

# Euro money market study 2022

Money market trends as observed through MMSR data\*

\*(first quarter of 2021 to fourth quarter of 2022)



# Contents

Overview				
1	The s	The secured segment		
	1.1	Volumes	10	
	1.2	Rates	14	
	1.3	Maturities and calendar effects	21	
	1.4	Counterparties	26	
2	The u	unsecured cash segment	30	
	2.1	Volumes	31	
	2.2	Rates	35	
	Box	1 €STR-based fallbacks for EURIBOR	41	
	2.3	Maturities and calendar effects	42	
	2.4	Counterparties	46	
3	The short-term securities segment		51	
	3.1	Volumes	51	
	3.2	Rates	56	
	3.3	Maturities and calendar effects	62	
	3.4	Counterparties	64	
4	The foreign exchange swap segment		67	
	4.1	Volumes	67	
	4.2	Rates	71	
	4.3	Maturities and calendar effects	75	
	4.4	Counterparties	79	
5	Over	night index swaps	82	
	5.1	Volumes	83	
	5.2	Rates	86	
	5.3	Maturities	90	

	5.4	Counterparties	92
Appen	dix		96
	Money	v market statistical reporting (MMSR)	96

# Overview

The 2022 Euro money market study is a comprehensive analysis of euro money markets using a unique, transactions-based dataset. The study covers five segments of the euro money markets: (i) secured transactions – repos and reverse repos, (ii) unsecured cash transactions, (iii) the issuance of short-term securities (STS), (iv) foreign exchange (FX) swaps, and (v) overnight index swaps (OIS). The study describes developments in these segments between January 2021 and December 2022 based on actual daily money market transactions executed by the 47 largest euro area banks and reported to the European Central Bank (ECB) through the Eurosystem's money market statistical reporting (MMSR) dataset.

**During 2021 and 2022 activity in the euro money market took place amid inflationary pressures.** The inflationary outlook changed towards the end of 2021. Mismatches between buoyant aggregate demand and overall constrained supply resulted in inflationary pressures after a prolonged period of very low inflation, which intensified in 2022 owing to the adverse supply shock on energy and agricultural commodities following the Russian invasion of Ukraine.

Along with other major global central banks, the ECB withdrew monetary policy accommodation to curb these inflationary pressures. This withdrawal was brought about via: (i) four policy rate hikes with an accumulated value of 250 basis points on the key ECB interest rates over the second half of 2022 and the consequent suspension of the two-tier system that was applicable during negative rates, (ii) the discontinuation of net asset purchases under the pandemic emergency purchase programme (PEPP) and the asset purchase programme (APP) as of 1 April 2022 and 1 July 2022 respectively, and (iii) the recalibration of the interest rate on all remaining targeted longer-term refinancing operations (TLTRO III) as of 23 November 2022.

The withdrawal of ECB monetary policy accommodation was accompanied by measures aimed at supporting monetary policy transmission and the orderly functioning of markets. The measures supporting monetary transmission and market functioning included (i) the temporary suspension in September 2022 of the zero interest rate ceiling for remunerating government and foreign central bank deposits until April 2023; (ii) the increase in the aggregate limit for securities lending against cash to €150 billion in November 2021, and to €250 billion in November 2022; and (iii) the extension of the Eurosystem repo facility (EUREP) for non-euro area central banks and of temporary swap and repo lines until January 2024. Furthermore, the Governing Council decided to adjust the remuneration of minimum reserves to the deposit facility rate (DFR) as of 21 December 2022, in order to align remuneration with the marginal cost and return of liquidity in the current abundant liquidity environment.

Given the primary role the euro money market plays in the transmission of monetary policy, the most salient result of the study is that policy rates hikes were transmitted to money market rates. The Governing Council raised the DFR from -0.5% to +2.0% in four consecutive meetings during the second half of 2022, terminating the policy cycle of negative rates that was introduced in June 2014. The pass-through to the unsecured segment was immediate, with overnight unsecured rates reflecting 99% of the policy rate changes within two days. Moreover, OIS rates swiftly reacted to the signals on monetary tightening provided by the Governing Council and hence the expectations embedded in OIS rates have largely reflected the policy rate changes that materialised in the second half of 2022.

#### **Figure A**





Source: BrokerTec and MTS, Bloomberg, ECB and STEP.

Note: Unsecured, secured and T-bills vertical bars compare the rate of trades with settlement on 22 December 2022 (2nd day of the maintenance period after the December 2022 rate hike) with the rate of transactions settled on the last day of the maintenance period before the July 2022 hike (1 week and 1 month before the last day of the maintenance period for EURIBOR and T-bill trades). Owing to the low STS issuance volume, the pass-through includes a longer settlement period (from 21 December 2022 to 6 January 2023) to achieve a better representativeness of the rate comparison.

# Unsecured borrowing rates remained anchored to the DFR, only marginally drifting away when investors preferred short-term investment in a context of

very ample excess liquidity. Overnight unsecured borrowing rates remained anchored to the DFR during the whole period under review, almost perfectly mirroring the official interest rate hikes. Still, the €STR-DFR spread had widened slightly to 10 basis points by the end of 2022, compared with 6 basis points at the beginning of 2021. This can be partly explained by the further increase in excess liquidity during the same period. The widening of the €STR-DFR spread – and the negative one-month EURIBOR-OIS spread – came from an imbalance between demand and supply for cash in the money market. On the supply side, depositors holding excess liquidity favoured investments in short maturities as they offered positive returns in an environment still dominated by high uncertainty surrounding the terminal rate and the policy rate path thereafter. On the demand side, euro area banks discouraged short-term cash inflows, as they weigh on the banks' regulatory ratios. Forward spreads (i.e. FRA-OIS spreads) remained positive, suggesting that the negative EURIBOR-OIS spreads were expected to be temporary and outweighed in future by lower levels of excess liquidity.

Figure B EURIBOR versus OIS spread developments



Sources: Bloomberg, ECB.

Another salient feature of the study is that turnover continued to be dominated by the secured segment, with national government debt collateralising secured trades. The secured segment is the largest segment of the euro money market, accounting in 2022 on average for 56% of the total €1.3 trillion in daily transactions and 30% of the total €7.0 trillion in outstanding amounts. The secured segment has become more attractive than the unsecured segment, with the latter accounting for 12% of the market share. This can be explained by (i) the mitigation of counterparty risk via collateral transfer, (ii) the favourable regulatory treatment, and (iii) the fact that cleared repos are an efficient vehicle for sourcing specific securities. Given the sheer size of the secured segment, repo rate developments have become increasingly important for assessing overall financing conditions and thus for monetary policy implementation.

#### **Figure C**

Overview of the size of the euro money market (daily turnover)



Outstanding amount (stock)



Sources: CSDB for the STS segment. Euro money market survey until 2015, and MMSR from 2016 onwards, for the other four segments.

Notes: From 2016 onwards, the series include MMSR transactions with all counterparties, excluding novated trades for the OIS segment. Until 2015 the series include euro money market survey data for 38 overlapping reporting agents and retropolated data for the 14 MMSR reporting agents not covered in the survey. The performed retropolation applies the growth rates of the overlapping sample series to the missing data backwards in time, starting from the first available observation in 2016 Q3. Two Confidential datapoints have been interpolated. For STS, we are considering only the borrowing side (issuance). For FX swap, we are considering swaps of euro against all currencies.

The scarcity of certain government securities exerted downward pressure on secured rates. During the severe phase of the COVID-19 pandemic in 2020, reporter rates remained well anchored to the DFR and rather homogeneous across jurisdictions. However, reporter gradually drifted below the DFR and became more dispersed across Member States in the period under review. As most secured trades

were backed by sovereign debt, scarcity of government bonds – particularly severe for certain German issuances – caused a larger share of bonds to trade at very low repo rates and a greater segmentation of repo rates across jurisdictions. The scarcity worsened in autumn 2022 owing to a higher preference for less risky short-term investments and higher margin requirements. This resulted in more demand for collateral as its value declined, thus underpinning further downward pressures on repo rates. Repo price developments reverberate in the financial conditions in government and corporate debt markets via asset swaps.

### The pass-through to repo rates of the four ECB policy rate hikes in 2022 was not as orderly as for unsecured rates. The pass-through to repo rates was uneven across jurisdictions and partially lagged. In two hikes (July and October 2022) the pass-through was 90% complete within two days for cash-driven repos based on general collateral, while it took about one week for securities-driven repos, especially for those using scarce German or French government securities. The pass-through of the September hike was even more sluggish with most repo rates remaining negative for some time after the DFR had been lifted from 0% to 0.75%. This lagged pass-through was largely triggered by a return of investors who had been absent from the money market during the negative interest rate policy cycle, including governments and foreign central banks moving sizeable funds from deposits in the Eurosystem into the repo market. A guicker and more complete pass-through across jurisdictions in response to the December rate hike was ensured, among other things, by (i) the temporary suspension of the 0% remuneration applied by the ECB to non-monetary policy deposits, (ii) the increase in the aggregate limit for securities lending against cash, (iii) the early repayments from TLTRO III, and (iv) the Deutsche Finanzagentur making more German bonds available to the market.

#### **Figure D**





Source: MMSR (end of the quarter dates excluded). Note: The rates consider both general collateral (GC) and non-GC trades aggregated.

**Finally, activity in the euro money market remained driven by non-banks, with money market funds (MMFs) and other investment funds (IFs) making up a growing share of the market.** MMSR data collect information on transactions executed by the largest banks in the euro area in a context of excess liquidity. This implies that a bank is always on one side of the MMSR transaction. The counterparty breakdown displayed in Figure E refers to the other side of the MMSR transaction. Non-banks<sup>1</sup> dominated transactions in the unsecured segment, while interbank trades represented the largest share of the activity in the FX swap market. On the other hand, CCPs<sup>2</sup> were involved in 70% of secured trades, and around 90% of

Non-banks comprise financial and non-financial corporations, including governments, foreign central banks and intermediaries such as MMFs, investment funds, pension funds and insurance companies.

<sup>&</sup>lt;sup>2</sup> Some of the CCPs have a euro area banking licence.

overnight index swap trades. On closer examination of the trades with non-banks, MMFs accounted for 28% of unsecured trades in 2022 and held 73% of total banks' issuance of short-term securities. There was a relevant increase in MMF participation in the unsecured segment (19% in 2020 and 7% in 2018). However, for uncleared secured trades, IFs were a more important counterparty than MMFs, accounting for over 30% of bilateral secured trades in 2022 – twice as much as in 2018.

#### Figure E





Sources: MMSR for secured, unsecured, FX swap, CSDB and ECB (Securities holdings statistics database – SHS) for STS. Some of the CCPs also have a banking licence. However, CCPs are displayed as a third category in this chart, separate from banks and non-banks.

# 1 The secured segment

The secured market has become the largest segment of the euro money market, accounting for 56% of total daily turnover in 2022. The mitigation of counterparty risk inherent to secured trades and the more favourable regulatory conditions were key to the secured segment becoming more attractive than the unsecured segment over the past decade. Moreover, repurchase agreements (repos) are an efficient vehicle for sourcing securities.

During 2021 and 2022 secured rates gradually drifted below the DFR and became more dispersed than in 2020. Scarcity of government bonds, particularly severe for certain issuances, caused downward pressure on rates and resulted in a larger share of trades well below the DFR. The structural scarcity of some government bonds was aggravated in autumn 2022 by a higher demand for shortterm safe assets and an increase in short positions in the bond cash market, underpinning further stress in repo rates.

The pass-through to repo rates of the four ECB policy rate hikes in 2022 was not as orderly as for unsecured rates. The response of repo rates to each of the four policy rate hikes was heterogeneous, with rates collateralised by bonds with a structurally higher demand experiencing a more volatile pass-through. In September 2022, policy rates returned to positive territory and uncertainty surrounded the remuneration applicable to certain non-monetary policy deposits. This led to the expectation of large amounts of funds looking to be placed in the market, which resulted in a large drop in repo rates on the first days of the new maintenance period. The Eurosystem suspended the zero interest rate ceiling on certain nonmonetary policy deposits until April 2023 and increased the limits of the securities lending facilities against cash from  $\in$ 150 billion to  $\in$ 250 billion. Moreover, the Deutsche Finanzagentur released  $\in$ 54 billion in German bonds to be used in the most expensive repo trades in order to alleviate collateral scarcity. These measures helped to stabilise rates closer to the DFR on the repo market and lay the foundations for a smooth end-of-year 2022 transition.

Both overnight volumes and repo rates exhibited seasonality at balance sheet reporting dates and most prominently at the end of the year. At the year end, borrowing cash was becoming less popular as it increases the size of the balance sheet, causing overnight transactions and rates to decline. The effect on repo rates was exacerbated in 2021 and to a lesser extent in 2022, declining by more than 200 basis points on both year-ends compared with less than 100 basis points on previous years.

**Central counterparties cleared around two-thirds of total activity in the repo market.** LCH SA, located in France, cleared more than half of the total trades, with EuroNext Clearing (formerly CC&G) and EUREX, located in Italy and Germany respectively, clearing the rest. Non-cleared trades were conducted by banks and mutual funds. While banks borrow and lend in repo, MMFs tend to be net cash lenders and investment funds are generally net cash borrowers.

# 1.1 Volumes

#### 1.1.1 Flows

With an average daily trading volume of approximately €698 billion, the secured segment is the largest segment of the euro money market (Chart 1.1.1). Daily turnover in the secured segment – traded among banks and CCPs – has more than doubled over the last decade, while during the same period the interbank unsecured segment shrank to one tenth. As a result, the euro area repo market has become the predominant form of short-term trading, representing almost 56% of total money market turnover.

#### Chart 1.1.1





Source: MMSR

Note: The percentages refer to the weight of the secured segment on the total of the euro money market for 2018, 2020 and 2022.

### 1.1.2 Stock

Outstanding amounts reached a new record high of €2.15 trillion in November 2022 (Chart 1.1.2). Over the last two years, the secured segment has played a key role in facilitating the exchange of both securities and cash in the financial system. Repo trades (49%) largely become a platform for seeking certain securities. Reverse repos (51%) are used to place cash buffers with euro area banks that have access to the ECB deposit facility. Such a trend has been reinforced with the return to positive rates.

#### Chart 1.1.2



Borrowing and lending secured trading volumes, daily values

Notes: Outstanding amounts are adjusted for open repo transactions without fixed maturity at origination. These transactions are outstanding for the entire period between origination and termination date. Confidential points are hidden.

#### 1.1.3 Drivers of volume

#### Dominance of non-general collateral trades

Activity in the repo market was largely driven by collateral exchange rather than cash management purposes (Chart 1.1.3). Repo transactions classified as non-general collateral (non-GC) accounted for about 83% of the daily volumes in MMSR. Non-GC covers transactions in which counterparties agree to use a specific security as collateral rather than a general basket of collateral. The scarcer this specific security is in the market, the more expensive it is to borrow it in a non-GC repo transaction. For certain securities with no supply shortages, non-GC and GC repo rates were roughly equivalent. When a security is very expensive – i.e. its repo rate is well below GC repo rates – it is called "special" repo. "Special" repo deals represented on average about 20% of all non-GC repo transactions, while occasionally reaching higher levels. This reflects the increasing scarcity for some securities that has been observed in the repo market.

#### Chart 1.1.3

Daily average of secured transactions by collateral type



Source: MMSR.

Note: Non-general collateral reporters to secured transactions collateralised using specific securities (international securities identification number (ISIN) codes) and trades with undefined collateral. Given that reporting special collateral is voluntary in the MMSR, the volumes may be under-represented.

#### Regulation fosters the demand for high quality securities

Prudential regulatory measures that address excessive leverage and unstable funding structures have an impact on the secured money market. The Basel Committee on Banking Supervision has developed a regulatory minimum leverage ratio (LR) to address the potential build-up of excessive leverage, a net stable funding ratio (NSFR) introducing a stable funding requirement for short-dated financing transactions, and a liquidity coverage ratio (LCR) to ensure that banks can withstand short-term liquidity dry-ups. Furthermore, the Financial Stability Board has developed a minimum haircut framework for a subset of securities financing transactions aimed at constraining the build-up of procyclical leverage outside the banking system.

**Regulatory ratios alter banks' incentives to enter repo activity.** Repo trades may worsen the LR as the cash received increases the assets side of the balance sheet and, at the same time, the security deployed as collateral is not derecognised from the balance sheet. Regarding the NSFR, short-term repos are not recognised as stable funding and hence this reduces the incentives to engage in such short-term funding transactions. As regards the LCR, the impact on a repo transaction depends on several factors, such as the nature of the collateral used, the counterparty involved and the haircuts applied.

Regulatory measures created to limit banks' balance sheet capacity and increase efficiency in securities management have contributed to a shift to centrally cleared transactions in the repo market (Chart 1.1.4). The LR framework contributed to the increasing role of central counterparties in the repo market, as it allows for the netting of repos and reverse repos with the same counterparty. Information from complementary data sources on the volume in the repo segment shows that the bulk of transactions in the euro repo market is conducted through clearing houses: LCH, EuroNext Clearing (formerly CC&G) and EUREX Clearing. Transaction-level data gathered from LCH and EUREX datasets cover around 70% of the MMSR volume. Most CCP-cleared repo transactions are negotiated on trading platforms: BrokerTec, MTS Repo platform and EUREX Repo.

#### Chart 1.1.4

Clearing houses

Trading platforms

0





Sources: MMSR (total repo volume, lending and borrowing), LCH (nominal amounts for RepoClear Ltd and RepoClear SA), EUREX Repo, BrokerTec and MTS. The data from EuroNext Clearing are not reported in the chart because they are not publicly available.

MTS

400

EUREX

EUREX

600

800

1,000

#### Increase in hedging needs and margin requirements

LCH

BrokerTec

200

The need to hedge against interest rate uncertainty, meet margin calls and support fixed-income market making in the derivatives markets gave investors an incentive to source securities via the repo market. The increase in demand for securities has been also largely fuelled by the requirements of the European Market Infrastructure Regulation (EMIR). According to EMIR, over-the-counter (OTC) interest rate derivatives should be cleared via CCPs, hence the need for collateral to meet margin calls. Moreover, the demand for repo transactions has also been stimulated by the need to cover short positions and to support market making on secondary markets for fixed-income derivatives.

The increase in margin requirements stemmed from the high volatility faced by markets in 2022 as well as from the increased calls per unit of hedging activity and created additional demand for collateral (Chart 1.1.5). As energy prices rose and the ECB embarked on a cycle of rapid and sizeable tightening of financing conditions, margin requirements from clearing houses on futures and swap contracts increased almost twofold. This led clearing houses' clients to source additional collateral to meet their margin requirements. The requirement to centrally clear these types of derivatives increased liquidity risk, as margin calls must be met with high quality liquid assets in the form of cash or securities. The increased usage of the

latter exacerbated the collateral scarcity and further exerted downward pressure on repo rates.

#### Chart 1.1.5

Initial margin (IM) posted by euro area entities



Source: ECB calculations.

# 1.2 Rates

#### 1.2.1 2021-2022 trends

The response of repo rates to the ECB's key policy rate hikes in 2022 was sluggish (Chart 1.2.1). Following the July, September and October 2022 rate hikes, the pass-through to non-GC repo rates was weaker than to rates for GC repo transactions. This contributed to an increase in the spread of repo transactions backed by special bonds to the DFR. The weaker pass-through to non-GC repo rates, in particular for German collateral, might have been due to frictions resulting from the bargaining power of the lenders of these scarce bonds. The pass-through of the September hike was even more sluggish than July with most repo rates remaining negative for some time after the DFR had been lifted from 0% to 0.75%. This lagged pass-through was largely triggered by the return of investors who had been absent from the money market during the negative interest rate policy cycle, including governments and foreign central banks moving sizeable funds from deposits in the Eurosystem into the repo market. A quicker and more complete passthrough across jurisdictions in response to the October rate hike was aided by (i) the temporary suspension of the 0% remuneration applied by the ECB to non-monetary policy deposits, (ii) the increase of the aggregate limit for securities lending against cash, (iii) the early repayments from TLTRO III, and (iv) the Deutsche Finanzagentur making more German bonds available to the market. Finally, the persistently weak pass-through of the December 2022 hike to repo rates was likely anticipating the seasonal decrease in rates around year-end due to the lower market liquidity.



Transmission of ECB rate hikes until the second day of the MP



Sources: BrokerTec, MTS.

Notes: Basis points difference of the volume-weighted average rates of the overnight (O/N), spot/next (S/N) and tomorrow/next (T/N) trades from the day of the Governing Council decision until the last day of the maintenance period (MP) and that settle either on the first or second day of the new MP, and the trades from the day of the Governing Council decision until the last day of the Base and the trades from the day of the Governing Council decision until the last day of the Governing Council decision until the last day of the MP and that settle either on the settle before the new MP. For Spain, there were no transactions with GC that met these date requirements for the September hike.

# Secured rates stood below the unsecured money market rates and the spread between GC and non-GC repo rates widened (Chart 1.2.2). GC repo rates

continued the progressive downward trend that followed the ECB's large liquidity injection in response to the coronavirus (COVID-19) crisis. As a result, GC repo rates traded below the DFR over the entire review period, with the negative spread between policy rates and GC rates growing over time to record levels. The drift of GC repo rates below the policy rate and below the euro short-term rate (€STR) reflects a widespread collateral scarcity - in contrast to the ample availability of cash - affecting the entire universe of government bonds. Simultaneously, non-GC rates declined more strongly than GC rates, and this decline became more pronounced after the second half of 2021. The GC/non-GC spread reflects the premium that investors are willing to pay to source a specific bond in a repo transaction. In specific collateral repos, rates are mainly determined by the supply and demand of the individual bond issued as collateral. Over the review period, the availability of bonds in repo markets decreased owing to central bank asset purchases, which withdrew collateral from the system, leading to an all-time low free float for many government bonds. Moreover, there was a pick-up in the demand for specific collateral driven by short selling and market making activity in the bond market and by the prepositioning for seasonality-driven spikes in the demand for collateral. The interaction between these factors led to an increase in the premium for borrowing specific collateral, resulting in wider GC/non-GC spreads.

#### Chart 1.2.2



#### Government repo rates by collateral type

Sources: BrokerTec, MTS.

The spread between repo rates and the DFR widened significantly for collateral across all jurisdictions and the heterogeneity across jurisdictions increased (Chart 1.2.3, panel a). For most of 2021 the repo rates for all jurisdictions moved together, while the gap between rates for repo transactions with collateral from core and non-core jurisdictions increased towards the end of 2021 and remained sizeable during 2022. Repo rates for German collateral were subject to additional downward pressures by the end of 2021 amid concerns of a severe shortage of collateral ahead of the year-end. Owing to economic and geopolitical uncertainty, the German collateral repo rates continued to drift further below the DFR during 2022 in the context of additional demand for safe assets.

Policy measures in the second half of 2022 have eased collateral scarcity and alleviated the severe collateral shortage (Chart 1.2.3, panel b). As mentioned earlier, in October 2022, the Deutsche Finanzagentur put €54 billion of own-held German bonds on the market, helping to smooth over German repo rates. Moreover, the temporary suspension of the 0% remuneration applied by the ECB to non-monetary policy deposits, together with the increase of the aggregate limit for securities lending against cash and the early repayments from the TLTRO III programme, served to alleviate tensions in the availability of collateral.

#### Chart 1.2.3



Government repo rates by collateral issuer jurisdiction

b) Repo rates' difference to DFR by jurisdiction (Jan-21 to Dec-22)



Sources: MMSR and ECB.

#### Note: The quarter-end dates were excluded.

### 1.2.2 Drivers of rates

Low repo rates result from the interaction between the supply and demand for collateral and cash seeking for short-term safe instruments. This equilibrium between cash and securities can be influenced by conjunctural and structural factors. Among the conjunctural factors, the most important drivers of swings in rates are seasonal patterns (such as reporting dates of regulatory ratios and futures delivery dates), idiosyncratic demand for specific securities and flight-to-quality episodes, e.g. owing to COVID-19 and the war in Ukraine. The structural factors, on the other hand, are

the ample availability of reserves and the lower free float of collateral.<sup>3</sup> The latter factors were caused by the implementation of asset purchase programmes and the conduct of credit operations, which led to central banks having a large footprint in financial markets.

#### **Collateral scarcity**

The severe collateral scarcity for certain high credit quality bonds was the decisive factor in the strong downward pressure on repo rates observed in autumn 2022 (Chart 1.2.4). Scarcity of government bonds, particularly severe for some specific issuances, caused downward pressures on rates and resulted in a larger share of trades well below the DFR. The structural scarcity of some government bonds was aggravated in autumn 2022 by a higher demand for short-term safe assets and by an increase in short positions in the cash market, thus underpinning further stress in repo rates.

<sup>&</sup>lt;sup>3</sup> The free float is defined as the share of total outstanding bond supply that is held by price-sensitive investors. Such investors can include all sectors other than the foreign official sector, insurance companies, pension funds and the Eurosystem (see the speech given by Isabel Schnabel at the Bond Market Contact Group in Frankfurt am Main on 15 September 2021).

#### Chart 1.2.4



Specialness in the German, French, Italian and Spanish repo markets: share of repo volume trading below the GC rate by spread band (%)

Sources: MMSR. BrokerTec and MTS

Note: Confidential points are hidden. Given that the reporting of special collateral is voluntary in MMSR, this chart aims to estimate the volume of non-GC special repo by looking at the most expensive transactions. The areas highlighted in red show the transactions that are more expensive compared with GC repo rate (a difference of 30 basis points or more).

#### Central bank footprint

The increasing presence of the Eurosystem in the market for euro area government bonds has contributed to a lower availability of collateral (Chart 1.2.5). The sizeable amount of net asset purchases conducted during 2021 and in the first half of 2022, as well as the full reinvestment of maturing holdings thereafter further increased the Eurosystem's share in the European sovereign debt market and contributed to lower repo rates. As the central bank behaves as a buy-and-hold investor, its asset purchases limit the free-floating availability of government bonds in the system. This stock effect diminishes the supply of bonds and thus increases the relative value of collateral, leading to lower repo rates. While GC repo is affected by asset scarcity – as the overall supply of collateral is diminished – non-GC repo has a higher sensitivity to a lower free float, because investors face greater difficulties finding specific collateral the scarcer it is.

#### Chart 1.2.5

Relationship between repo rates (GC and non-GC) and availability of securities in the Eurosystem



Sources: Eurosystem, BrokerTec and MTS.

Note: The DFR was subtracted from the repo rates and is represented as a daily monthly average. The availability of European government bond (EGB) is calculated by subtracting the Eurosystem footprint on government bonds from the total issuance of euro area government bonds. The Eurosystem footprint is the monetary policy government bond portfolios, plus pledged government bonds as collateral for the Eurosystem lending operations, minus government bonds lent by the Eurosystem through the securities lending facility.

To attenuate the impact of its larger footprint, the Eurosystem has activated the securities lending facilities (Chart 1.2.6). The securities lending framework aims to support the functioning of bond and repo markets by lending back the market bonds bought under the APP and the PEPP. Moreover, the Deutsche Finanzagentur issued €54 billion to alleviate collateral scarcity of the German bonds used in the most expensive repo trades.<sup>4</sup> Both measures contributed to stabilise rates closer to the DFR on the repo market.

<sup>&</sup>lt;sup>4</sup> See the Deutsche Finanzagentur press release.

#### Chart 1.2.6



Usage of the Eurosystem securities lending facilities against cash collateral

Source: Eurosystem. Note: YE refers to "year end".

# 1.3 Maturities and calendar effects

#### 1.3.1 Flows

The repo market is mainly a short-term market, with most transactions taking place in the one-day maturity bucket (Chart 1.3.1). One-day maturity transactions, mainly concentrated in spot/next (S/N) and tomorrow/next (T/N), accounted for about 90% of the total repo turnover in 2022. Given that (specific) collateral-driven secured transactions are typically executed at the S/N tenor, this increase in S/N transactions reflects the growing importance of specific secured transactions.

Chart 1.3.1





Source: MMSR.

Note: O/N – overnight; S/N – spot/next; T/N – tomorrow/next.

#### 1.3.2 Stock

Roughly 85% of the total outstanding secured transactions are concentrated below the three-month maturity bucket (Chart 1.3.2). The larger share of the outstanding amount for term transactions relative to their daily turnover responds to the fact that these are not rolled over daily. The outstanding volumes on shorter maturities mainly involve borrowing transactions, with a total share of about 45% (compared with about 39% of the stock of volume in lending transactions). The stock of repos traded on longer maturities is higher for lending transactions, as repos are used as a source of liquidity provision when taking a position in longer maturities.

#### Chart 1.3.2



Share of total outstanding amount at 15 September 2022 by original maturity

Source: MMSR.

Note: The outstanding amount is a snapshot taken on 15 September 2022 in order to avoid reporting dates. The outstanding amount transforms the daily transaction volumes (flows) into a stock variable based on maturity dates. Outstanding amounts are adjusted for open repo transactions without fixed maturity at origination. These transactions are outstanding for the entire period between origination and termination date. Both borrowing and lending sides have been considered.

#### 1.3.3 Calendar effects

In recent years, there has been a significant decline in reportes at quarterand year-ends (Chart 1.3.3). Banks have an incentive to reduce the size of their balance sheets at regulatory reporting dates, especially at year-end, in order to improve their supervisory ratios. This leads to a reduction in their intermediation capacity, and ultimately in reporting activity, which is particularly balance-sheet intensive around these periods. As a result, investors willing to borrow collateral are charged a premium for this balance sheet cost, which has increased over the past years due to the imbalance between the amount of cash and the availability of securities in the system.

#### Chart 1.3.3

Effect of reporting dates on repo rates



Source: MMSR.

Note: Rate difference between the last business day of the quarter and the first business day of following quarter.

Volumes declined at the end of each quarter owing to counterparties' balance sheet constraints (Chart 1.3.4). In an environment of high excess liquidity, repo transactions predominantly serve collateral management purposes. Compared with the average volume traded during the quarter, borrowing activity on the last day of each quarter has gradually decreased, as banks are less willing to borrow liquidity and lend collateral to control their balance sheet size. The decline of volumes and the lower repo rates at these dates have generated (i) difficulties in hedging short positions in the repo market; (ii) an increase in settlement failures; (iii) difficulties for non-bank counterparties in depositing liquidity and, consequently, increased exposure to unexpected losses owing to particularly punitive rates; and (iv) volatility and uncertainty regarding one-day rates.

#### Chart 1.3.4

#### Volume effect of reporting dates (quarter-end and year-end)



Source: MMSR

Note: Volume difference between the last business day of the quarter and the first business day of following quarter.

# Counterparties intensified their prefunding activity ahead of the major balance sheet reporting dates over the years to avoid acquiring collateral at

particularly punitive rates in the last days of each year (Charts 1.3.5 and 1.3.6). In recent years, market participants have hedged their liquidity (or collateral) needs beyond the reporting dates by stepping up their prefunding activity on repo transactions. Repo transactions that were settled in the second half of the year and mature at the beginning of the following year increased in 2022, reaching €347 billion at the end of 2022, similar to 2021 and significantly higher than in 2020. The spread between euro area repo and OIS rates for transactions maturing after the year-end widened, peaking by the end of September and then gradually narrowing down in response to measures taken during the fourth quarter aimed at alleviating collateral scarcity. By the end of the third quarter of 2022, markets had discounted particularly low rates at the end of the year and possible increases in fails following the Governing Council's September 2022 decisions. As the end of the year approached, a series of measures had been taken by the Eurosystem and by governments in order to alleviate the scarcity of specific securities in the market.5 As a result, conditions in the repo market slightly improved. These measures helped to stabilise rates and narrow the repo-OIS spread, ensuring a smoother end-of-year transition.

#### Chart 1.3.5



Sources: MMSR, Bloomberg.

Note: Collateral issuer locations: DE, IT, FR, ES. The prefunding rates refer to all transactions executed and settled throughout the year of the selected period and that mature in January of the following year. Transactions are considered that fit in the maturities buckets of 1W, 2W, 1M, 2M, 3M, 6M, 9M and 12M. Trades maturity dates are adjusted for open repo transactions without fixed maturity at origination, so they reflect the date of termination or the latest date if a still ongoing operation. The size of the bubble represents the size of the transaction. Confidential points are hidden.

<sup>&</sup>lt;sup>5</sup> As mentioned before, this refers to the increase of the securities lending limit against cash.

#### Chart 1.3.6





Source: MMSR.

Note: Collateral issuer locations: DE, IT, FR, ES. The prefunding volumes refer to all transactions executed and settled throughout the year of the selected period and that mature in January of the following year. Considering the transactions that fit in the maturities buckets of 1W, 2W, 1M, 2M, 3M, 6M, 9M and 12M. Trades maturity dates are adjusted for open repo transactions without fixed maturity at origination, so they reflect the date of termination or the latest date if a still ongoing operation. Confidential points are hidden.

# 1.4 Counterparties

### 1.4.1 The importance of non-banks

Around two-thirds of traded volumes in the euro repo market are centrally cleared (Chart 1.4.1). While some of the CCPs have a banking licence, they are considered as a third category, separate from banks and non-banks.

#### Chart 1.4.1





Source: MMSR.

Note: Secured borrowing and lending volumes displayed. Some of the CCPs also have a banking licence. However, CCPs are displayed as a third category in this chart, separate from banks and non-banks.

# The highest volumes of non-cleared transactions were conducted by MMSR reporting agents with other banks and with investment and money market

**funds (Chart 1.4.2).** The non-cleared activity was distributed across banks, other types of financial institutions, general governments and, to a lesser extent, insurance companies. This trend has been ongoing since 2018. While banks borrow and lend in repo because of their market intermediation activity and their own portfolio management, MMFs tend to be net cash lenders and investment funds are generally net cash borrowers. Investment funds use repo transactions to increase their leverage for financing securities holdings.

#### Chart 1.4.2

Daily average non-cleared secured transaction volumes by sector



Source: MMSR.

### 1.4.2 Direction of the trade by sector and by jurisdiction

**French institutions account for the largest volumes in borrowing and lending repo transactions, followed by German institutions (Chart 1.4.3).** Institutions from the Cayman Islands make up the third-largest counterparty jurisdiction for both trading directions.

#### Chart 1.4.3

Top 5 lender and borrower jurisdictions



Source: MMSR.

Note: Only bilateral trades were considered. KY refers to the Cayman Islands.

Traded volumes for different counterparty sectors and jurisdictions were evenly distributed across borrowing and lending transactions (Chart 1.4.4). Moreover, over half of the turnover with bank counterparties is cross-border, and

MMSR reporting agents are net borrowers from other banks. On the other hand, over half of the turnover with CCPs is domestic, and MMSR reporting agents are net lenders in these transactions.

#### Chart 1.4.4

Direction of the trade by sector and by jurisdiction



#### Source: MMSR.

Notes: For compliance with confidentiality rules, euro area cross-border and international trades need to be displayed together under cross-country label.

The share of non-euro area international counterparties increased over the course of 2022 (Chart 1.4.5). The share of trades with non-euro area international counterparties reached 20% of total turnover, compared to 15% at the end of 2020. However, the share of domestic trades remained the most sizeable with almost half of the total turnover.

#### Chart 1.4.5

#### Direction of the trade by sector and by jurisdiction



#### Source: MMSR.

Note: Domestic refers to trades with a counterparty located in the same jurisdiction than the MMSR reporting bank. Euro area crossborder refers to trades with a counterparty located in the different member state than the MMSR reporting bank. Rest of the world refers to trades with a counterparty located outside the Euro area.

# The unsecured cash segment

2

Activity in the unsecured cash segment remained subdued but showed signs of reactivation during the second half of 2022. With excess liquidity reaching a record high of  $\in$ 4.7 trillion in the period under review, activity in the European money markets was largely driven by transfers of funds from non-banks to banks that subsequently placed them in the deposit facility of the Eurosystem. While the amount of funds exchanged in the secured segment was almost three times larger than in the unsecured segment, the return to positive interest rates in 2022 unlocked some business that had remained dormant during the negative interest period. Moreover, rising policy rates triggered devaluations of the securities holdings, requiring account holders to deposit additional cash or securities to meet margin calls, thus increasing trading volumes. Both factors relaunched activity – mainly overnight – in the unsecured segment by about one-fifth.

The pass-through of four policy rate hikes to unsecured overnight rates was rapid and efficient, but somewhat slower for longer maturities. The €STR responded immediately and by 99.4% to the four rate hikes. The EURIBOR also reacted to the policy normalisation process, but a less immediate pass-through was noted.

The €STR-DFR spread reached 10 basis points by the end of 2022 compared with 6 basis points at the beginning of 2021. Downward pressures on borrowing rates came from a persistent imbalance between cash demand and supply. On the demand side, euro area banks discouraged short-term cash inflows as they worsen the banks' regulatory ratios. On the supply side, depositors placing an increasing amount of excess liquidity favoured short money market maturities which, in the latter part of 2022, offered positive returns in an environment still dominated by large uncertainty surrounding the ECB terminal policy rate. This resulted in banks paying lower rates for deposits, which caused a wider €STR-DFR spread and negative one-month EURIBOR-OIS spreads, reflecting negative liquidity risk premia in shorter tenors. However, forward spreads (i.e. FRA-OIS spreads) remained positive, suggesting that the negative EURIBOR-OIS spreads were expected to be temporary.

Both overnight volumes and rates exhibited seasonality at quarter-ends, and this was more notable at year-ends. At these dates, both the usual volume of transactions and interest rates are reduced, as borrowing cash becomes particularly unwelcome for regulatory reasons. The rate effect exacerbated in 2021 and 2022, with the rate declining by 20 basis points on both year-ends compared with a decline of less than 7 basis points in previous years.

Almost 80% of the turnover reflected transactions between banks with access to the deposit facility and non-banks with no access to it. Non-bank counterparties domiciled in Germany, Luxembourg and Ireland showed the most active lending activity. Liquidity tended to accumulate in German, French and Belgian banks, independently of whether the liquidity had originally been distributed by the Eurosystem's credit providing operations or its asset purchases.

# 2.1 Volumes

#### 2.1.1 Flows

With an average daily trading volume of  $\leq 138$  billion, the unsecured segment was the third-largest segment of the euro money market in terms of volume (Chart 2.1.1), growing by approximately 21% over the last year. Unsecured transactions represented 12% of the total euro money market trading volume in the period under review, as measured in the MMSR data. The average daily trading volume stood at  $\leq 125$  billion in 2021 and increased to  $\leq 151$  billion in 2022.

#### Chart 2.1.1

Market size per segment in terms of daily transaction volumes, average in each quarter



Source: MMSR.

Note: The percentages refer to the weight of the unsecured cash segment on the total of the euro money market for 2018, 2020 and 2022.

#### 2.1.2 Stock

Outstanding amounts increased with the monetary policy normalisation cycle in the second half of 2022, starting from the lower levels observed during the pandemic (Chart 2.1.2). The decline in volumes stopped in 2021 and stabilised at around €265 billion, approximately €80 billion lower than in the years before the COVID-19 crisis. Inflation pressures changed market expectations of ECB interest rates and triggered appetite for more active liquidity management in 2022. This reactivation of activity increased the outstanding volume to around €300 billion in the first half of 2022 and €400 billion in the second half of 2022. In November 2022, outstanding volume hovered close to €500 billion, the highest outstanding volume recorded in the unsecured segment since MMSR data collection started.



Chart 2.1.2 Borrowing and lending trading volumes, daily values

Note: Confidential points are hidden

### 2.1.3 Drivers of volume

# Liquidity placements from non-banks, concentrated in overnight maturity

Money market activity in the unsecured segment remained dominated by financial institutions other than banks and corporates placing their liquidity with euro area banks at very short tenors (Chart 2.1.3). Almost 78% of banks' unsecured transactions have a non-bank as counterparty. Non-banks without access to the Eurosystem standing facilities place cash of an overnight maturity via the money market with euro area banks. These banks subsequently deposit funds with the ECB at the DFR. While there has been an increased preference for secured trading in money markets since the global financial crisis, market participants' daily liquidity management practices and the less onerous pricing of unsecured trades have always preserved daily borrowing activity above €100 billion.

#### Chart 2.1.3



Market size per data source – average daily transaction volumes over the last two years

Sources: AnaCredit (bank loans below one year) and MMSR (borrowing and lending). Note: While borrowing covers banks' transactions vis-a-vis any counterparty, lending only covers interbank activity.

The overnight segment represented 83% of the total unsecured volume (Chart 2.1.4). The reactivation of the unsecured activity in the second half of 2022 remained largely concentrated in the overnight maturity bucket.

#### Chart 2.1.4

Quarterly daily average volume traded by maturity bucket



Source: MMSR.

#### Return to positive interest rates

The return to positive interest rates in 2022 unlocked some business that had remained dormant during the negative interest period and triggered a decline in the value of securities holdings, requiring account holders to deposit

additional cash to meet margin calls (Chart 2.1.5). Both factors contributed to a reactivation of activity in the unsecured segment by about one-fifth, mainly overnight and in the very short-term tenors. The daily average volume contribution to the  $€STR^6$  increased from €46 billion in 2021 to €56 billion in 2022. The increase in €STR volumes was particularly strong during the second half of 2022, with an average daily volume of €60 billion and a peak of €80 billion on 14 September 2022.

#### Chart 2.1.5





#### Source: MMSR.

Notes: The chart is calculated as the daily average of the borrowing transactions divided into different selected maturities: "O/N eligible" captures O/N transactions contributing to the €STR, including those affected by the trimming procedure; "O/N not eligible" captures O/N transactions outside the €STR calculation (call accounts transactions with governments and NFCs, as well as small trades below €1 million); and "Other maturities" captures the residual borrowing transactions with maturities of longer than overnight.

#### Interbank activity in the unsecured cash segment has also increased, albeit

still at a low level (Chart 2.1.6). While interbank lending activity continues to be subdued, with daily flows between €4 billion and €7 billion, the share of unsecured interbank activity in MMSR for all maturities has slightly increased, from almost 7% at the beginning of 2021 to 10% at the end of 2022.

<sup>&</sup>lt;sup>6</sup> The euro short-term rate (€STR) reflects the wholesale euro unsecured overnight borrowing costs of the 47 largest banks located in the euro area.

#### Chart 2.1.6



Percentage of unsecured lending and borrowing volumes across counterparties with and without access to the DFR

Source: MMSR.

Note: Borrowing and lending average daily transaction volumes over the last two years are shown. Confidential points are hidden

# 2.2 Rates

#### 2.2.1 2021-22 trends

Unsecured rates increased for all tenors in 2022 after reaching a historical low at -0.60% in December 2021 (Chart 2.2.1). The €STR remained broadly stable in 2021 at an average of around -0.568%, while in the first half of 2022 the €STR fluctuated at a somewhat lower level, close to, but without reaching -0.6%. The EURIBOR also remained broadly stable in 2021, hovering below, but close to, the DFR in all maturities except for the 12-month tenor, which remained slightly above the DFR. All EURIBOR at -0.605% and the six- and 12-month EURIBOR at -0.554% and -0.518%, respectively. In 2022, higher inflationary pressures changed market expectations regarding the ECB official interest rate hikes and led to a steady increase of all unsecured rates and to higher term risk premia. This had a more visible impact on the 12-month EURIBOR which discounted further ECB interest rate hikes. By the end of 2022 the €STR stood at 1.89% and the 12-month EURIBOR at 3.00%.


(left y-axis: percentages; right y-axis: EUR billions)



Sources: MMSR, ECB, Bloomberg.

Notes: EURIBOR stands for euro interbank offered rate. The EURIBOR is based on the average interest rates at which a large panel of European banks borrow funds from one another. There are different maturities, ranging from one week to one year.

The pass-through of the four policy rate hikes to the unsecured rates in 2022 was rapid and effective (Chart 2.2.2). The increases in the ECB's official interest rates were well transmitted to the unsecured segment. The €STR responded immediately with a 99.4% pass-through of the four rate hikes of +50 basis points, +75 basis points, +75 basis points and +50 basis points decided in the second half of 2022, increasing by 49.6 basis points on 27 July to -0.085%, by 74.5 basis points on 14 September to 0.662%, by 74.4 basis points on 2 November to 1.403%, and by 49.9 basis points on 21 December to 1.902%, respectively. The EURIBOR also reacted to the policy normalisation process, but a less immediate and less complete pass-through was noted.





Sources: ECB and Bloomberg.

### 2.2.2 Drivers of rates

### Negative liquidity premia in short tenors

Overnight unsecured borrowing rates remained anchored to the DFR even if they drifted marginally away amid investors' preferences for short-term investments (Chart 2.2.3). On 3 January 2022, the €STR successfully replaced the euro overnight index average (EONIA) as the overnight benchmark rate for the euro. The transition took place over several years, guided by a private sector working group on euro risk-free rates.<sup>7</sup> Users of the EONIA managed to switch to the new benchmark rate successfully within the required deadlines.<sup>8</sup> Overnight unsecured borrowing rates remained anchored to the DFR during the whole period under review, almost perfectly mirroring the official interest rates hikes, although the €STR spread with the DFR slightly widened.

Notes: The €STR shows the one-day change for unsecured overnight trades that settled on the last day of the MP and the first day of the MP. The EURIBOR with one-week and one-month maturities reflects the change compared with one week and one month prior to the first day of the MP.

<sup>&</sup>lt;sup>7</sup> See the website of the European Securities and Markets Authority (ESMA) for more information on the Working group on euro risk-free rates (WG RFR), an industry group created to identify and recommend risk-free rates that could serve as alternatives to the EONIA and fallbacks for EURIBOR benchmarks.

<sup>&</sup>lt;sup>8</sup> See "The euro short-term rate (€STR): completing the transition to the new euro benchmark", ECB Economic Bulletin, Issue 4, 2022.





Source: MMSR.

The negative relationship between excess liquidity and unsecured rates persisted in the review period (Chart 2.2.4). By the end of 2022 the €STR stood around 10 basis points below the DFR<sup>9</sup> compared with around 6 basis points at the beginning of 2021<sup>10</sup>. Until mid-2022 the spread increase was smooth and gradual, with the variation on the spread of 2 basis points at around 18 months, in line with the speed observed in 2020. However, the pace accelerated in the second half of 2022, increasing by another 2 basis points in about six months amid the four interest rates hikes. The negative relationship between excess liquidity and unsecured rates recently intensified, putting further downward pressure on unsecured overnight rates.

<sup>&</sup>lt;sup>9</sup> Average for the fourth quarter of 2022.

<sup>&</sup>lt;sup>10</sup> Average for the first quarter of 2021.



Relationship between excess liquidity and unsecured interest rates

Sources: MMSR, Bloomberg

Note: Unsecured borrowing, weekly average of volume-weighted average rate's spread to DFR.

### Banks' market power in a positive interest rate environment

Banks had the market power to keep borrowing rates low as a result of access to the ECB's deposit facility and the return to positive rates. Downward pressure on borrowing rates was also caused by a persistent imbalance between demand and supply for cash in the money market. On the supply side, market participants showed a preference for placing cash in the shortest tenors, given (i) the uncertainly stemming from the war in Ukraine, (ii) the uncertainty regarding ECB rate hikes, and (iii) the restricted counterparty risk limits for longer maturities. As a result, most of the supply of funds was concentrated in the overnight maturity bucket. On the demand side, banks had limited appetite for cash in such short maturities because it impacts their LCR<sup>11</sup> and does not have NSFR regulatory value. In addition, the cash also negatively impacts the LR<sup>12</sup> and, if kept at the central bank, leads to an increase in banks' balance sheet size. This in turn leads to higher regulatory costs, such as supervisory fees<sup>13</sup> and contributions to the Single Resolution Fund<sup>14</sup>. Therefore, banks were only willing to accept liquidity below 30 days at rates further below the DFR to compensate for the impact of those new deposits on banks' regulatory ratios and levies. Moreover, banks' market power on rate negotiation with other non-bank economic agents seemed to increase with the

<sup>&</sup>lt;sup>11</sup> The effect on the LCR denominator depends on the type of deposit. While financial deposits below 30 days require a 100% buffer of liquid assets, non-operational deposits below 30 days require 40% and operational deposits require 25%.

<sup>&</sup>lt;sup>12</sup> With the entry into force of Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 (CRR II), the LR and the NSFR became binding on 28 June 2021.

<sup>&</sup>lt;sup>13</sup> See Article 10(3) of Regulation (EU) No 1163/2014 of the European Central Bank of 22 October 2014 on supervisory fees.

<sup>&</sup>lt;sup>14</sup> See the 2023 Resolution Reporting and Article 14(1) of Commission Delegated Regulation (EU) 2015/63 of 21 October 2014.

transition to a positive rates environment. These factors explain the widening of the €STR-DFR spread which took place in the second half of 2022.

## Positive risk premia visible on tenors above three months and FRA rates

Signs of credit risk were visible in forward rate agreement rates, but not in borrowing rates below the three-month tenor (Chart 2.2.5). The EURIBOR-OIS spread is generally seen as a good measure of credit and liquidity risk. The EURIBOR is (at least partly) built on actual unsecured borrowing transactions. It therefore contains a credit element between trade counterparties and a liquidity element in the form of funding availability. In contrast, the OIS reflects expectations of overnight and almost risk-free rates. Hence, the spread between the two is usually positive and a good measurement of credit and liquidity risk. However, EURIBOR-OIS spreads for the one-month tenor turned negative from August 2022 with brief episodes where it turned positive. It has been almost constantly inverted since the beginning of October 2022, together with the three-month EURIBOR-OIS spread. The downward pressure observed on term rates up to three months seems to be attributable to a negative liquidity premium and driven by cash supply-demand imbalances, equal to that observed in the €STR. The one-month EURIBOR also showed a more sluggish reaction to the repricing of ECB policy rates, suggesting that the downward pressure is largest for funds that fully weigh on the LCR denominator. However, the three-month FRA-OIS spread remained positive at 4 basis points for March 2023 and at 10 basis points for mid-2023. As FRAs reflect expectations on future unsecured interest rate levels, the persistence of a positive FRA-OIS spread in the tenors where the EURIBOR-OIS spread is negative suggests that the negative spreads are expected to be temporary. Therefore, it seems that the FRA-OIS spread was a better indicator for monitoring the development of credit risk perception across maturities in 2022 than the EURIBOR-OIS spread.

Chart 2.2.5





Source: Bloomberg.

### **Box 1** €STR-based fallbacks for EURIBOR

One of the benchmark rate reforms guided by the Financial Stability Board, the EU Benchmarks Regulation (BMR) and the International Organization of Securities Commissions (IOSCO), is the introduction of robust fallbacks in contracts referencing benchmark rates. These fallbacks would cover a scenario in which the benchmark was subject to the risk of disruption or discontinuation.

While there are no plans to discontinue EURIBOR, the EURIBOR fallback measures would make it possible for market participants to comply with Article 28(2) of the BMR.

On 11 May 2021, the working group on euro risk-free rates issued recommendations<sup>15</sup> supporting a homogeneous and consistent development of robust fallback measures for EURIBOR-linked contracts across market usage and segments. These recommendations put forward the use of compounded €STR rates and term €STR rates as components of EURIBOR fallback measures, depending on the different asset categories.

### Compounded €STR average rates

On 15 April 2021 the ECB started publishing compounded €STR average rates and a compounded index based on the €STR in response to market feedback. The rates are backward-looking compounded averages of the €STR calculated over standardised tenors of one week, one month, three months, six months and twelve months. The compounded €STR index makes it possible to calculate a compounded €STR average rate over any other tenor of choice. Publication takes place each TARGET2 business day at 09:15 CET. The rules for the calculation and publication of the

<sup>&</sup>lt;sup>15</sup> See "Recommendations by the working group on euro risk-free rates on EURIBOR fallback trigger events and €STR-based EURIBOR fallback rates", 11 May 2021.

compounded  $\in$ STR average rates and index are published on the ECB website<sup>16</sup> and their design was the result of a public consultation.

### €STR term rates

On 14 November 2021, the European Money Markets Institute started publishing a euro forwardlooking term rate (EFTERM) based on available market data on OIS and futures that reference the €STR, where the ICE Benchmark Administration acts as its calculation agent. EFTERM applies a waterfall methodology using dealer-to-client bid and offer prices and volumes obtained from Tradeweb's institutional trading platform or end-of-day settlement prices for ICE one-month €STR futures contracts. Tradeable bid and offer prices and volumes from regulated electronic trading venues will also be used in the waterfall, when available. EFTERM is calculated for five tenors: one week, one month, three months, six months and twelve months. Publication takes place on every TARGET2 business day at or shortly after 11:15 CET.

On 26 October 2021, Refinitiv launched a prototype forward-looking fallback rate. The Refinitiv Term €STR adopts a waterfall methodology that uses dealer-to-client bids and offers quotes of €STR and OIS from Tradeweb's institutional trading platform as the primary source. An integrated fallback based on the compounded €STR is used as the secondary source. Publication of the Refinitiv Term €STR is planned to take place on a daily basis for five tenors: one week, one month, three months, six months and twelve months.

### 2.3 Maturities and calendar effects

### 2.3.1 Flows

The data show an increase in the overnight volume, to the detriment of the other maturity buckets (Chart 2.3.1). Between 2021 and 2022 the average overnight volume increased by  $\leq 24$  billion to  $\leq 108$  billion, representing 83% of the unsecured volume, while the rest of the maturity buckets experienced a decline in volume (for example, the three-month volume fell from  $\leq 34$  billion to  $\leq 20$  billion). This increase in overnight activity seemed to be the result of banks preferring to negotiate on the shorter maturities. The transfer of the unsecured activity from the longer maturity buckets to the overnight bucket occurred in two different stages. First, in 2021, an aggregate decline of the average daily transaction volume was mainly observable in the longer maturity buckets (for example, volumes with maturities of one to three months and above three months declined by  $\leq 14$  billion and  $\leq 6$  billion, respectively). Second, in 2022 the reactivation of the unsecured activity was largely concentrated in the overnight maturity bucket.

<sup>&</sup>lt;sup>16</sup> See "Compounded €STR average rates and index: Calculation and publication rules", ECB, Frankfurt, October 2020.

Chart 2.3.1

Volume (average daily transaction) per maturity bucket



Source: MMSR.

### 2.3.2 Stock

**Outstanding amounts (stocks) accounted for a higher weight of longer maturities compared with overnight activity (Chart 2.3.2).** One-day maturity trades only account for 28% of the total outstanding borrowing volume. The remaining 72% of borrowing outstanding amounts and almost all lending contracts have a maturity of over one week. Therefore, they appear more prominent than in the flow data. Specifically, both lending and borrowing activity have a similar concentration of around 35% in the one-week and three-month maturity tenors. However, lending outstanding volumes constitute a larger share of contracts with a maturity of 4 months and over.

### Chart 2.3.2



Borrowing and lending volumes (outstanding at period end) per maturity bucket at 15 September

Source: MMSR.

Note: The middle of the month was chosen in order to avoid quarter-end differences in the composition of the maturity buckets in the outstanding amounts.

### 2.3.3 Calendar effects

Unsecured overnight volumes and rates exhibit seasonality at quarter-ends and more notably at year-ends. At these dates, both the usual volume of transactions and rates are reduced, as borrowing cash becomes particularly undesirable for regulatory reasons and therefore euro area banks only take it at lower rates.

### On rates

**Overnight borrowing rates fell substantially at quarter-ends (Chart 2.3.3).** In order to reduce the borrowing activity on the reporting dates, banks lower prices for taking up overnight deposits. This effect has gradually increased over time and intensified for the last two year-ends, with an overnight rate decline of 7 basis points in the fourth quarter of 2020, compared with 20 basis points in the fourth quarter of 2022. The stronger effect on rates despite the lower impact on volume in the period under review might be attributable to banks' market power regarding rate negotiation.



Chart 2.3.3 Effect of reporting dates on unsecured interest rates

Source: MMSR.

Note: Rate difference between the last business day of the quarter and the first business day of following quarter.

### On volume

Overnight borrowing volume fell significantly at reporting dates, showing approximately 20% lower volume at year-ends (Chart 2.3.4). On these reporting dates banks try to minimise their balance sheet size with the aim of improving their regulatory ratios, optimising their financial state at the reporting date and reducing their contributions to certain bank levies. Several factors put pressure on banks to avoid liquidity holdings from non-banks and to not rely heavily on central bank funding in their year-end balance sheet: (i) the entry into force of the liquidity ratio regulation on 28 June 2021, (ii) the increasing levels of excess liquidity recorded until mid-2022, and (iii) the re-inclusion of central bank exposures for the calculation of the leverage ratio as of April 2022. For these reasons, a volume decline at quarterends and especially at year-ends is observed, with a decline of  $\in$ 39 billion in the fourth quarter of 2020, and  $\notin$ 29 billion in the fourth quarter of 2021 and the fourth quarter of 2022. The decrease in lending volume at reporting dates is more marginal than the decrease in borrowing activity.

### Chart 2.3.4

Effect of reporting dates on trading volume



Source: MMSR.

Note: Volume difference between the last business day of the quarter and the first business day of following quarter.

### 2.4 Counterparties

### 2.4.1 The role of non-banks

Almost 80% of euro area banks' unsecured trades were conducted with nonbank counterparties (Charts 2.4.1 and 2.4.2). Roughly 78% of the unsecured activity in the MMSR was made up of banks receiving cash from other entities that do not have access to the ECB deposit facility. Of such entities, non-bank financial institutions – in particular MMFs – and NFCs registered the highest volumes, followed by governments. Interbank business accounted for the remaining 22%.



Percentage of trades per counterparty group (banks and non-banks)

Source: MMSR.

# While non-bank financial institutions – including MMFs and other investment funds – were the largest cash depositors, trades with non-financial

corporations grew considerably in 2022 (Chart 2.4.2). In relative terms, MMFs recorded the highest growth in cash deposits with banks - 44% since 2021 continuing the upward trend observed since 2020, when the deterioration in risk sentiment led MMFs to maintain more liquidity in order to be able to meet potential outflows at any time. This trend was reinforced with the return of the positive interest rates environment. NFCs became the second-largest contributor to unsecured market activity in 2022, after having declined in volume in 2021. This decline was attributable to the release of part of the liquidity buffers built during the COVID-19 crisis. In 2022 NFCs rebuilt liquidity buffers in view of new macroeconomic uncertainties linked to inflation and commodity price volatility. This rebuilding led to a daily average volume of €35 billion. Other financial institutions and governments also increased their deposits during 2022, despite the fall observed in 2021. The ECB Governing Council's September 2022 decision to remunerate government deposits held with the Eurosystem at market rates until April 2023 tempered abrupt shifts from Eurosystem accounts to the market in a positive rate environment. Finally, interbank lending volumes decreased from 2020 to 2021 and remained broadly stable in 2022 at around €7 billion.



Unsecured volumes for each counterparty sector, borrowing and lending

Source: MMSR.

Note: "Other financials" includes financial auxiliaries, captive financial institutions and money lenders, pension funds, insurance corporations, non-MMF investment funds and other financial intermediaries.

### 2.4.2 Direction of the trade by sector and jurisdiction

In terms of jurisdiction, German and French banks received cash predominantly from non-banks domiciled in Germany, Luxembourg and Ireland (Charts 2.4.3 and 2.4.4.). Over time, excess liquidity tended to accumulate in very large banks located in a few euro area countries (Germany, France or Belgium). Thus, high volumes were transacted among market counterparties across jurisdictions, independently of how the liquidity had originally been provided by the Eurosystem. Due to their status as financial hubs for the fund industry, Luxembourg and Ireland have a high concentration of MMFs. Germany also acts as a financial hub for corporations and other financials. These non-bank actors ultimately place their liquidity in euro area banks because they do not have access to the central bank deposit facility. Chart 2.4.4 shows that in the review period, almost 50% of the unsecured activity was domestic, and euro area cross-border flows accounted for 40% of unsecured activity. Around a half of the inflows to banks came from financials and corporations - and to a lesser extent from governments - from the same jurisdiction. Euro area cross-border activity predominantly reflected inflows from financial institutions. Finally, the international trades were limited, taking place on the interbank market and also reflecting inflows from financial institutions.

Direction of trade by jurisdiction (top five borrowers and lenders)



Source: MMSR.

Note: On the borrower side, the fifth jurisdiction was removed in compliance with MMSR confidentiality rules.

### Chart 2.4.4

### Direction of the trade by counterparty



Source: MMSR.

Notes: In the unsecured segment, the lending side does not mirror the borrowing one, as on the lending side the MMSR reporting agents are only providing information on trades concluded with counterparties belonging to ESA 2010 sector "S.122". On the borrowing side the range of counterparties is much broader, covering other financial corporations, non-financial corporations and governments. In this chart we are considering both sides of the trade to show the current representation.

Despite higher levels of domestic activity, cross-border trading increased over the past two years (Chart 2.4.5). The share of volume traded between counterparties belonging to different countries in the euro area increased from 35% in 2021 to 40% in 2022, while domestic business remained at around 50%. The increase in domestic activity observed at the end of 2022 seemed to be related to the growth of interbank lending activity (Chart 2.1.6).





Source: MMSR.

Notes: Domestic refers to trades with a counterparty located in the same jurisdiction than the MMSR reporting bank. Euro area crossborder refers to trades with a counterparty located in the different member state than the MMSR reporting bank. Rest of the world refers to trades with a counterparty located outside the Euro area.

### The short-term securities segment

The short-term securities (STS) segment of the euro money market encompasses several markets with their own legal basis, participants and dynamics. The international and multi-currency Euro Commercial Paper (ECP) market remains the largest market and is mainly governed by English law. The second most important market is the Negotiable European Commercial Paper (NEU CP) and medium-term notes (NEU MTN) market, which is governed by French law and was reformed in 2016 to comply with international standards and attract a larger number of issuers, especially non-domestic issuers. Other domestic markets in Belgium, Germany, Spain and Italy are smaller. The Short-Term European Paper (STEP) label was launched in 2006 and its aim is to foster the integration of European markets for short-term paper by harmonising standards and practices.

Issuances in the STS segment stabilised in 2021 below pre-pandemic levels and increased again during the latter half of 2022. Banks issued 75% of STS in the primary market, leading the increase observed in the second half of 2022. TLTRO take-up substituted banks' STS issuance as a funding source in 2021. Conversely, TLTRO repayments in the second half of 2022 and a renewed appetite for investment opportunities at positive rates had a positive impact on banks' STS issuances. However, pre-pandemic levels are yet to be achieved.

From 2021 to early 2022, the yield curve of euro-denominated STS remained flat and steepened thereafter following monetary policy normalisation. The pass-through of hikes in Eurosystem policy rates to rates in the STS segment was complete. The high degree of uncertainty in financial markets and the monetary policy normalisation accentuated investors' preference for STS issuances up to three months. Issuances of STS with maturities above nine months continued to decrease for the whole period under review. MMFs remain the largest investors in short-term securities.

### 3.1 Volumes

#### STS issuance and price activity are best measured in statistical datasets

**outside the MMSR dataset**. MMSR data cover four out of the five segments of the euro money market. Information on the fifth segment – STS issuance – is provided by the statistics on the Centralised Securities Database (CSDB) for volumes and STEP for rates, as they both cover a broader range of short-term debt instruments compared with the MMSR.

(EUR billions)



Notes: The CSDB contains data on "certificates of deposit", "commercial paper" and "other money market instruments" with a maturity of up to 12 months for all currencies and all issuer types located in the euro area. The MMSR only covers euro-denominated issuances made by a sample of reporting agents. The STEP includes STS in all currencies and from all types of issuers, and with a STEP label. NEU CP covers STS issued under the NEU CP programme in France, which are largely euro denominated. Dealogic provides STS primary market issuances by euro area issuers in all currencies.

### 3.1.1 Flows

With an average daily issuance volume of  $\notin$ 9.9 billion, the STS market remains the smallest segment of the euro money market in terms of volume (Chart 3.1.2). After reaching a low point at the end of 2020 ( $\notin$ 8.3 billion), gross issuances of commercial paper (CP) and certificates of deposit (CD) gradually increased at the end of 2022. The average daily gross issuances have accelerated more sharply since the third quarter of 2022, reaching  $\notin$ 12.4 billion by the end of 2022.







Source: CSDB.

Notes: The series consider only the borrowing side (issuance) by all counterparties sectors (except public entities), and all currencies. The percentages refer to the weight of the short-term securities segment on the total of the euro money market for 2018, 2020 and 2022.

### 3.1.2 Stock

The outstanding stock of STS has remained broadly stable (Chart 3.1.3). This is because the share of EUR- and USD-denominated issuances grew in the second half of 2022 at the expense of GBP-denominated issuances After the annual average outstanding amount fell to  $\in$ 556 billion in 2021 from  $\in$ 648 billion in 2020, it recovered slightly to  $\in$ 586 billion in the second half of 2022. EUR-denominated STS remained dominant (61% in the second half of 2022 compared with 55% in January 2021), followed by USD-denominated STS (25% compared with 29% in January 2021). On the contrary, the weight of GBP-denominated STS slightly decreased from 15% to 14%. STS denominated in other currencies remained marginal (1%).

### Chart 3.1.3





Source: CSDB.

Notes: Outstanding amounts of securities with maturities of up to one year issued by all sectors, excluding general government issuance.

### 3.1.3 Drivers of volume

### Dominance of bank issuance

# Banks led the recovery of STS issuance in the second half of 2022 (Chart 3.1.4). Banks issued 74% of STS in the primary market, leading the increase observed in the second half of 2022. The issuance of NFCs increased slightly on average over 2022 compared with previous years, without showing a consistent upward trend yet.



Development of daily average issuance split by issuer group (banks and non-banks)

Source: CSDB.

Note: Average daily issuance volume of securities with maturities of up to one year issued in all currencies, by all sectors, excluding general government issuance.

After the Eurosystem changed the terms of TLTRO for the period from June 2020 to June 2022 in response to the COVID-19 crisis, large TLTRO take-up substituted banks' STS issuance as a funding source (Chart 3.1.5). Banks' STS outstanding volumes strongly declined in the second half of 2020, when banks were able to fulfil their funding needs at a more favourable cost through TLTRO III at -1% until June 2022. During 2021 and the first half of 2022, banks' STS outstanding volumes remained stable, representing less than 25% of their TLTRO III holdings, compared with more than 50% from 2018 to 2019 under TLTRO II. In this context, some banks continued with their STS programmes, mainly to keep their investor base and to ensure their presence in the STS market once TLTRO III funding matures. As a result, net issuance in 2021 and the first half of 2022 remained broadly in line with maturing amounts.

Conversely, TLTRO III repayments in the second half of 2022 – following the recalibration of terms in October 2022 – had a positive impact on banks' STS issuance. The ECB decision to recalibrate the TLTRO III terms from June 2022 onwards as part of the monetary policy normalisation process made TLTRO funding less attractive and resulted in repayments reaching €800 billion in the fourth quarter of 2022. This had a positive impact on the recovery of banks' STS issuances by the end of 2022.





Sources: CSDB and ECB.

Note: Outstanding amounts of securities with maturities of up to one year, considering only banks' issuance

### Focus on short-term STS issuances

STS issuances were predominantly in short tenors, potentially owing to the uncertainty surrounding the size and trajectory of expected ECB policy interest rate hikes (Chart 3.1.6). As soon as signals on monetary policy normalisation were rooted in market sentiment, most investors showed appetite only for paper below one month with a maturity before the next expected interest rate hike. Therefore, issuances were strongly concentrated in the one- to three-month maturity bucket. A similar dynamic was also reported in USD and GBP STS markets, as the central banks in these currency areas were also raising policy rates to address inflation.





Source: CSDB

Note: Average daily issuance volume of securities with maturities of up to one year issued in all currencies, by all sectors, excluding general government issuance. Each maturity band excludes the previous (shorter) maturities bands.

### 3.2 Rates

### 3.2.1 2021-2022 trends

The pass-through of ECB policy rate hikes to rates in the STS segment was more effective in August and September than in July and December (Chart 3.2.1). In August and September yields for issuances on very short maturities (< 1 week) immediately reflected the new DFR. However, the pass-through for STS issuances with a maturity of between eight and 31 days was not as close, particularly in July and December. The lower pass-through following the July rate hike can be explained by the very low volume of issuances performed during the summer period (15 issuances for  $\leq 1.2$  billion). On the contrary, in October (and after the TLTRO III rate recalibration), the volume of issuances with a maturity of between eight and 31 days was much higher (113 issuances for  $\leq 7.7$  billion), and their yield increased more than the DFR. After the December Governing Council meeting, issuances with a maturity of between eight and 31 days were again limited (38 issuances for  $\leq 3.8$  billion) and did not mirror the DFR hike (potentially owing to a basis effect).





#### Source: STEP.

Note: The pass-through was calculated by subtracting the volume-weighted average STEP zero-coupon yields of the maintenance period after the Governing Council decision and the previous maintenance period. Considering that maintenance period in t refers to the decision of the Governing Council in t, the period after the decision includes all instruments issued from the start until the end of the respective MP (t), that mature between the start and end of the current MP (t). The period before the rate hike includes all the issuances carried out between the start and end of the previous MP (t-1), and that matured during the previous MP (t-1).

### The STEP yield curve has steepened since July 2022, as longer maturities reflected an upward trend in the ECB rate hike expectations (Chart 3.2.2). In the

first quarter of 2021, the STEP yield curve was flat. Yields close to the DFR reflected expectations of no changes in the monetary policy stance for at least one year. STEP yields on zero-coupon paper with a maturity of up to three months were, on average, 6 basis points below the DFR. However, in the first quarter of 2022 signals of monetary policy normalisation set up expectations for the first policy rate hikes in the third quarter of 2022 and caused the STEP yield curve to slightly steepen for maturities straddling the first expected rate hike. Following the July 2022 policy rate increase, the STEP yield curve steepened further. Rate hike expectations sharply rose from mid-August 2022, as inflation was higher than anticipated and ECB communication was perceived as hawkish. In this context, the implementation of the 75 basis point rate hike in September 2022 accelerated the steepening of the STEP yield curve.



STEP yield curve comparison across time

Sources: STEP, ECB.

Note: The series consider only yields on zero-coupon paper with a maturity of up to 12 months.

### 3.2.2 Drivers of rates

### Interest rate expectations

Over 2021 and 2022, yields on STS were consistent with EURIBOR yields (Chart 3.2.3). The nine- to 12-month STS spread to OIS remained contained until the July 2022 rate hike. However, it increased thereafter in a context of lower STS trading volumes and a limited number of issuances. The yields followed the upward trend observed for EURIBOR and OIS rates with matching maturities.





Sources: STEP, Bloomberg.

Notes: Issuances by total economy and all ratings.

### Eurosystem measures

The spread of STS yields and OIS rates remained compressed from June 2020 to March 2022, against the background of large TLTRO III take-up at very favourable conditions (Chart 3.2.4). In March 2020, in the context of the COVID-19 crisis, the start of the PEPP and the expansion<sup>17</sup> of the corporate sector purchase programme alleviated the tensions on the STS market. In addition to purchase programmes, the change to the terms of TLTROs in June 2020 and the subsequent high take-up generated lower issuances from banks on the STS market and contributed to lowering STS yield spreads to OIS rates. From March 2022, STS spreads stabilised at a higher level as the Eurosystem entered a normalisation

Expansion to non-financial commercial papers with a remaining maturity of at least 28 days (versus six months previously). The Eurosystem STS holdings by non-financial commercial papers reached €35 billion in June 2020 but receded quickly and remained below €10 billion from March 2021.

phase with the end of the TLTRO III additional special interest rate period in June 2022 and the first DFR hike in July 2022.

### Chart 3.2.4

Daily spread of STEP zero-coupon yields and OIS by maturities, and TLTRO relevant periods



Sources: STEP and Bloomberg.

Note: The dashed lines indicate the dates where (i) TLTRO rate changes were announced (12 March 2020, 30 April 2020 and 27 October 2022) and the announcement of the extension of the special interest rate period (SIRP) (10 December 2020). The highlighted yellow area represents the SIRP and additional SIRPs (from 24 June 2020 until 23 June 2022), when the interest rate on TLTRO III funds was as low as -1% for banks meeting the respectified criteria.

### **Issuer rating**

Rate dispersion based on the issuer rating increased in 2022 (Chart 3.2.5). In 2021 rates paid by issuers were very similar regardless of their credit rating. However, in 2022 a higher dispersion of rates depending on the issuer rating was observed, especially for issuances at shorter maturities. Data on longer-term issuances did not show a higher rate dispersion. This could be because the issuances on these tenors were performed by the issuers with the highest ratings and that most probably belong to the banking sector.



Spread of issue yield of STEP zero-coupon instruments denominated in EUR of the highest credit rating versus all ratings, by maturity

Source: STEP.

### Counterparty type

Over the review period, the yields paid by non-banks (mainly NFCs) on threemonth STS were higher than yields paid by banks (Chart 3.2.5). NFCs also recorded a higher dispersion of rates than banks, although it tended to decrease over time. Contrary to the usual trend, in the fourth quarter of 2022 rates paid by NFCs were relatively close to the yields paid by banks.

### Chart 3.2.6

Daily yields of STEP zero-coupon 3-month STS denominated in EUR of banks and NFCs



Source: STEP.

### 3.3 Maturities and calendar effects

### 3.3.1 Flows

The high degree of uncertainty in financial markets on the speed of the monetary policy normalisation in 2022 accentuated the preference for STS issuances with short tenors. Maturities shortened on average between 2020 and 2022, with issuances of longer tenors (more than three months) decreasing. This shortening of maturities can be explained by the volatile interest rate environment, given that most STS, such as CP/CD, are issued at fixed rates. While floating rate CP issuances were gaining momentum, they remained relatively limited. Notably, banks' daily STS issuances up to three months increased to €5.3 billion in 2022 (from €3.6 billion in 2020) and issuances on longer tenors (between six months and one year) fell to €2.4 billion (from €3.1 billion). The maturity of the issuances of other entities (mainly NFCs) remained stable, except on the three-month tenor in which issuances reached €1.4 billion in 2022, twice the daily average volume in 2020 and 2021 (€0.6 billion and €0.7 billion, respectively).

### Chart 3.3.1





Source: CSDB.

Notes: Daily average issuance of euro area countries in all currencies, excluding general government issuance. Each maturity band excludes the previous (shorter) maturities bands.

### 3.3.2 Stock

Banks usually favoured issuances on longer tenors (more than three months), while corporates and public entities refinanced themselves on shorter maturities (Chart 3.3.2). For banks, this dynamic is influenced by the LCR regulation, which penalises bank issuances that are shorter than one month. On the contrary, corporates focus their issuances on one- to three-month maturities, which are the appropriate tenors for funding their working capital requirements.

### Chart 3.3.2



STS outstanding amounts at 30 September 2022 by issuer type and maturity

Source: CSDB.

Notes: Outstanding amounts of securities with a maturity of up to one year, excluding general government issuance. "MFIs" stands for monetary financial institutions. Each maturity band excludes the previous (shorter) maturities bands.

### 3.3.3 Seasonal issuance pattern

Banks' STS issuances until 2022 had been characterised by a seasonal pattern reflecting high issuance in the first half of the year and limited activity in the last months of the year. However, banks' issuance in 2022 significantly deviated from this pattern due to the extraordinary impact of TLTRO repayments (Chart 3.3.3). From 2015 to 2021, STS gross issuances in the fourth quarter were usually between €0.5 billion and €1 billion less than the average amount issued over the year. Most of the yearly funding programmes had already been achieved close to the year-end and balance sheet constraints – especially for banks – became more binding at year-end. On the other hand, quarterly issuances in the first half of the year were usually higher than the yearly average. However, issuances in the first half of 2022 showed a deviation from the yearly average, with considerably higher net issuances in the second half of the year.

### Chart 3.3.3





Source: CSDB.

Note: Difference between the quarter and year daily average issuance volume of securities with maturities of up to one year issued in all currencies, by all sectors (excluding general government).

### 3.4 Counterparties

### 3.4.1 STS issuers and investors

Banks were the main issuers of STS in the primary market in 2021 and 2022 (Charts 3.4.1 and 3.4.2). Banks accounted for 74% of daily average issuances between January 2021 and December 2022. The remaining 26% was issued by other entities, of which NFCs were the largest contributors. This allocation among issuers had remained stable over the past years.

### Chart 3.4.1





Source: CSDB.

**MMFs remained the largest investors in the STS market (Chart 3.4.2).** Euro area MMFs traditionally provide short-term funding to banks and NFCs by investing in short-term instruments such as CP and CD. On 30 June 2022, they held 74% of STS outstanding amounts, far more than bank investors (12%) and other financial corporations<sup>18</sup> (8%). NFCs and other financials remained marginal investors in STS (3% each). Other financials invested their cash in longer-dated and safer assets, mostly Treasury bills, while NFCs opted for bank deposits or buying MMF shares.

### Chart 3.4.2



### Borrowed and lent amounts in STS by sector

Sources: CSDB for issuers and ECB (Securities holdings statistics database – SHS) for the holders. Notes: Both charts display the outstanding amounts as of 30 September of each year of the instruments that were issued in the Euro area, in all currencies, in the period from January 2020 to 30 September 2022. Non-bank issuers do not include central and local governments.

### 3.4.2 Direction of the trade by sector and jurisdiction

French banks were the main issuers and French MMF were the main investors in the STS market. About 60% of STS outstanding amounts were issued by French and German entities (€222 billion and €128 respectively, Chart 3.4.3), while Dutch, Belgian and Finnish entities were smaller borrowers (between €40 billion and €70 billion in issued outstanding amounts). French MMFs were the largest lenders to banks via the euro short-term debt market (€170 billion, representing 50% of total STS holdings). Other notable lenders were Irish and Luxembourgish MMFs (each about €70 billion, representing 20% of total STS holdings). MMFs based in Ireland and Luxembourg had a higher share of USD and GBP funds and were also more active in the foreign-denominated STS instruments of euro area banks.

<sup>&</sup>lt;sup>18</sup> "Other Financials" covers insurance companies, pension funds and non-MMF investment funds.

### Chart 3.4.3

Top issuing and holding countries, excluding public issuers



Sources: CSDB for issuers and SHS for holders.

Note: Outstanding amounts at 30 September 2022. The outstanding amounts refer to money market instruments (except Treasury bills) that were issued by euro area countries, with maturities of up to one year, in all currencies. Additionally, instruments issued by governments were excluded. For the holders' side, euro area holders are also considered.

### A large part of banks' issuance as well as MMFs' holdings in the euro area

were cross-border (Chart 3.4.4). However, this was not the case for NFC borrowers, whose funding source is mainly domestic.

### Chart 3.4.4

Top issuers and holders by jurisdiction and type of trade



Sources: CSDB for issuers and SHS for holders.

Note: Outstanding amounts at 30 September 2022. The outstanding amounts refer to money market instruments (except Treasury bills) that were issued by euro area countries, with maturities of up to one year, in all currencies. Additionally, instruments issued by general governments were excluded. For the holders' side, euro area holders are also considered. The chart displays only the operations where a match between the two databases was found.

### The foreign exchange swap segment

During 2021 and 2022, EUR/USD swaps remained the most common FX swaps traded worldwide, with around 25% of the €900 billion global daily volumes traded in the euro area money market. The FX swap segment is the second-largest segment of the euro money market. Euro area financial institutions obtain short-term funding in foreign currencies to hedge against currency risks that stem from owning assets denominated in foreign currencies. As in the past, during 2021 and 2022 the activity in this segment was dominated by the US dollar, as the dollar is mostly used in international transactions, and as a store of value, not only in crisis times. The US dollar market is also one of the most transparent and well-functioning capital markets in the world. Moreover, owing to its high liquidity and fungibility, the US dollar is often used to obtain funding in other currencies whose underlying FX swap markets are less liquid against the euro.

The consistent breach of covered interest parity (CIP) observed in 2021 and 2022 predominantly stemmed from the structural shortage of USD in the international system, along with the balance sheet costs associated with dealer intermediation. The USD shortage intensifies particularly at quarter- and year-ends. For this reason, market participants concerned about a wider FX swap basis (i.e. USD premium) around year-end usually frontload USD funding as of October in order to avoid large supply-demand imbalances over the year-end. In 2021 and 2022, the seasonal tightening of US dollar funding conditions was moderate, while prefunding ahead of the year-end became more expensive in 2022, starting earlier and with larger volumes.

Euro area banks use FX swaps to intermediate between their euro area clients in need of US dollar funding and counterparties located in the United States and the United Kingdom, who are natural providers of US dollars. Euro area clients are predominantly from the financial sector and are predominantly pension funds and insurance companies. The recourse to the Eurosystem's one-week US dollar tender operations, which are priced as a backstop to US dollar funding conditions, was insignificant during 2021 and 2022.

### 4.1 Volumes

### 4.1.1 Flows

With an average daily trading volume of €265 billion, the FX swap segment grew 44% over the last two years, consolidating its position as the second largest segment of the euro money market (Chart 4.1.1). FX swap transactions represented 24% of the total euro money market volume in the review period, with its relative volume tripling since the creation of the euro.

### Chart 4.1.1



Market size per segment - average daily transaction volumes

Source: MMSR.

Note: The percentages refer to the weight of the FX swap segment on the total of the euro money market for 2018, 2020 and 2022.

### 4.1.2 Stock

**Outstanding amounts also showed notable growth (Chart 4.1.2).** FX swaps had totalled  $\in$ 4.4 trillion within the fourth quarter of 2022, recording a  $\in$ 1 trillion increase in total stock since mid-2021.

### Chart 4.1.2

Buying and selling trading volumes, daily values



Source: MMSR.

Notes: From 2016 on, the series include MMSR transactions in all currencies, buying and lending and all maturities up to one year. Confidential points are hidden.

### 4.1.3 Drivers of increasing volumes

Need to manage currency and maturity mismatches embedded in balance sheets assets denominated in foreign currencies

FX swaps are widely used to hedge against currency risk and to source shortterm funding in foreign currencies (Chart 4.1.3). Euro area banks use FX swaps for hedging against the currency risk that they incur by holding assets in foreign currency while their funding is denominated in euro. As a relevant share of euro area banks' assets (loans and securities) is denominated in foreign currency, they fund them via FX swaps by buying foreign currency against euro. Accordingly, the spot and forward legs of the FX swap transaction facilitate switching currencies for a prespecified period. Euro area banks also use FX swaps to hedge against potential cash flow risks that may arise from maturing US dollar-denominated investments financed with short-term funding. The imbalance between purchasing assets with a maturity of one year or longer and financing them with shorter repos and FX swaps (overnight to three months) leads to a maturity mismatch. This in turn exposes borrowers to rollover risk. Foreign assets held by euro area banks are mainly denominated in US dollar, and transactions involving a US dollar leg account for approximately 80% of average daily transaction volume. The pound sterling (GBP), Swiss franc (CHF), Japanese yen (JPY) and other currencies account for a much smaller share. A further driver of demand is intermediation, as most euro area banks reporting to MMSR are net lenders of US dollar in FX swap markets. They could either borrow US dollar in an FX swap and then lend to clients, or they could borrow US dollar on the US repo market and then lend the US dollar on the FX swap market to those parties without access to the US dollar domestic market.

### Chart 4.1.3





Source: MMSR.

### Flight to safety and effect of strong US dollar appreciation

Increased demand for US dollar funding driven by risk aversion resulted in a strong appreciation of the US dollar exchange rate in 2021 and 2022 (Chart 4.1.4). In a context of high inflation and concerns about a global recession, markets were affected by high volatility. The US dollar has therefore become a safe haven asset. For the first time in 20 years, the US dollar reached parity with the euro, following a 13% appreciation against the euro in the review period. The US dollar similarly appreciated against other currencies. During the review period the market was influenced by several factors that increased risk and uncertainty, leading to an increased demand for the US dollar. Among the main factors were elevated volatility in both FX and repo markets, Federal Reserve System policy normalisation (the start of the rate hiking cycle and subsequent quantitative tightening) and, at the beginning of 2022, events related to the Russian war in Ukraine.

### Chart 4.1.4 Spot exchange rate EUR/USD



Source: Bloomberg.

Within the FX market, FX swap trading took prominence over spot and outright forward activity (Chart 4.1.5). The foreign exchange (FX) market is the world's deepest financial market with an average daily total trading volume of  $\notin$ 7.5 trillion in April 2022 according to the 2022 Bank for International Settlements (BIS) Triennial Survey. Within the FX market, there are three main trading instruments: FX swap contracts (USD 3.8 trillion), spot transactions (USD 2.3 trillion) and outright forward contracts (USD 1.1 trillion). EUR/USD transactions are the most common pair traded in FX swap contracts, with daily average volumes reaching  $\notin$ 900 billion. Combined MMSR and BIS survey data suggest that at least 25% of global EUR/USD FX swap activity involves one bank from the euro area.

### Chart 4.1.5



Market size - average daily transaction volume in the FX swap market

Sources: MMSR, BIS survey.

Notes: The BIS data display the global average daily volume of foreign exchanges in April 2022, which was converted from USD into EUR by using the weighted average of the EUR/USD rate in April 2022. MMSR data include only activity by euro area banks.

### 4.2 Rates

### 4.2.1 2021-2022 trends

FX swap rates closely reflect (i) the interest rate differential of the involved currencies' domestic funding rates (Chart 4.2.1) and (ii) an additional premium reflecting the supply/demand equilibrium for US dollar funds (Chart 4.2.2). The interest rate differential in the review period reflected expectations of central banks' policy rate hikes materialising during 2022. When markets are functioning well and intermediation is not impaired, implied FX swap yields stand relatively close to US domestic interest rates, thus compressing the FX swap basis spread.<sup>19</sup> The policy rate changes adopted by the Federal Reserve in 2022 had a relatively quick pass-through to FX swap rates, demonstrating market efficiency and liquidity. Accordingly, implied US dollar borrowing yields followed the pattern of the effective federal funds rate (EFFR).

<sup>&</sup>lt;sup>19</sup> An investor holding euro has the following investment options: (i) invest the money in the unsecured euro cash market for one month at the prevailing euro denominated interest rate; or (ii) convert the euro into US dollars through a one-month FX swap and invest the dollars for one month at the prevailing dollar-denominated interest rate (e.g. US Treasury bill), collecting at maturity the final payout from the Treasury bill and converting the dollars back into euro. In an efficient market these two strategies must provide equal returns, because otherwise opportunities for arbitrage will arise. Hence, in the absence of market frictions, the US dollar spread should hover around zero.
#### Chart 4.2.1

US implied yield per maturity



Sources: MMSR, Bloomberg

The consistent breach of CIP reflects the global structural shortage of US dollar supply. This becomes particularly strong at reporting dates and during times of stress (Chart 4.2.2). As mentioned in Section 4.1, non-US financial institutions often hold more assets than liabilities denominated in US dollar and also with longer maturities. This results in a structural shortage of US dollar financing in the international system. Consequently, currency-related risks occur at institutions and maturity mismatches become embedded in their balance sheets. Euro area banks tend to fill the US dollar funding gap either (i) by borrowing US dollar directly in the US repo market and using their USD asset holdings as collateral, or (ii) via FX swap transactions (USD receiving, EUR providing). Euro area banks also use FX swaps to hedge against potential cash flow risks that may arise from maturing USD dollar-denominated investments financed with short-term funding. The maturity mismatch comes from the imbalance between purchasing assets with a maturity of one year or longer and financing them with shorter repos and FX swaps (overnight to three months). The mismatch exposes borrowers to rollover risk. The ability to rollover short-term US dollar funding via FX swaps or repo can become difficult at quarter-ends. This is when the usual providers of US dollar funding in the FX swaps market (US banks) seek to limit their intermediation owing to balance sheet constraints that result from capital regulations such as the leverage ratio and G-SIB scores. Consequently, around quarter-ends, and particularly at year-ends, the breach of CIP increased and resulted in wider FX swap spreads (i.e. US dollar premium). The spread between the US dollar and another currencies reflects the premium paid by international institutions to obtain US dollars in the FX swap market. This premium is measured as the difference between the implied interest rate on US dollar borrowed in the EUR/USD FX swap market and the US dollar riskfree rate, which is represented by the US dollar OIS rate. Since the global financial crisis, FX swap-implied US dollar funding rates have significantly exceeded the respective domestic dollar interest rate whenever demand for the US dollar far outstripped its supply. During the period under review, the premium paid by euro

area banks to borrow US dollar increased particularly on two occasions. It increased ahead of the 2021 and 2022 year-ends. Furthermore, between February 2022 and December 2022 – following the Russian invasion of Ukraine – borrowing premia for US dollar funding temporarily increased to 80-150 basis points across maturities.

#### Chart 4.2.2

FX swap premium (spread between the USD implied borrowing yield and the USD OIS rate for equivalent maturity)



#### 4.2.2 Drivers of the higher FX swap rates

#### Efficient pass-through

US dollar implied borrowing yields followed developments in the effective federal funds rate and the interest rate differential between the United States and the euro area. In a context of high inflation, the Federal Reserve and the European Central Bank stepped up the monetary policy normalisation process, albeit at different paths and paces. The Federal Reserve started hiking rates in March 2022 and the ECB in July 2022. By the end of 2022 the Federal Reserve had increased rates by 425 basis points and the ECB by 250 basis points. Policy rate hikes quickly and fully passed through to FX swap rates.

## Arbitrage opportunities

**Repo rates can also be a driver of the US dollar premium in the FX swap market.** For instance, if euro GC repo rates trade at a higher rate than their US dollar equivalent, the euro lender needs to be compensated by its counterparty and therefore receive a higher US dollar premium in the FX swap. At quarter-ends, US GC repo rates are usually kept relatively stable owing to the Federal Reserve's overnight reverse repo facility (ON RRP), which sets a soft floor for overnight rates. High usage of the facility can result in a reduction in US dollar supply in the FX swap market and therefore increase the US dollar premium.

## Occasional US dollar supply shortages

The supply of US dollar in the FX swap market depends on the liquidity position of US banks acting as lenders, the intermediation capacity of which is sometimes constrained. When FX swap-implied yields start to diverge from comparable domestic US dollar borrowing rates, the premium is affected. Increases in the premium reveal impairments in FX swap intermediation, with demand surpassing supply<sup>20</sup>.

The intermediation capacity of US banks depends, among other factors, on the degree to which the marginal trade affects their regulatory metrics at quarterends. US banks are constrained by a stricter implementation of Basel III leverage ratios. Therefore, the minimum spread at which US banks step into the market tends to be wider than those of foreign banks, as they must assess what impact such intermediation will have on their leverage ratio, global systemically important banks (G-SIBs) score and liquidity stress tests. In the run-up to the year-end, G-SIBs monitor their scores and seek to reduce market making activity that could otherwise lead to a higher G-SIB score and capital surcharge (Chart 4.3.3).

## Minor recourse to the central bank US dollar-providing operations

Demand in regular Eurosystem US dollar-providing operations has been limited (Chart 4.2.3). To ensure US dollar funding in crisis times for euro area banks, the ECB established a swap line with the Federal Reserve in 2008. It was made permanent in 2013 and forms a swap line network alongside the Swiss National Bank, the Bank of England, the Bank of Japan and the Bank of Canada. The operations are conducted on a weekly basis as seven-day US dollar liquidityproviding operations against regular Eurosystem collateral. At the start of the COVID-19 crisis in March 2020 and as a result of related US dollar funding concerns, the price of the US dollar was lowered from a spread of 50 basis points to a spread of 25 basis points over US dollar OIS. Furthermore, in addition to the existing weekly operation, two temporary measures were introduced until the end of June 2021: (i) an eighty-four-day term operation, and (ii) the frequency of the sevenday operations was increased from weekly to daily. In the last two years, the demand for US dollar tender operations has been low compared with the peaks in 2020, as US dollar funding costs in the market were lower than the cost of the Eurosystem tender operations. On average, the implied US dollar yield of FX swaps was 8 basis points lower than the cost of borrowing US dollar via the tender, not taking into account the cost of collateral posted with the central bank.

<sup>&</sup>lt;sup>20</sup> See calendar effects under the maturities section.

#### Chart 4.2.3



USD-providing operations (1-week and 84-day maturities) and their rates

(left y-axis: millions; right y-axis: percentages)

Source: ECB.

## 4.3 Maturities and calendar effects

#### 4.3.1 Flows

Daily trading in FX swaps is more diversified across maturities compared with other segments of the money market (Chart 4.3.1). While other segments of the money market are highly concentrated in the tomorrow/next bracket, the maturities of FX swap transactions are more diverse, albeit still dominant in the shortest segments.

The volumes are concentrated in one-day maturity transactions, which account for more than 70% of the total volume in 2021 and 2022 and show the most significant cumulative year-on-year growth. 50% of these one-day maturity transactions are tomorrow/next contracts. The significant year-on-year increase in contracts with maturities of longer than one day shows that market activity is moving to secure exchange rate conditions for longer periods in times of higher market uncertainty.

#### Chart 4.3.1

Average daily transaction volumes per maturity bucket



Source: MMSR.

## 4.3.2 Stock

Around 70% of outstanding FX swap contracts have maturities of up to three months (Chart 4.3.2). Contracts with a maturity between one week and three months account for the largest part of the outstanding volume. The share of contracts with a maturity of more than six months is less than 20% of the total outstanding amount. The volume-weighted average maturity decreased primarily during periods of heightened risk aversion in the market, when volatility grew.

## Chart 4.3.2





Source: MMSR.

## 4.3.3 Calendar effects

On the last day of every quarter, FX swap volumes tend to increase in comparison to the first business day of the next quarter (Chart 4.3.3). To fulfil regulatory requirements and complete balance sheet adjustments, banks tend to increase US dollar buying activity in the FX swap segment at quarter-ends, an effect that is particularly notable as the year-end approaches. An exceptional pattern was observed at the end of 2021, where USD buying volume in the FX swap market decreased by more than €40 billion.

#### Chart 4.3.3





Source: MMSR

Note: Volume difference between the amount of the transactions settling on the last business day of the quarter and the amount of the transactions settling on the first business day of the following quarter. Due to lack of trades on some dates, the spot value dates have been replaced by either the closest next TARGET2 opening day (for the start quarter) or the closest previous TARGET2 opening day (for the end quarter).

Shortages in US dollar resources at quarter-ends led to an increase in the US dollar premium (Chart 4.3.4). When comparing the US dollar premium – calculated as the difference between the USD implied rate for one-day contracts and the effective federal funds rate – on the last business day of the quarter with the first business day of the subsequent quarter, spikes were observed over the entire review period. However, in contrast to previous periods, the premium increase for the year-end was in line with, not higher than, increases observed at the quarter-ends. This development reflects higher liquidity in the market. During 2021 and 2022, the premium paid by euro area banks to borrow US dollar across the year-end increased to 75-125 basis points compared with 200-260 basis points in 2019 and 2020.

#### Chart 4.3.4



Effect of reporting dates on FX swap premium – comparison of end/start of quarter levels

#### Source: MMSR.

Note: Basis point difference between the rates of the transactions settling on the last business day of the quarter and the rate of the transactions settling on the first business day of the following quarter. Owing to the lack of trades on some dates, the spot value dates have been replaced by either the closest next TARGET2 opening day (for start quarter) or the closest previous TARGET2 opening day (for end quarter).

# The smooth year-end observed in 2021 and 2022 was also facilitated by extensive prefunding activity (Charts 4.3.5 and 4.3.6). In 2021 and 2022 the tightening of US dollar funding conditions around reporting dates was less pronounced than it had been in 2019 and 2020. This was probably owing to higher prefunding activity that helped mitigate the premium in October and November.

Interestingly, 2022 led to some very expensive prefunding in October and November, culminating in a benign year-end.

#### Chart 4.3.5

#### **Prefunding volumes**



#### Source: MMSR.

Note: The effect of reporting dates on USD prefunding volumes is shown, referring to all transactions that sell euro and buy dollars, executed and settled in the selected years, with a maturity between 1 January and 31 January of the next year. Forward contracts were excluded. Confidential points are hidden.

#### Chart 4.3.6

Rates of prefunding activity



Sources: MMSR, Bloomberg. Note: The size of the bubbles refers to the transaction's size. The premium paid by MMSR reporting agents is measured as the volume-weighted spread between the implied rate paid minus the USD OIS rate for all maturities transactions that sell euro and buy dollars settling through the year and maturing in January of the following year. Actual SOFR and €STR OIS rates are as of May 2019 and October 2018, respectively. Values before fallback dates were constructed by Bloomberg. Confidential points are hidden.

#### **Counterparties** 4.4

#### Marginal role of non-banks 4.4.1

Interbank transactions dominate most of the MMSR activity in the FX swap market (Charts 4.4.1 and 4.4.2). Almost 80% of the transactions are conducted between banks, whose large share in this market segment is a result of their intermediation role. The second group in terms of importance is made up of the other financial corporations, which include, among others, pension funds and insurance companies. The third group by trading volumes is made up of non-financial corporations.

#### Chart 4.4.1





Source: MMSR.

#### Chart 4.4.2





Source: MMSR.

## 4.4.2 Direction of the flows

Large banks channel US dollar funding from international financial centres to euro area clients (Charts 4.4.3 and 4.4.4). Euro area banks tend to maintain a matched book structure on EUR/USD FX swaps, resulting in a net US dollar position which is small compared with the notional outstanding of the FX swaps. Euro area banks use FX swaps to intermediate between counterparties located in the United States and the United Kingdom, who are historical providers of US dollars, and euro area clients in need of US dollars. Euro area clients come predominantly from the financial sector (non-banks) and benefit from the international connections of euro area intermediating banks. Most financial counterparties receiving US dollar funding are pension funds and investment funds located in France, Germany and the Netherlands.

#### Chart 4.4.3

Top buyers and sellers of EUR/USD FX swaps by jurisdiction



Source: MMSR.

#### Chart 4.4.4

Time evolution of the weight of domestic, cross-euro area and international transactions



Source: MMSR.

Note: Domestic refers to trades with a counterparty located in the same jurisdiction than the MMSR reporting bank. Euro area crossborder refers to trades with a counterparty located in the different member state than the MMSR reporting bank. Rest of the world refers to trades with a counterparty located outside the Euro area.

## Overnight index swaps

Market participants rely on OIS to manage their interest rate risk exposures, using spot contracts for hedging and forward contracts for taking positions on the path of interest rates. Central banks use the overnight index swaps (OIS) rate curve to identify market expectations of the future course of monetary policy. This is because overnight rates referred to in OIS trades are closely tied to the prevailing official policy rates and changes in the expected and realised monetary policy stance move OIS rates. For this reason, market participants use OIS contracts to either hedge against financial exposures to changes in overnight interest rates or to speculate on their future direction. However, they do not use OIS contracts for funding purposes, as they only involve the exchange of interest payments, not notional amounts.

Activity in the euro OIS segment increased at the end of 2021, when inflation expectations surged. Activity grew further in 2022 when expectations for increases in official ECB policy rates consolidated and new signals on further hikes emerged. As the speed of the hiking cycle intensified in 2022 and uncertainty about future policy rate changes increased, most OIS contracts with spot settlement, which are mainly used for hedging, had a maturity of less than three months. However, activity increased the most in OIS contracts with forward settlement, as these are primarily used to take positions on the future path of central bank policy rates, especially during the first three quarters of 2022. Dates in most forward contracts were linked to the Eurosystem's maintenance periods. This suggests that market participants were anchoring their interest payments to the possibility of changes in the official interest rates. Throughout 2022 activity was especially elevated around the meeting dates of the Governing Council in anticipation of policy rate hike decisions and/or new signals on the monetary policy stance.

In the first three quarters of 2021 OIS rates were anchored to the DFR. However, they increased during 2022 when inflation expectations surged, and market participants began to anticipate rate hikes. The Russian war in Ukraine worsened the economic and inflationary outlook in the euro area, leading to increased uncertainty about the path of policy rates and causing volatility indicators to reach unprecedented levels.

The vast majority of OIS trades were centrally cleared, in line with European regulations. CCPs accounted for around 90% of the total activity in the OIS segment. Among authorised CCPs, the UK-based LCH Limited clears the majority of OIS contracts. German-based EUREX clears the second most contracts, however its presence in the market is significantly lower than LCH Limited. The European Commission has authorised market participants to continue using LCH Limited for clearing OIS contracts until 2025. Meanwhile, new legislative proposals to improve the attractiveness of OIS clearing in the EU, develop infrastructure, enhance supervisory arrangements and address potential risks to financial stability are being discussed.

## 5.1 Volumes

#### 5.1.1 Flows

Average daily trading activity in the OIS segment reached about €100 billion in 2022, more than double the volumes of previous years (Chart 5.1.1). Volumes observed in the first three quarters of 2021 were stable, with an average daily traded notional of €36 billion. During this period most market participants did not see a need to enter into OIS contracts as no changes on interest rates were expected, unlike the end of 2021 and 2022. In the fourth quarter of 2021 average traded notional OIS volumes rose to €58 billion. In the first quarter of 2022 they increased further by €20 billion to €78 billion. In the remaining quarters of 2022, the average traded notional increased further up to €106 billion.

#### Chart 5.1.1





Source: MMSR.

Notes: Two confidential datapoints have been interpolated. OIS novated trades are excluded. The percentages refer to the weight of the OIS segment on the total of the euro money market, for 2018, 2020 and 2022.

## 5.1.2 Stock

## In terms of outstanding amounts, the OIS remained in third position of all

interest rate derivative markets (Chart 5.1.2). The most common types of interest rate derivatives were: (i) interest rate swaps (IRS), (ii) forward rate agreements, and (iii) overnight index swaps. According to data from the EMIR database, the amount of outstanding OIS contracts reached €20.8 trillion in 2022, an increase of 127% compared with the previous year. This lies in contrast to the 34% average growth of the overall interest rate derivatives market.

#### Chart 5.1.2



The euro area interest rate derivatives market - outstanding amounts

Sources: EMIR, ECB calculations.

Notes: Outstanding amounts in EUR interest rate derivatives on 15 September in 2020, 2021 and 2022. Outliers and double-reported transactions have been removed.

## 5.1.3 Drivers of volume

#### Need to manage interest rate risk

Market participants rely on OIS to manage their interest rate risk exposures (Chart 5.1.3). Counterparties do not use OIS trades for funding purposes as the transaction only involves the exchange of interest payments between the parties, without exchanging the notional amounts. OIS transactions with spot settlement are mainly used by asset and liability managers (i.e. banks or pension funds) to hedge their portfolios. Contracts with forward settlement, on the other hand, are largely used by hedge funds to take speculative positions on central bank interest rate changes. Forward contracts that coincide with the central bank's minimum reserve maintenance periods (MP-dated) are of particular interest to market players that express their expectations on Eurosystem policy rate decisions. OIS transactions with forward settlement dates accounted for around 30% of the total traded notional in the first three quarters of 2021. In the fourth quarter of 2021 and the first half of 2022 activity in transactions with forward settlement dates outpaced (in volume) the OIS transactions with spot settlement. After an increase in the fourth quarter of 2021, spot transactions rose steadily from the second quarter of 2022, reflecting hedging needs ahead of the start of monetary policy normalisation. By the end of 2022 forward and spot contract volumes were of a similar magnitude, each accounting for around 50%.

## Chart 5.1.3



Average daily OIS traded notional per quarter split by transaction type

Source: MMSR

Notes: Total traded notional in each quarter split by transaction type, excluding novations

## Expected changes in policy rates

OIS activity in 2022 was especially elevated around Governing Council meeting dates in anticipation of policy rate hike decisions and indications of the monetary policy stance (Chart 5.1.5). Volumes in the OIS segment increase whenever markets anticipate changes to the Eurosystem's monetary policy, particularly regarding policy rate changes. This is because the Eurosystem's monetary policy is the major determinant of overnight unsecured money market rates, which form the basis of OIS rates. Accordingly, OIS volumes started to increase ahead of the December 2021 Governing Council meeting. Forward guidance at this meeting suggested that net purchases under the asset purchase program would end shortly before any rise in key ECB policy rates. In addition, volumes in the OIS market rose significantly ahead of the June 2022 Governing Council meeting in which President Lagarde pre-announced an increase of the key ECB's policy rates. Volumes peaked again around the September and October 2022 Governing Council meetings when the ECB announced increases of 75 basis points with the intention of "frontloading" the increase of the key ECB interest rates. Volumes remained at elevated levels until the December 2022 meeting, when the Governing Council decided to hike the key policy rates by 50 basis points.

#### Chart 5.1.4





Source: MMSR.

Notes: Ten-day moving average of OIS paid and received transaction volumes plotted against trade date, excluding novations and including all maturities. The dots indicate ECB Governing Council monetary policy meetings. Confidential points are hidden.

## 5.2 Rates

## 5.2.1 2021-2022 trends

Throughout 2021, OIS rates remained relatively stable as market participants did not expect interest rate changes in the near term, whereas in 2022 OIS rates heavily increased (Chart 5.2.1). In the last quarter of 2021, OIS rates with maturities of two years and more started to rise, as inflation expectations increased and market participants anticipated that central bank action was inevitable. The rise in OIS rates was accompanied by higher implied and realised volatility in OIS rates, reflecting the uncertainty surrounding the outlook of interest rate expectations. The beginning of 2022 was marked by higher OIS rates, particularly on contracts with maturities of one year and more.

#### Chart 5.2.1

Evolution of spot OIS rates across different maturity bands



Source: MMSR.

Notes: Volume-weighted average rate for selected maturity bands, plotted against trade dates. Only spot transactions were considered, with novations excluded. The vertical lines flag relevant Governing Council dates, with the February and June meetings signalling upcoming potential interest rates hikes and the remaining lines marking actual interest rate hikes. Confidential points are hidden.

#### 5.2.2 Drivers of rates

#### Change of monetary policy stance

#### Forward OIS curves anticipated the change in monetary policy stance

throughout 2022 (Chart 5.2.2). The forward OIS curve is considered one of the best indicators for gauging the interest rate expectations of market participants. OIS contracts allow two counterparties to exchange fixed and floating interest rate payments on an agreed notional amount. The swap rate (the fixed rate agreed at the beginning between the parties) reflects the expected market overnight rates over the duration of the contract. The floating rate is linked to an overnight benchmark (i.e. €STR in the case of the euro area) which is a reflection of the monetary policy stance. Repricing of interest rate expectations drives a substantial change in the OIS forward curve.<sup>21</sup> Expectations of policy rate increases were well anticipated, as evidenced by the steeper OIS forward curve of June 2022 (red forward curve) compared with the OIS forward curve of December 2021 (yellow forward curve). The forward curve of December 2022 (blue forward curve) inverted for maturities in 2024 and onwards shows expectations for a terminal rate of 3.3% to be reached by mid-2023, as well as expectations for potential interest rate cuts towards 2024. This stands in stark contrast to expectations observed in 2021, when market participants

<sup>&</sup>lt;sup>21</sup> OIS contracts have three features that enable them to gauge interest rate expectations: (i) no notional is exchanged, (ii) liquidity risk is minimised as there is no initial cash flow, and (iii) credit risk is also minimised as most transactions are centrally cleared.

were only anticipating interest rates to enter positive territory by the second half of 2026.

#### Chart 5.2.2

Forward OIS curves and expectations of terminal rates



Sources: Bloomberg, ECB.

Notes: The OIS forward curves show nominal rates. SMA stands for the ECB Survey of Monetary Analysts.

## Volatility reflecting uncertainty on the ECB terminal rate

The repricing of interest rate expectations was accompanied by a surge in realised and expected volatility of OIS contracts to unprecedented levels, reflecting the market uncertainty surrounding future interest rates (Chart 5.2.3). Realised volatility, measured as the intraday trading range of OIS forward contracts, started to increase in the fourth quarter of 2021. At this time foreign central banks had initiated a review of forward guidance on the policy outlook in order to faster normalise their accommodative monetary policy stances. Expected volatility also started to increase, along with a deterioration in liquidity conditions in the OIS market, which was reflected in wider bid-offer spreads. These uncertainty measures further increased throughout 2022 and peaked around mid-2022, amid higher-than-expected inflation, economic activity data prints and unprecedented interest rate hikes by central banks.

#### Chart 5.2.3



Implied and realised volatility; liquidity conditions of 1-year forward swap rate in 2 years' time

Note: Swaptions are used to measure implied volatility. All swaptions are at-the-money contracts, i.e. their exercise price equals the forward interest rate prevailing at the start of the contract. The basis point measure is obtained as the product of implied volatility as a percentage and the corresponding forward swap rate. Realised volatility is calculated as the intraday spread of the EUR 1y1y forward swap rate and the liquidity conditions as the bid and ask spread.

## Interaction between forward OIS and inflation swap rates

The relationship between interest rate and inflation expectations varied throughout the review period (Chart 5.2.4). Before the outbreak of the COVID-19 pandemic, there was a positive relationship between interest rate expectations and inflation expectations. After March 2020, despite increasing medium-term inflation expectations, forward OIS rates did not initially respond much and remained stable at negative values. Market participants anticipated that the ECB's monetary policy stance would remain accommodative given economic vulnerabilities and the forward guidance provided by the Governing Council. In 2022 as the Governing Council moved from forward guidance towards a meeting-by-meeting approach, the correlation between interest rate and inflation expectations changed again when interest rate hikes seemed inevitable. The dispersion in the data points also reflects the high level of uncertainty surrounding inflation expectations and the ECB's response.

Source: Bloomberg.

#### Chart 5.2.4

Relationship between forward OIS and inflation swap rates



Source: Bloomberg. Notes: Forward OIS rates prior to the existence of €STR-linked OIS contracts were assumed to be 8.5 basis points below those referring to the EONIA-linked OIS contracts. Forward zero-coupon inflation swap rates refer to contracts linked to HICP excluding tobacco, as published by Eurostat, with a lag of three months.

#### **Maturities** 5.3

#### 5.3.1 Flows

Spot trading volumes remained concentrated in maturities up to three months, while transactions with forward settlement tended to align exposures with the ECB's maintenance period calendar (Chart 5.3.1). Looking at spot settlement transactions, the largest volumes can be found in the below three-month maturity bucket. By comparison, IRS referencing EURIBOR or LIBOR often have much longer maturities. On the other hand, OIS contracts with forward settlement saw their activity increase in 2022, particularly on those contracts coinciding with the dates of the ECB's maintenance periods (denoted as MP-dated forward contracts).

#### Chart 5.3.1

Average daily OIS traded notional per quarter split by maturity bands



Sources: MMSR, ECB calculations.

Notes: Total traded notional in each quarter split by maturity bands, excluding novations; forward transactions are split between MPdated contracts (i.e. contracts that match the start and end dates of the maintenance periods with a tolerance of three days) and those that do not meet this criterion.

## 5.3.2 Stock

Derivative contracts can have very long maturities, sometimes as long as 50 years. This is also shown in the distribution of the OIS contracts stock (Chart 5.3.2). OIS outstanding amounts are indeed dominated by contracts above one year. While transactions with longer maturities are less frequent, they represent a larger weight of the stock of derivatives. Moreover, 30% of the stock of OIS trades is made up of trades with forward contracts. The growth of forward transactions was remarkable in 2022, as in 2020 they only represented 15%.

#### Chart 5.3.2

Amounts outstanding split by maturity bucket at inception



Sources: MMSR, ECB calculations.

Notes: The outstanding amount is a snapshot taken on 15 September for each of the years reported, and also chosen specifically in order to avoid reporting dates. The outstanding amounts transform the daily transaction volumes (flows) into a stock variable based on maturity dates. Novations are excluded.

## 5.4 Counterparties

## 5.4.1 The relevance of central counterparties

**Most OIS transactions are centrally cleared (Chart 5.4.1).** Around 90% of OIS transactions reported in the MMSR data are centrally cleared. The high usage in clearing reflects regulatory requirements implemented in August 2012 via the EMIR,<sup>22</sup> with the aim of increasing transparency and reducing systemic risk.

EMIR made central clearing mandatory for financial and non-financial counterparties with significant notional positions in the OIS market. These central counterparties must be authorised and/or supervised by the European Securities and Markets Authority (ESMA). The ESMA provides a list of central counterparties authorised to offer services and activities in the Union.

#### Chart 5.4.1



Percentage of trades per counterparty group (other banks and CCPs)

Source: MMSR.

Note: In compliance with the confidentiality rules, the volume of the trades with "non-banks that are not CCP" is not displayed owing to its small volume.

Non-euro area CCPs cleared most of the OIS trades (Chart 5.4.2). The OIS volumes cleared by non-euro area CCPs significantly increased in 2022 to €30.1 billion from €15.3 billion in 2021. EU-based CCPs, which gained relevance in 2021, saw volumes declining in 2022 to levels seen in 2020.

#### Chart 5.4.2

Daily average OIS volume on the receiving leg split by counterparty



Source: MMSR.

Notes: Daily average volume of transactions receiving fixed interest rate payments split by centrally cleared and bilateral transactions, as well as by CCP location. Confidential values are hidden.

LCH Limited led the successful transition from EONIA to the €STR by converting all their positions that still referred to the old benchmark on 16 October 2021 (Chart 5.4.3). The first OIS contract referencing the €STR appeared in October 2019 along with the start of the daily publication of the new underlying benchmark rate. The share of contracts referencing the €STR moved very slowly until the LCH Limited conversion. The reason for the slow transition was the lack of incentive for market participants to lead the change in benchmark convention given the economic equivalence between both indexes (i.e. since October 2019 EONIA was equated by the  $\in$ STR plus a fixed spread of 8.5 basis points). The European Commission also introduced a regulation on 21 October 2021 that designated the  $\notin$ STR as the replacement rate for the EONIA in any contract and in any financial instrument. Finally, EONIA stopped being published on 3 January 2022 as anticipated and all existing contracts had by that time been converted to the  $\notin$ STR.

#### Chart 5.4.3



€STR and EONIA OIS in the MMSR dataset

Sources: MMSR, Bloomberg, ECB calculations.

Notes: The MMSR dataset does not provide information on which benchmark the transaction is linked to. Therefore, these had to be interpolated based on market data. The transactions were flagged as linked to the €STR or EONIA depending on the proximity between their reported spot OIS rate and the respective market OIS rate. Excludes novations, forward transactions and outliers.

## Most of the OIS contracts are settled cross-border with international

**counterparties during the review period (Chart 5.4.4).** In fact, this is artificially driven by the fact that most contracts are centrally cleared by LCH Limited. LCH Limited is UK-based and qualifies as international traffic, whereas the actual counterparties could potentially be based in the euro area. However, it was not possible to verify this with certainty using the available data sources. On average, international activity represents 82% of the overall settled transactions. From the third quarter of 2021 to the fourth quarter of 2022 international cross-border activity increased from 76% to 86%. The increase was to the detriment of euro area cross-border activity, which decreased across the same period. This might be simply masking counterparties that switched to central clearing instead of bilateral clearing from the third quarter of 2021. Euro area cross-border traffic represents on average 10% of total transactions, whereas domestic transactions represent 8%.

#### Chart 5.4.4





Source: MMSR. Note: Novations excluded. Domestic refers to trades with a counterparty located in the same jurisdiction than the MMSR reporting bank. Euro area cross-border refers to trades with a counterparty located in the different member state than the MMSR reporting bank. Rest of the world refers to trades with a counterparty located outside the Euro area.

# Appendix

## Money market statistical reporting (MMSR)

**MMSR gathers daily information on activity in the euro money markets.** The aim of the transaction-based statistical data of MMSR is to provide the Eurosystem with a comprehensive view of activities in the euro money markets. This is to assess the effectiveness of monetary policy and to assist the Eurosystem in maintaining stability in the financial markets.

**MMSR data collect all individual transactions in euro with maturities of less than one year conducted by the largest 47 banks in the euro area.** The transactions have maturities lower than 397 days.<sup>23</sup> Data should be reported to the ECB every day by 07:00 – reporting started on 1 July 2016. Originally 53, the number of reporting agents currently stands at 47 due to mergers and other corporate actions. The participating reporting agents cover the largest euro area banks in terms of balance sheet size<sup>24</sup> and are listed in Figure C.<sup>25</sup> In operational

terms, MMSR data are collected by the ECB with the support of several NCBs. The

#### MMSR data cover four segments of the euro money market: secured,

legal framework for MMSR is laid down in Regulation (EU) No 1333/2014<sup>26.</sup>

**unsecured, FX swaps and OIS. Both legs of the transactions are reported.** This means that both lending and borrowing transactions are covered in the secured and unsecured segments, both the selling and the buying of foreign currency are covered in the FX swaps segment and, finally, both the paying and the receiving of fixed interest rates are included in the OIS segment. Transactions are reported for trades conducted with non-retail counterparties such as other credit institutions, other financial corporations, NFCs and governments.<sup>27</sup> Table A.1 lists the main characteristics of the transactions reported for each segment.

**Information is reported on the volume, pricing, maturity and counterparty for each transaction.** For each transaction, reporting agents are required to provide a set of attributes. The most relevant attributes include the trade date, the maturity structure (settlement date, maturity date), the turnover (the amount involved in the transaction), the counterparty (even if it is a tri-party agent) and the pricing (the

<sup>&</sup>lt;sup>23</sup> In line with the ESMA definition of short-term financial instruments. For the OIS segment only, all swap contracts tied to the unsecured overnight rate are considered to be short term, irrespective of their maturity.

<sup>&</sup>lt;sup>24</sup> The selection was carried out based on the total balance sheet assets at the start of the data collection.

<sup>&</sup>lt;sup>25</sup> The updated list of reporting agents is also available on the ECB's website.

<sup>&</sup>lt;sup>26</sup> Regulation (EU) No 1333/2014 of 26 November 2014 concerning statistics on the money markets (ECB/2014/48) (OJ L 359, 16.12.2014, p. 97), as amended by Regulation (EU) 2015/1599 (ECB/2015/30) (OJ L 248, 24.9.2015, p. 45), Regulation (EU) 2019/113 (ECB/2018/33) (OJ L 23, 25.1.2019, p. 19), Regulation (EU) 2019/1677 (ECB/2019/29) (OJ L 257, 8.10.2019, p. 18), and Regulation (EU) 2020/2004 (ECB/2020/58) (OJ L 412, 8.12.2020, p. 31).

<sup>&</sup>lt;sup>27</sup> Transactions are reported when conducted with financial corporations (except central banks where the transaction is not for investment purposes), general government or NFCs classified as "wholesale" under the Basel III LCR framework. Lending transactions in the unsecured segment are only reported when the counterparty is a credit institution.

interest rate for the secured and the unsecured segments, the fixed interest rate underlying the contract for the OIS, and the spot exchange rate and forward points for the FX swaps). The counterparty to the transaction must also be reported, preferably by providing its unique legal entity identifier (LEI)<sup>28</sup>. For secured transactions, the security employed as collateral, identified by its international securities identification number (ISIN), is also provided. Table A.2 provides a summary of the main information available in the MMSR data.

Identification of the counterparties has recently improved. The MMSR dataset has evolved over time, through amendments to the MMSR Regulation seeking to improve the data collection. Two relevant changes took place in March 2019. First, the reporting of the LEI was extended to all counterparties when it was available. This change increased the number of transactions for which the sectoral classification is centralised in the ECB, ensuring consistency and providing a more accurate picture of money market transactions. Second, the scope of the eligible counterparties was extended to financial auxiliaries, as well as captive financial institutions and money lenders, in the process improving the completeness of the MMSR data collection.

#### MMSR reflects new trades, while lifecycle events affecting existing

transactions are not covered. MMSR collects information on transactions in respect of their generation or "re-generation" through renegotiation or novation. Lifecycle events such as early cancellation or margin variation are not reported, while open-ended transactions are generally reported daily. MMSR data cover wholesale money market transactions performed by the euro area reporting agents (including their branches in the European Free Trade Association and the United Kingdom) with any counterparty in the world. Trades taking place between reporting agents are reported by both parties.

<sup>&</sup>lt;sup>28</sup> The LEI is a 20-digit, alpha-numeric code that connects to key reference information and allows clear and unique identification of companies participating in global financial markets. If the LEI is not available, the sector and country of residence of the counterparty is reported.

#### Figure A1

Reporting agents contributing to MMSR



Source: ECB. Note: A more detailed list of reporting agents is available on the ECB's website.

### Table A1

#### Scope of reporting for the four market segments included in MMSR

Segment	Maturity
Secured	Secured transactions consist of short-term repo transactions (borrowing and lending) denominated in euro. This includes bilateral transactions concluded directly between two counterparties,transactions mediated by a CCP and transactions where a third separate agent takes care of the collateral management (tri-party repos). Securities lending transactions which take place against cash must also be reported within the secured market segment.
Unsecured	Unsecured transactions consist of several kinds of shortterm borrowing/lending contracts that share the characteristic of not being secured by any collateral. Unsecured transactions within the scope of MMSR take place using the instruments defined in the MMSR Regulation, in particular:
	unsecured deposits: unsecured interest-bearing deposits that are either redeemable at notice or have a maturity of not more than one year, and that are either taken (borrowing) or placed (lending) by the reportingagent;
	call accounts: either cash accounts with daily changes in the applicable interest rate, giving rise to interest payments or calculations at regular intervals, and a notice period for withdrawing money, or saving accounts with a notice period for withdrawing money;
	fixed-rate or variable-rate short-term debt securities: borrowing via the issuance of STS, which are denominated in euro, from the reporting agent to counterparties, or refers to lending via the purchase on the primary market of STS, which are denominated in euro, issued by other credit institutions.
FX swaps	FX swap transactions consist of transactions with a maturity of up to and including one year (defined as transactions with a maturity date of not more than 397 days after the settlement date), in which euro are bought/sold on a near term value date against a foreign currency with an agreement to resell the purchased currency on a forward, pre agreed maturity date.
OIS	OIS transactions consist of daily euro OIS transactions denominated in euro with any maturity. It is the maturity of the underlying asset that qualifies the OIS as a money market instrument, regardless of the final maturity of the OIS.

## Table A2

#### The main information available in MMSR

Variables	Unsecured segment	Secured segment	FX swap segment	OIS segment
Proprietary transaction identification	Specifies the unique in	nternal transaction identi	fier used by the repo	rting agent.
Counterparty identification	Specifies the counterparty's LEI if the counterpart supranational authority, or otherwise the counter		-	
Trade date	Specifies the date on which the parties enter into the transaction- trade time is reported if available.			
Settlement date, value date or start date	Specifies the date on which the amount of money is exchanged.	Specifies the date on which the cash is initially exchanged with the collateral.	Specifies the date on which amounts of currency are exchanged based on an agreed FX rate.	Specifies the date on which the floating overnight rate used in the calculation of the OIS payout is computed.
Maturity date	Specifies the date on which the amount of money is due to be repaid by the borrower.	Specifies the date on which the cash is due to be returned against the collateral.	Specifies the date on which the FX swap transaction expires and the currency sold on the value date is repurchased.	Specifies the last date of the term over which the compounded overnight rate is calculated.
Transaction type	Specifies whether the transaction is borrowing or lending.	Specifies whether the transaction is the borrowing or lending of cash.	Specifies whether the euro amount reported is bought or sold on the value date.	Specifies whether the fixed interest rate is paid or received.
Transaction amount	Specifies the nominal amount in euro lent or borrowed.	Specifies the nominal amount in euro lent or borrowed.	Specifies the nominal amount of the FX swap in euro.	Specifies the notional amount of the OIS.
Rate type	Specifies whether the is fixed or floating.	transaction interest rate		
Deal rate	Specifies the interest r lent is to be remuneral fixed rate transactions	ted. Only specified for		
Reference rate index	Specifies the ISIN cod reference rate. Only sp transactions.	e of the underly ing pecified for floating rate		
Basis point spread	Specifies the number of or deducted from the u rate. Only specified for transactions.			
Foreign exchange spot rate			Specifies the FX rate between the euro and the foreign currency applicable to the transaction on the value date.	
Foreign exchange forward points			Specifies the difference between the FX forward rate and the spot rate.	
Fixed interest rate				Specifies the fixed rate used in the calculation of the OIS payout.
In strument type	Specifies the instrument via which the borrowing/lending takes place.			

Variables	Unsecured segment	Secured segment	FX swap segment	OIS segment
Collateral ISIN		Specifies an ISIN if possible. Otherwise, the collateral asset class, issuer sector and (if applicable) pool are reported.		
Special collateral indicator		Specifies whether a repo transaction is conducted against special collateral. Reporting this is optional.		
Collateral nominal amount		Reporting this is optional for transactions in which the asset pledged is not identified via individual ISINs.		
Collateral haircut		Specifies the haircut (a risk control measure – the market value of the collateral is reduced by a certain percentage). Reporting this is only mandatory for single collateral bilateral transactions.		
Foreign currency code			Specifies the ISO code of the currency bought/sold in exchange for euro.	

Source: ECB. Note: The above table is a selective and abbreviated overview of the variables reported to the ECB in the context of MMSR. For a comprehensive overview, please refer to the MMSR reporting instructions, available on the ECB's website.

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