³ Thus, the Governing Council decides on the general operational aspects of T2S, including the T2S risk management framework. The MIB's responsibilities include, among other things, preparing proposals (in full respect of the mandates of the European System of Central Bank committees) regarding the TARGET Services Risk Management Framework applicable to T2S risk as well as to other systems in operations and projects under MIB governance.¹⁴

The T2S risk status and assessment, including risk analysis and mitigation measures (if required), are shared on a regular basis with the CSDs and the NCBs via the relevant fora: the Operations Managers Group, the Project Managers Group, the CSD Steering Group, the Securities Managers Group and the Eurosystem Risks Management Forum. Within the context of their own risk management activities, and complying with their own national regulatory requirements, CSDs and NCBs flag new risks to the relevant T2S governance bodies if they consider such risks to be significant.

Following a recommendation received from the T2 Overseer (the Eurosystem), a three-lines-of-defence model¹⁵ was adopted for risk management – adding a second line (governance) to the existing two (audit and operations) and extended to all TARGET Services according to the TARGET Services Risk Management Framework. This second line reports to the MIB and considers the operational risks for all TARGET services. At the end of 2023 TARGET Services risk management was strengthened by the decision to establish an independent TARGET Services Risk Committee (TSRC) to support the risk management function and assist the MIB in fulfilling its responsibility as regards TARGET Services risk management by advising on the relevant policies and frameworks for monitoring and mitigating risks.

¹³ 2012/473/EU: [Guideline of the European Central Bank of 18 July 2012 on TARGET2-Securities](#) (ECB/2012/13) (OJ L 215, 11.8.2012, p. 19).

¹⁴ See the MIB's [mandate](#).

¹⁵ See the IIA position paper, "[The three lines of defence position paper](#)", Institute of Internal Auditors, July 2020.

4.2 Oversight

The Eurosystem continued its oversight of T2S throughout 2023 in accordance with the Eurosystem oversight policy framework. The ECB maintained its primary responsibility for T2S, leading and coordinating all oversight activities. T2S oversight adhered to the principles for financial market infrastructures (PFMIs) established by the Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions, which the Eurosystem deemed relevant for T2S.¹⁶

The PFMIs are the international standards for FMIs and comprise various financial entities including payment systems, CSDs, securities settlement systems, central counterparties and trade repositories. Although T2S does not fall within the exact definition of an FMI provided in the PFMI report, the Eurosystem has decided to continue applying the PFMIs to T2S because the principles relate to functions performed by T2S, namely the settlement and recording of securities transactions.

Over the course of 2023 the operations function actively engaged in dialogue with the oversight function to address outstanding oversight recommendations from prior assessments. Progress was acknowledged, leading to the closure of outstanding recommendations based on actions completed.

In line with cooperation efforts, the operations function continued to provide information requested to the ECB's oversight function in 2023. This included details on operational incidents and changes introduced in the T2S release in November 2022. Following assessments of these updates, the operations function addressed the recommendations issued. Operations also supplied the oversight function with aggregated settlement statistics, operational and financial performance data, as well as information on risk management, testing and migration activities to facilitate the monitoring of relevant T2S activities.

In addition, the oversight function launched a comprehensive assessment of all TARGET services in October 2023. As a first step, the operations function was requested to deliver a self-assessment by February 2024. The outcome is expected in the second half of 2024.

4.3 External examination

T2S services are performed on a single technical platform integrated with central banks' RTGS systems for all participating currencies. Under the [T2S Framework Agreement](#), the Eurosystem and the CSDs have agreed that the performance of T2S services will be subject to technical and operational examinations performed by an external examiner. These examinations provide all participating CSDs with an independent, third-party assessment based on the established industry norm

¹⁶ See [CPMI Papers \(No 101\)](#).

(ISAE 3402). The external examiner must be a reputable, internationally active accounting firm.

These examinations aim to provide CSDs with reasonable assurances that (a) the organisation set up by the Eurosystem meets the obligations outlined in the Framework Agreement, and (b) the controls implemented are effective, designed appropriately, and allow for efficient risk assessments in a way that meets security objectives.

As its statute requires, the Eurosystem conducted a public tender in 2018 and appointed an external examiner for four years, a period which was later extended by an additional year to cover 2018-2022 (with the last examination, of the year 2022, performed in 2023). The fifth external examination, completed in 2023, concluded with a final report issued on 21 December 2023. An extensive action plan will be developed in response to the findings. With few exceptions, the external examiner confirmed the adequacy and effectiveness of the T2S controls examined for the period from 1 January 2022 to 31 December 2022.

A special examination of T2S Release 6.0 was also undertaken by the external examiner.

In 2024 a new external examiner, appointed after a negotiated tender procurement exercise, will conduct the external examination of the year 2023.

4.4 Special review

In December 2020 the ECB had appointed Deloitte GmbH to conduct an independent review of five major information technology-related incidents (not cyber incidents) which had occurred in 2020, affecting payment transactions and securities processing associated with TARGET services.

On 28 July 2021 the ECB published [Deloitte's independent review](#). The report included a detailed description of the relevant incidents, the impact each had on TARGET services' participants and the respective root causes. In its [response](#), the Eurosystem accepted Deloitte's general conclusions and recommendations and committed to address them decisively. 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.

Measures addressing the majority of recommendations have been implemented and more than 90% of all planned actions were completed by the end of 2023, with the remaining measures expected to be implemented in 2024. 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 CSG will be regularly updated on the implementation of the action plan until the process has been completed.

5 System evolution

5.1 Regular software updates

The evolution of T2S reflects changes in business needs, regulatory requirements and new market standards, along with some enhancements related to system maintenance. The T2S annual release schedule includes one major release in June and one minor release in November, including change requests and production problems, as well as two production problem releases in February and September which only include fixes for known production problems.

5.1.1 T2S releases in 2023 (Release 6.3, R2023.JUN, R2023.SEP, R2023.NOV)

T2S Release 6.3, fixing 21 known production problems, was deployed on 17 February 2023.

The major release T2S R2023.JUN was deployed on 10 June 2023. This contained eleven change requests (listed in Table 4 below), one editorial change request and 32 fixes for known production problems. The changes covered a wide range of functional areas including the addition of MS Edge as a new supported browser, a new procedure to extend the NTS during the weekend, enhancements related to the processing of high volumes of transactions in RTS/NTS, adjustments to the processing of transactions during the end of day period by the penalty mechanism and improvements in the reporting of settlement transactions.

Although the go-live of R2023.JUN had originally been intended to introduce T2S Data Warehouse, it was agreed to implement the software in a non-activated mode in production.

A second release solely aim at fixing production problems (R2023.SEP) was deployed on 16 September 2023, fixing 21 such issues.

The minor release T2S R2023.NOV was deployed on 18 November 2023 and included six change requests (listed in Table 5 below), one editorial change request and fifteen fixes for production problems. The changes included adaptations to the upcoming migration of Danish Kroner to T2 and TIPS in April 2025, enhancements to the penalty mechanism for linked scenarios and enriched reporting of transactions via CRDM screens.

The numbers of change requests deployed and production problems resolved in 2023 are shown in Table 3.

Table 3
T2S releases in 2023

	R2023.FEB	R2023.JUN	R2023.SEP	R2023.NOV
Change requests	-	13	-	7
Production problems	21	32	21	15

Table 4
Change requests implemented in R2023.JUN

Change request	Change request title
T2S-0551-SYS	Reporting of restriction references for CoSD blocked positions in the statement of holdings (semt.002)
T2S-0638-SYS	T2S should allow and process already matched instructions which include the counterparty's securities sub-position to be used for settlement purposes
T2S-0699-SYS	Decommissioning LTSL, scope and definition of queries and reports and access specifications to data warehouse functionalities
T2S-0740-SYS	No check of the minimum settlement unit upon revalidation of partially settled instructions and partially settled settlement restrictions
T2S-0761-SYS	Enhanced optimisation during RTS to maximise transaction throughput on the same resource
T2S-0762-URD	New option for opening T2S during the weekend
T2S-0763-SYS	T2S multi-criteria settlement optimisation
T2S-0764-SYS	No intraday update of the negative position flag
T2S-0769-SYS	Add MS Edge to the list of supported browsers for U2A interaction
T2S-0779-SYS	Optimise processing of CORP transactions during real-time settlement: grouping in collections and modified sorting method
T2S-0781-SYS	Allowing security intraday restriction maintenance on or after maturity date
T2S-0787-URD	Instructions released during cut-off with CYCL as the reason for failure must have an SEFP penalty imposed
T2S-0795-SYS	Multiplex editorial Change Request (for R2023.JUN)

Table 5
Change requests implemented in R2023.NOV

Change request	Change request title
T2S-0596-SYS	Enhanced settlement instruction - details screen to display T2S matching reference and the counterparty's instruction details
T2S-0733-SYS	Definition of a classification of transactions for CB T2S data
T2S-0756-SYS	If an instruction is cancelled, then T2S should no longer consider it to be part of a pool
T2S-0782-SYS	Adaptations due to the decommissioning of Kronos2 and migration to T2
T2S-0783-SYS	RTS improvement to the optimisation process dedicated to corporate action high volume
T2S-0786-SYS	Counterparty leg of a failing instruction due to reason code "LINK" should not be penalised
T2S-0808-SYS	Multiplex Editorial Change Request (for R2023.NOV)

5.1.2 Future system evolution

Changes to T2S will continue to be delivered in two releases in 2024 – a major release in June and a minor one in November.

The major release in June envisages the implementation of changes to (i) enhance reporting during the start of day period, i.e. when no settlements are taking place, (ii) transfer all data still available in the LTSI, i.e. from the T2S go-live (2015) until July 2023, to the new DWH, and (iii) adjust the business rules for settlement restrictions of matured securities in line with the rules for settlement instructions under the CoSD framework.

Later in the year, the minor release in November is expected to introduce (i) enhancements to the handling of automatic cancellations of settlement instructions by CSDs external to T2S, (ii) updated standards on the classification of financial instruments, and (iii) additional secured groups' attributes to simplify access rights management.

Looking ahead to 2025, the intention is that a new functionality aimed at unlocking the full potential of T2S and fostering cross-border settlement across Europe will be implemented. This functionality is expected to reduce the complexity currently involved in setting up securities with CSD links and contribute to an increase in the number of cross-border links within T2S and a more interconnected European settlement landscape.

Furthermore, in line with the MIB plan to enhance the operational resilience of T2S, the ongoing development and implementation work on new tools and functionalities to be activated in the event of a large-scale technical incident or cyber-attack will continue throughout the year.

Box 4

T2S strategic evolution

Following MIB approval of the T2S strategic evolution roadmap in September 2023, two categories of strategic measures will be further developed from 2024 onwards to enhance T2S core benefits to the European financial industry over a horizon of five to ten years:

- functional enhancements which are expected to return benefits in terms of the operational efficiency, resilience, performance and costs of the T2S platform. Proposals for such functional enhancements were collected during an investigation phase; these will be submitted for assessment through the standard change and release management process;
 - use of alternative technologies is expected to enhance the scalability, modularity and maintainability of T2S through the potential implementation of application programming interfaces (APIs) and microservices. A staged approach will be taken for alternative technologies, with the delivery of multiple proof-of-concepts awaited in 2025 before any decision on implementation in the T2S production environment is taken.
-

5.2 Eurosystem Collateral Management System

The Eurosystem Collateral Management System (ECMS) will be a single collateral management system used to manage eligible assets mobilised as collateral in Eurosystem monetary policy operations. It will replace the current local collateral management systems.

The ECMS will interact with the CLM module in T2 to ensure settlement of payments stemming from monetary policy operations, corporate actions and fees, and to update the relevant credit line.

In addition, the ECMS will interact with T2S in respect of the settlement of securities and management of the auto-collateralisation process. The resulting synergies are expected to benefit NCBs and all other ECMS players– counterparties, CSDs and tri-party agents – by contributing to the efficient exchange of securities, collateral and liquidity within the Eurosystem. It will be accessible via a single common interface across jurisdictions and will facilitate the mobilisation of cross-border collateral.

User testing continued in 2023 on NCB, CSD and tri-party agent connectivity. Community testing started in May with the CSDs and TPAs, and extended to counterparties in July.

To support ECMS stakeholders in testing activities, updated versions of detailed information on the testing and migration strategy were published on the ECB website. An ECMS focus session reached out to external stakeholders in June, and the workshop series with CSDs and tri-party agents continued throughout the year. The MIB approved the addition of several change requests to the go-live release scope for the ECMS.

In order to allow users more time to complete testing of the ECMS functionalities in a stable environment, the Governing Council of the ECB decided on 29 November 2023 to reschedule the launch of the ECMS from 8 April 2024 to 18 November 2024.

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Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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PDF ISBN 978-92-899-6461-6, ISSN 2599-9257, doi:10.2866/621077, QB-CH-24-001-EN-N
HTML ISBN 978-92-899-6462-3, ISSN 2599-9257, doi:10.2866/371857, QB-CH-24-001-EN-Q