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Securities Finance Landscape

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Abstract

Repurchase agreements (repos) and securities lending and borrowing (SLB), though often under-recognised outside specialised circles, are foundational instruments of modern market-based finance. By allowing securities and cash to be exchanged against collateral under agreed contractual terms, they provide secured liquidity, support settlement and market-making activity, and enable the efficient allocation of balance sheet and collateral across the financial system. In this sense, securities finance acts as a “circulatory system” for wholesale markets: it mobilises assets without requiring outright purchases or sales and facilitates the transfer of funding and securities when and where they are needed.

This thesis develops a structured overview of securities finance with a particular focus on the European market. The first part is dedicated to physical securities finance, starting from the mechanics of repo and SLB transactions and the main contractual and operational choices that shape them. Particular attention is given to market structure and the role of key agents and infrastructures, including custodians, tri-party agents, central securities depositories and central counterparties, as well as to the regulatory and documentation layers that underpin the market in Europe.

The second part extends the analysis to synthetic securities finance, focusing on instruments such as total return swaps and related structures that replicate the economic exposure of physical financing without the same settlement and operational mechanics. The discussion emphasises why these instruments have gained relevance in recent years, how their use differs across market participants, and how their development interacts with European market practice and regulatory constraints.

Finally, the thesis develops a quantitative perspective by analysing valuation and pricing. Physical and synthetic instruments are studied through coherent pricing frameworks, showing how their market value and daily P&L are constructed from contractual cash flows and from the evolution of relevant market variables. This pricing focus provides the link between the institutional description of securities finance markets and the practical computation of value, risk, and profitability in trading and risk management.

Keywords: securities finance; repo; securities lending; total return swap; pricing;

Abstract in lingua italiana

I pronti contro termine (repo) e le operazioni di prestito titoli (Securities Lending and Borrowing, SLB), sebbene spesso poco considerati al di fuori di alcune nicchie, costituiscono strumenti fondamentali della finanza moderna. Attraverso lo scambio temporaneo di titoli e di liquidità a fronte di collaterale, essi forniscono liquidità garantita, sostengono il buon funzionamento dei processi di regolamento e dell'attività di market making. In questo senso, il mondo *securities finance* può essere interpretato come un vero e proprio “sistema circolatorio” dei mercati wholesale: mobilita attivi senza richiedere compravendite definitive e facilita il trasferimento di liquidità e titoli dove e quando necessario.

La presente tesi sviluppa un'analisi strutturata dell'universo *securities finance*, con particolare attenzione al mercato europeo. La prima parte è dedicata alla cosiddetta *Physical securities finance*, a partire dalla descrizione delle meccaniche operative dei repo e delle operazioni di SLB e delle principali scelte contrattuali e operative. Viene posta particolare attenzione alla struttura di mercato e al ruolo dei principali operatori e delle infrastrutture rilevanti, tra cui depositari, agenti tri-party, depositari centrali di titoli e controparti centrali, nonché ai livelli regolamentari e documentali che sostengono il funzionamento del mercato in Europa.

La seconda parte estende l'analisi verso la *Synthetic securities finance*, concentrandosi su strumenti quali i total return swap e strutture affini, che replicano l'esposizione economica delle operazioni fisiche. La discussione evidenzia poi le ragioni della crescente rilevanza di tali strumenti negli ultimi anni, come essi sono regolamentati e quali sono gli attori coinvolti.

Infine, la tesi sviluppa una prospettiva quantitativa attraverso il pricing e la valuation di questi prodotti. Gli strumenti fisici e sintetici vengono esaminati mediante framework di pricing coerenti, mostrando come vengano calcolati effettivamente il valore di mercato e il PL. L'attenzione al pricing fornisce così il collegamento tra la descrizione istituzionale dei mercati della *securities finance* e il calcolo operativo di valore, rischio e redditività nelle attività di trading e di gestione del rischio.

Parole chiave: securities finance; repo; securities lending; total return swap; pricing;

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1 | Introduction

Modern financial markets function because cash, securities, and risk exposures can circulate continuously among participants with different constraints and objectives. A large share of this circulation does not take place through outright purchases and sales, but through contractual arrangements that provide temporary access to liquidity or to specific securities. These arrangements are essential for short-term funding, for the smooth settlement of trades, and for the ability of intermediaries to support secondary-market liquidity and price discovery.

Within this broader set of mechanisms, securities financing transactions (SFTs) occupy a central position. In their *physical* form, SFTs are secured transactions in which securities are exchanged against cash so that, in economic terms, they resemble a collateralised loan backed by one or more securities. In contrast to listed instruments traded on organised venues under standardised terms, most physical SFTs are negotiated over the counter: they are agreed bilaterally between counterparties and can be tailored along multiple dimensions, including maturity, eligible collateral, margining and substitution rights, settlement arrangements, and the treatment of income and corporate actions. This contractual flexibility is one of the reasons why physical securities finance has become embedded in the daily liquidity management and collateral optimisation practices of financial institutions.

Alongside these physical transactions, modern securities finance also includes a growing set of *synthetic* solutions that replicate the economic effect of secured funding or financed exposure without requiring the legal transfer of the underlying security. In these structures, the economic return of a reference asset is exchanged via a derivative contract against a financing leg, typically supported by derivatives margining and, in some cases, central clearing. The development of synthetic securities finance has been closely linked to balance-sheet constraints, the scalability of derivatives infrastructures, and the expansion of prime brokerage and client-facing financing services. As a result, securities finance today is best understood as a multi-instrument toolkit combining physical and synthetic implementations that can deliver similar economic outcomes through different legal, operational, and regulatory channels.

SFTs serve two closely related functions. First, they provide secured funding and liquidity management tools, allowing institutions to mobilise assets without permanently changing their portfolio allocations. Second, they enable market participants to source specific securities when needed, for example to support market making, hedging activity, or the timely settlement of trades. In practice, these functions make securities finance a key link between financial intermediaries and a critical component of the market infrastructure that supports trading activity. More broadly, securities finance activity can be classified into *cash-driven* transactions, where securities are posted to obtain funding, and *securities-driven* transactions, where participants seek temporary access to particular securities. In general, repos are predominantly cash-driven, whereas securities lending is more frequently securities-driven.

The global financial crisis of 2007–2008 highlighted the systemic dimension of securities finance. In stressed conditions, concerns about the quality and liquidity of collateral can lead to increases in haircuts and margin calls. This mechanism can amplify funding pressures by forcing the rapid unwinding of leveraged positions and generating negative feedback loops between asset prices, collateral values, and the solvency of intermediaries. Episodes of market disruption have shown that, while secured funding is generally more resilient than unsecured funding, it can still transmit stress through procyclical collateral dynamics and through the interconnectedness of dealer balance sheets.

As part of the post-crisis regulatory response, international bodies, in particular the Financial Stability Board (FSB), emphasised the need to strengthen transparency and supervisory oversight in repo and securities lending markets. The FSB is an international body created in 2009 that coordinates financial stability policy at the global level by bringing together national authorities, standard-setting bodies, and major international institutions. In the aftermath of the crisis, it played a central role in identifying vulnerabilities associated with non-bank intermediation and secured funding markets and in formulating policy recommendations aimed at mitigating systemic risk. A core recommendation was the systematic collection of comprehensive and detailed data on securities financing transaction exposures, together with improvements in risk controls such as collateral valuation standards, margining discipline, limits on cash collateral reinvestment, and guidance on haircuts.

In the European Union, this agenda materialised in the Securities Financing Transactions Regulation (SFTR), adopted in 2015 and implemented in phases from 2020 onward [1]. SFTR is a regulatory reporting regime: it defines the scope of SFTs subject to reporting and imposes detailed obligations on market participants to report transaction-level information to authorised trade repositories, thereby enabling supervisors to observe market

activity through consistent, harmonised data rather than relying on proxy estimates.

The implementation and ongoing functioning of this transparency framework sits within the broader EU supervisory architecture, notably through the role of the European Securities and Markets Authority (ESMA) [2]. ESMA is the EU authority responsible for strengthening investor protection and promoting stable and orderly securities markets. Within SFTR, ESMA develops and maintains detailed reporting standards and validation rules, registers and supervises trade repositories, and supports national competent authorities by enabling access to the dataset and publishing aggregated statistics that inform market monitoring and risk assessment. The regulatory and reporting framework for securities finance, with a specific focus on the European regime and its market implications, is examined in dedicated chapters later in the thesis.

Importantly, SFTR operates at the level of market transparency and supervisory oversight rather than at the level of private contracting. It does not determine the legal enforceability of repo or securities lending transactions, nor does it prescribe pricing conventions, collateral eligibility, or close-out mechanics. These contractual and operational dimensions are instead governed by master agreements such as the Global Master Repurchase Agreement (GMRA) for repos and the Global Master Securities Lending Agreement (GMSLA) for securities lending [3, 4], which define the rights and obligations of the counterparties throughout the transaction lifecycle and are developed in detail in subsequent chapters.

This thesis then adopts a balanced perspective across *physical* and *synthetic* securities finance, with an emphasis on European market structure and evidence. The core instruments considered are:

- **Physical securities finance**

- **Repurchase agreements (repos).** Collateralised funding transactions in which one party obtains cash by transferring securities with a commitment to repurchase equivalent securities at a future date (the cash provider faces the position as a reverse repo).
- **Buy-sell backs (BSB).** Economically close to repos but implemented as two legally separate outright transactions (spot and forward), with differences in income treatment, margining conventions, and documentation practice.
- **Securities lending and borrowing (SLB).** Temporary transfer of securities from a lender to a borrower against collateral, with an agreement to return equivalent securities on demand or at maturity, and with contractual handling

of recalls and corporate actions.

- **Synthetic securities finance**

- **Total return swaps (TRS)**. OTC derivatives through which total return on an underlying (price change plus income) is exchanged against a financing leg, replicating financed exposure without transferring legal title of the underlying.
- **Total return futures (TRF)**. Exchange-traded and centrally cleared contracts that package a total return exposure into a standardised futures format, relying on derivatives margining and clearing infrastructure.

The remainder of the thesis develops these instruments in parallel: first from a descriptive and institutional perspective (mechanics, lifecycle, agents, and European market structure, including the EU regulatory and reporting layer), and subsequently from a valuation perspective, establishing coherent pricing and mark-to-market frameworks for both physical and synthetic implementations.

2 | Physical Securities Finance

2.1. Repurchase Agreements (Repos)

The main operation in the securities finance area is the repurchase agreement, commonly referred to as a repo. It is one of the most widely used instruments and a cornerstone of modern secured funding. Through repos, market participants obtain liquidity by temporarily transferring securities in exchange for cash, making repos a key source of capital market liquidity. They play a central role in banks' treasury operations, liquidity management, and asset–liability management frameworks, and they are also a primary tool used by central banks in the conduct of open market operations.

From an economic perspective, a repo can be understood as a collateralised loan: one party obtains cash while providing securities as collateral and agrees to repay the cash plus interest at maturity. From a legal perspective, however, a repo is structured as a simultaneous sale of securities combined with a forward commitment to repurchase the same or equivalent securities at a later date. This legal form implies a full transfer of title of the collateral during the life of the transaction, distinguishing repos from secured loans based on pledges.

The underlying securities involved may include equities, bonds of various types, or warrants, and they may consist of either a single security or a pool of securities, in which case the transaction is commonly referred to as a *basket repo*.

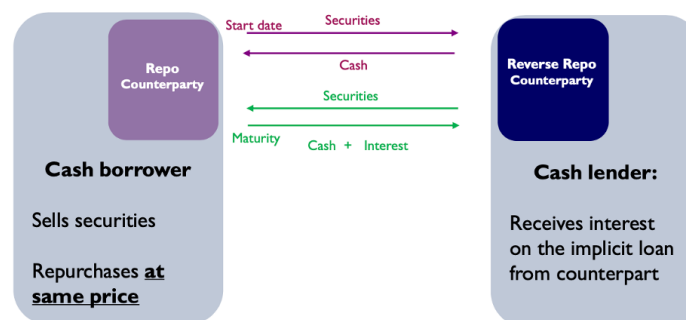


Figure 2.1: Cash and securities flows in a bilateral repurchase agreement (repo).

A bilateral repo is the simplest operational form of a repurchase agreement and remains a common market standard. It is executed directly between two counterparties: the seller of securities, who is simultaneously the cash borrower and collateral provider, and the buyer of securities, who acts as cash lender and collateral taker. On the start date, the seller delivers securities and receives cash. On the repurchase date, the seller returns the cash amount plus the agreed repo interest and receives back equivalent securities. Maturities are most frequently overnight or short term, although longer-dated and open repos are also used depending on funding and collateral objectives.

The securities delivered at inception function as collateral and provide credit protection to the cash lender. If the cash borrower defaults and fails to repurchase the securities, the cash lender is entitled to liquidate the collateral in order to recover the exposure.

In practice, this protection is strengthened by requiring the collateral to exceed the cash advanced. Concretely, the cash amount exchanged is set below the market value of the securities, by applying an initial discount (often called a haircut or initial margin). This buffer is designed to absorb adverse price moves and liquidation costs in the period between a default and the effective sale of the collateral.

Because collateral values fluctuate over time, repos require ongoing collateral maintenance. In standard market practice this is achieved through periodic valuation of the collateral (typically daily) and the exchange of variation margin. If adverse market movements reduce the collateral coverage relative to the outstanding cash exposure beyond agreed thresholds, the cash lender may issue a margin call requiring the borrower to deliver additional eligible collateral (or cash) in order to restore the contractually agreed level of over-collateralisation. Although both counterparty default and collateral issuer distress are possible, this combination of an initial buffer and dynamic margining is designed to reduce expected loss and to limit the likelihood that a default results in an uncovered exposure.

Settlement of repo transactions is typically conducted on a delivery-versus-payment (DVP) basis, ensuring the simultaneous exchange of securities and cash. In specific operational settings, settlement may also occur free-of-payment, in which case the securities and cash legs are processed separately and the synchronisation of the exchange is managed through internal controls and settlement arrangements.

At inception, the securities are valued at their prevailing dirty price, i.e. including accrued interest in the case of bonds. Subsequent collateral calls and releases are based on updated market valuations, so that the collateral amount required to secure the cash exposure is not static but varies over time with the market value of the underlying securities and the

agreed margining parameters.

During the term of the repo, several important economic mechanisms apply. The seller obtains the use of the cash proceeds and may deploy them for funding, trading, or liquidity management purposes. The buyer acquires legal ownership of the securities and, as a result, is typically entitled to reuse the collateral. This right of reuse allows the buyer to sell the securities outright, enter into another repo, or pledge them to a third party. At the same time, any income generated by the securities during the repo term, such as coupons or dividends, is passed back to the original seller through manufactured payments, ensuring that the seller retains the economic benefits of ownership. At termination, the transaction is unwound through the return of equivalent securities to the seller and the repayment of the original cash amount plus repo interest to the buyer.

The repo rate, which may be fixed or floating, for example indexed to an overnight benchmark, represents the cost of secured funding and reflects prevailing market conditions, collateral quality, and transaction-specific features.

The same transaction can be viewed from the opposite economic perspective. Instead of borrowing cash against securities, a participant may provide cash funding in order to receive securities as collateral for a specified period. In this case, the transaction is referred to as a *reverse repo*.

Operationally, the reverse repo counterparty delivers cash at inception and receives legal title to the collateral securities, subject to the terms of the master agreement. At maturity, the cash provider receives back the original cash amount plus repo interest and returns equivalent securities to the original cash borrower. From a risk perspective, a reverse repo is typically used as a secured cash investment: the lender earns a repo rate while holding collateral that can be liquidated in the event of counterparty default, subject to haircut and margining arrangements that protect against adverse collateral price movements.

From a portfolio and treasury standpoint, reverse repos are commonly used by cash-rich institutions, such as money market funds, corporates, and certain asset managers, to deploy short-term liquidity in a manner that is generally safer than unsecured lending.

While the structure described above pertains to a classic repo, typically governed by a Global Master Repurchase Agreement (GMRA) that will be better explained later, a functionally similar yet legally distinct variant exists: the sell/buy-back (SBB). Although both structures are economically equivalent to secured deposits, they differ in legal documentation and operational treatment. Nevertheless, for regulatory reporting purposes, sell/buy-back transactions are generally treated in the same manner as repos, as discussed

later.

In a classic repo, the repurchase price is fixed at the outset, explicitly separating the financing cost, expressed through the repo rate, from the security price. Manufactured payments and corporate action treatments are clearly defined. In contrast, a sell/buy-back consists of two separate outright market transactions, one spot and one forward, with no explicitly stated interest rate. The financing cost is embedded in the difference between the two transaction prices. This structure can lead to different treatments of income payments and default events compared to classic repos.

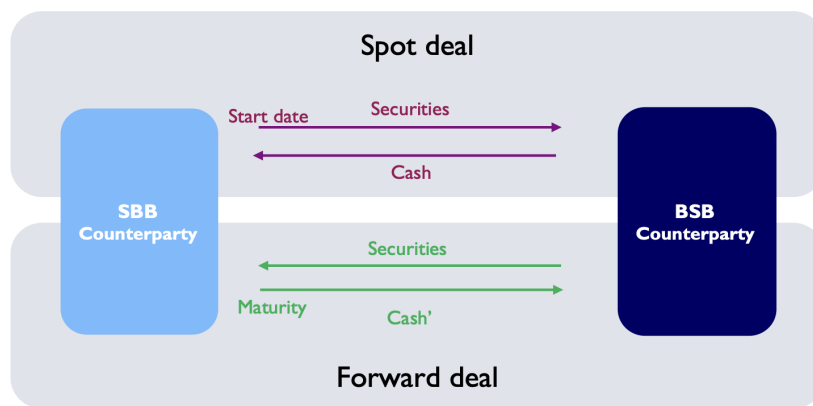


Figure 2.2: Cash and securities flows in a bilateral repurchase agreement (repo).

The distinction between classic repos and sell/buy-back transactions is crucial for legal documentation, operational processing, and tax treatment, underscoring the importance of the governing master agreement, as will be discussed in more detail later. Although the two structures are economically very similar, and sell/buy-backs are generally reported as repos for regulatory purposes, the analysis that follows will focus primarily on repos, given their greater relevance and standardisation in modern securities finance markets.

As discussed previously, repos are highly standardised in their core economic structure. However, as over-the-counter instruments, they exhibit a high degree of flexibility across several dimensions. In practice, a repo trade is defined not only by its underlying collateral and repo rate, but also by a set of parameters that shape its liquidity profile, risk allocation between counterparties, and operational treatment throughout the transaction lifecycle.

Typical degrees of freedom include the maturity convention, the collateral definition (single security versus basket), eligibility and concentration criteria, the settlement model (bilateral versus tri-party), and, in some market segments, the use of central clearing. The following subsections introduce these key design dimensions in a structured way.

2.1.1. Maturity structure

The first and most immediate classification concerns how maturity is defined and managed over time, as it directly affects funding stability, liquidity risk, and the presence of embedded optionality. In practice, three broad maturity formats are commonly distinguished:

- term (or closed) repos,
- open repos,
- repos with embedded maturity optionality.

A term repo, often referred to as a closed repo, has a fixed repurchase date agreed at inception. The transaction is initiated on the start date and terminates automatically on the agreed maturity date, when the cash borrower repays the principal plus repo interest and receives back equivalent securities. From a risk-management perspective, term repos provide certainty over the funding horizon and cash flows, which is particularly relevant for treasury planning and for managing regulatory liquidity metrics.

An *open repo* has no predetermined final maturity date. Instead, it remains outstanding until one party gives notice to terminate, with the applicable notice period specified contractually (e.g. same day, next business day, or a longer period). Open repos therefore provide flexibility: the cash borrower can maintain secured funding as long as needed, while the cash lender can withdraw liquidity subject to the notice constraint. Operationally, open repos require the same collateral maintenance discipline as term repos, but their liquidity profile differs because termination is driven by notice rather than by a fixed maturity date.

Between these two polar cases, market practice often employs repos with embedded maturity optionality, most commonly in the form of extendable or evergreen structures.

An extendable repo is initiated with an initial repurchase date but includes a contractual option to extend the maturity to a pre-agreed later date. The extension right is typically exercised by the collateral provider, that is, the cash borrower, at a predefined decision date during the original term and under terms agreed at inception.

An evergreen repo is a specific and widely used form of extendable repo in which the transaction automatically renews after its initial term expires. The parties agree that the repo rolls forward repeatedly and potentially indefinitely, unless one party gives termination notice within a predefined notice period. In the most common operational setup, the notice decision is evaluated on a frequent schedule, almost always daily, so that the matu-

rity effectively behaves like a sequence of short-term repos linked by automatic renewal. Evergreen repos therefore combine the operational convenience of continuous funding with the contractual ability to terminate on short notice, making them suitable for ongoing financing needs while preserving flexibility.

2.1.2. Basket repos and specific repos

As briefly introduced above, repo transactions can also be classified according to the economic motivation that drives the trade. A standard distinction is made between general collateral (GC) repos, also referred to as basket repos, and specific repos, often called specials. This distinction is important because it explains why repo rates can differ materially even for transactions with similar maturities and counterparties, and because it links repo pricing to collateral scarcity and market microstructure.

In a general collateral repo, the transaction is primarily cash-driven. The main objective of the collateral provider is to obtain secured funding, while the cash provider aims to invest cash in a secured form. In this setting, the precise identity of the collateral is not central, provided it belongs to an accepted basket of eligible securities.

General collateral refers to a set of broadly substitutable securities within the same high-quality asset class, for example core sovereign bonds, which are viewed as economically equivalent by the cash provider and therefore trade at a common GC repo rate. Because the parties agree on the cash amount, maturity, and repo rate before knowing exactly which eligible security will be delivered, the collateral provider retains flexibility in selecting which securities to deliver from its inventory, subject to eligibility and concentration criteria.

This substitutability also implies that collateral can typically be substituted during the life of the repo without altering the economic nature of the trade, as long as the replacement securities remain within the same GC basket and satisfy agreed haircuts and limits. As a result, GC repo rates are determined largely by the supply and demand for cash and by balance-sheet conditions in secured funding markets, rather than by the scarcity of any individual security.

By contrast, a specific repo, or special, is primarily security-driven. The economic motivation is not simply to borrow or lend cash, but to obtain temporary access to a particular security. This need may arise, for example, to meet delivery obligations in the cash or futures market, to cover short positions, or to support market-making activity in a security that is scarce.

In a specific repo, the collateral is explicitly identified at trade negotiation, and the transaction is effectively agreed for a specific quantity of securities rather than for a generic basket. Because the cash provider seeks access to that particular collateral, there is generally little or no willingness to accept substitution, except under narrowly defined contractual conditions.

The pricing of specific repos reflects this scarcity. When demand for a given security is high relative to supply, the repo rate on that security tends to trade below the GC repo rate, sometimes significantly. Economically, this lower rate can be interpreted as a *specialness premium* paid by the party that needs to borrow the security: the cash lender accepts a lower return in exchange for obtaining access to a security that is valuable for settlement or trading purposes.

2.1.3. Tri-party repo

This distinction between general collateral and specific repos is also closely linked to the operational processing model adopted in practice. While general collateral (GC) repo is typically characterised by standardised collateral baskets and funding-driven motivations, it does not imply a uniform operational structure across the market.

In Europe, a significant share of GC activity is now switching to a tri-party mode. Now according to recent European market statistics, tri-party repo accounts for roughly 10–15% of total outstanding repo volumes, with general collateral financing representing only a fraction of tri-party positions.[5]

Tri-party repo therefore does not constitute a different economic instrument — the transaction remains a repurchase agreement involving the exchange of cash against collateral — but it represents a distinct collateral management model in which a third-party agent administers collateral allocation, substitution, valuation, and margining. The economic substance of the repo is unchanged, while the operational burden of collateral selection and lifecycle management is delegated to a specialised infrastructure. .

In a tri-party arrangement, the two trading counterparties delegate key post-trade functions to a specialised and neutral tri-party agent, typically a custodian bank or an international central securities depository. In Europe, the main providers of tri-party services include Euroclear, Clearstream, BNY Mellon, and JPMorgan Chase.

The agent holds collateral in custody, or has access to the custodian account of the securities inventory of the parties, and administers the collateral lifecycle on behalf of the counterparties. This includes the selection and allocation of eligible securities from the

collateral provider's inventory, the application of agreed haircuts, the daily valuation of collateral, and the implementation of margin adjustments. The use of a tri-party agent therefore provides an operational infrastructure that supports large volumes and short maturities while reducing settlement frictions and bilateral processing costs.

Tri-party repo is particularly suited to general collateral funding because the cash lender is typically indifferent between eligible securities within a defined basket. Instead of requiring the collateral provider to deliver specific securities on a trade-by-trade basis, the parties agree an eligibility profile *ex ante*, specifying the acceptable collateral universe, for example in terms of asset types, issuer constraints, ratings, maturity limits, and concentration limits. At trade initiation and throughout the life of the transaction, the tri-party agent allocates collateral that satisfies this profile and ensures that the post-haircut collateral value covers the cash exposure.

As market values evolve, the agent can automatically adjust the allocation by moving additional securities into the collateral set or releasing excess collateral, effectively operationalising margining through reallocation. Substitution is also facilitated, since the agent can replace collateral within the custody pool while maintaining compliance with eligibility constraints and coverage requirements.

The tri-party model therefore enhances the scalability and standardisation of general collateral repo. It allows dealers and cash investors to transact efficiently in round amounts of cash, while ensuring that collateral allocation and maintenance are performed in a systematic and transparent manner. For this reason, tri-party repo has become a core infrastructure component of the modern repo market.

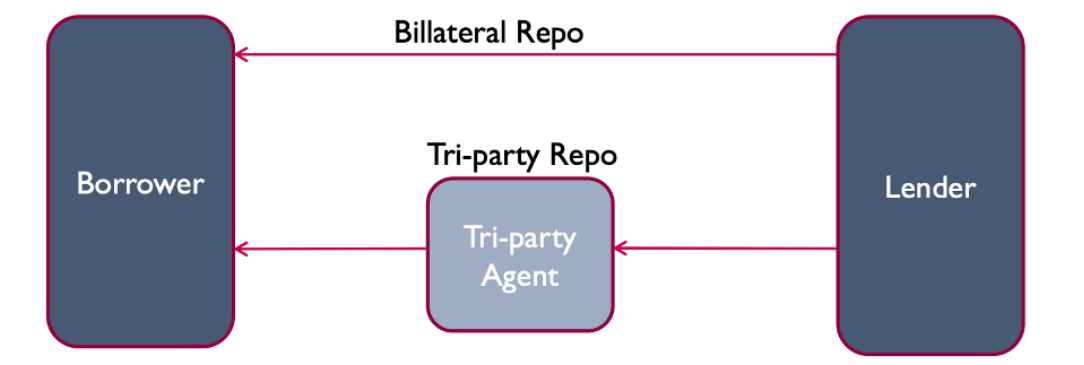


Figure 2.3: Comparison between bilateral and tri-party repo operational structures.

It is important to emphasise that the tri-party model, despite improving collateralisation discipline and operational robustness, does not eliminate counterparty credit risk. Even

when collateral is held and administered by a tri-party agent, the economic exposure remains bilateral: if the cash borrower defaults, the cash lender must still rely on the collateral liquidation process to recover its claim, subject to market liquidity and valuation risk. The tri-party agent is not a guarantor of performance. Its function is to administer the collateral mechanics, including allocation, valuation, substitution, and margin maintenance, and to provide an operational infrastructure that reduces settlement frictions and supports scalability, but it does not replace the contractual credit exposure between the two trading counterparties.

2.1.4. Clearing houses

A key distinction between tri-party processing and central clearing concerns the treatment of counterparty credit risk. As discussed above, a tri-party agent improves the operational management of collateral but does *not* become a counterparty to the trade and therefore does not remove the bilateral nature of the exposure. By contrast, central clearing is specifically designed to *transform* bilateral counterparty exposure into exposure to a single, specialised risk manager: the central counterparty (CCP). In that sense, clearing does not “make credit risk disappear”, but it aims to mutualise, standardise, and control it through novation, margining, and a structured default management process.

From a market-structure perspective, the European repo market can be organised along two operational dimensions: whether the trade is centrally cleared through a CCP, and whether collateral management and settlement are performed bilaterally or through a tri-party custodian. This produces four stylised segments: cleared versus uncleared, crossed with bilateral settlement versus tri-party settlement.

In a centrally cleared repo, the original contract between two counterparties is typically replaced (through *novation*) by two contracts: each participant faces the CCP rather than facing the original counterparty. The CCP becomes the buyer to every seller and the seller to every buyer, thereby concentrating counterparty credit risk onto its own balance sheet and risk framework. The CCP then controls this risk by applying a margin model (initial margin and variation margin), enforcing eligible collateral and haircut schedules, and maintaining a default waterfall and predefined close-out procedures. A further structural benefit of clearing is *multilateral netting*: exposures and settlement obligations across multiple counterparties can be netted at the CCP level, reducing gross balance-sheet usage for active dealers and improving the efficiency of collateral and liquidity management.

ESMA adopts the cleared/uncleared and bilateral/tri-party taxonomy to describe the repo landscape under SFTR reporting, highlighting that bilateral repos exchange cash

and collateral directly between counterparties, while tri-party repos outsource post-trade processing and collateral management to a third-party agent. Empirical evidence based on SFTR data confirms that the European repo market remains predominantly uncleared and predominantly processed without an external collateral agent.

According to ESMA's *EU Securities Financing Transactions Markets 2024* report [6], the average outstanding repo principal amount observed in the SFTR dataset during the first ten months of 2023 was approximately EUR 6.9 trillion, alongside an average of roughly 329,000 outstanding repo transactions.

Within these outstanding amounts, around 40% (approximately EUR 2.7 trillion) was centrally cleared in 2023, while the non-cleared segment accounted for 61% (about EUR 4.2 trillion). The non-cleared segment itself was overwhelmingly processed bilaterally, representing around 55% of total principal amounts, with only a smaller share managed via tri-party arrangements (around 6%). In aggregate, transactions processed without an external agent represented the large majority of repo activity, both in terms of principal amounts and transaction counts [6].

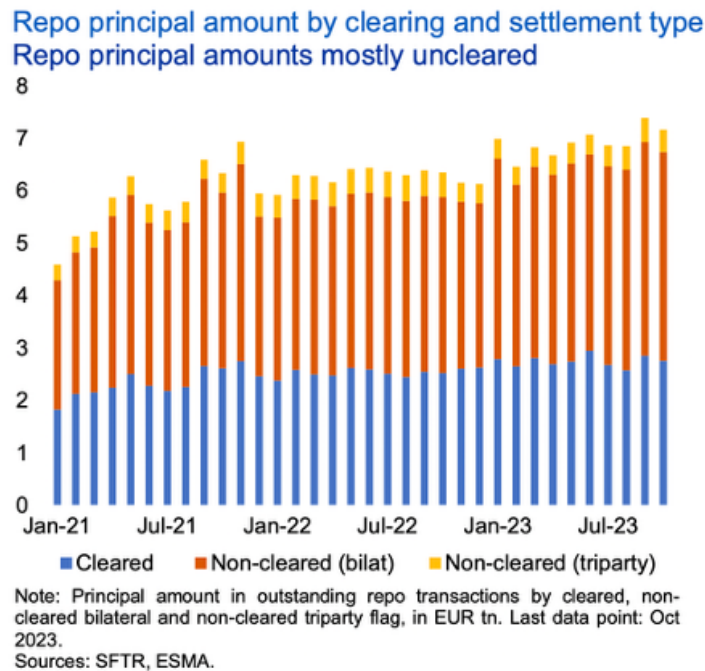


Figure 2.4: Repo principal amounts by clearing and settlement type in the EU market.

2.2. Securities lending

The other main product in securities finance is the securities lending transaction, which, as already introduced, is an agreement in which one party, the lender, temporarily transfers securities to another party, the borrower, in exchange for collateral provided to mitigate counterparty credit risk. The borrower commits to returning equivalent securities rather than the exact same instruments, either on a fixed maturity date or on demand. Upon the return of the securities, the lender releases the collateral to the borrower.

In contrast to repo transactions, securities lending is primarily securities-driven. The economic motivation generally arises from the borrower's need to obtain a particular security, rather than from a pure funding objective. This feature also explains why securities lending transactions are commonly negotiated on specific securities, such as a given equity or bond issue, rather than on broad collateral baskets, even though the collateral posted by the borrower may itself be diversified.

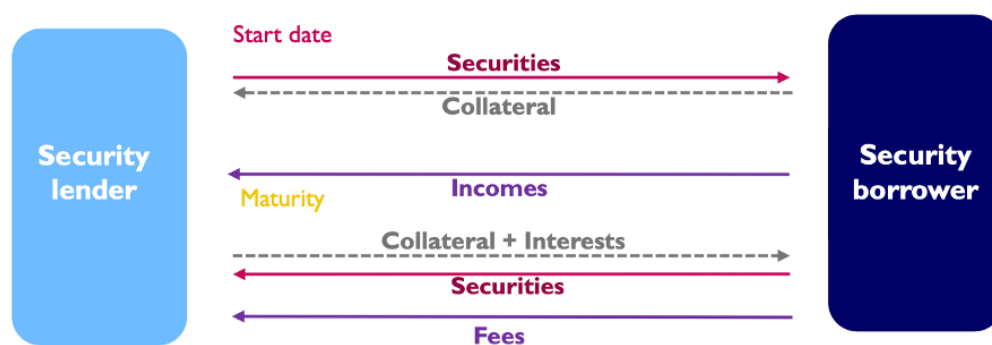


Figure 2.5: Cash, collateral, and income flows in a securities lending transaction.

As a result, securities lending plays a central role in facilitating short selling, market making, and settlement efficiency across equity and fixed-income markets. Consider a hedge fund that intends to establish a short exposure on an equity, for example to express a negative view or to hedge an existing long position such as a convertible bond or an equity derivative. In order to sell the stock short, the fund must first borrow the shares via a securities lending transaction.

A typical structure is as follows. The hedge fund, acting as borrower, borrows a number of shares from a long-term investor, such as a pension fund, acting as lender, often through a lending agent. At initiation, the borrower posts collateral, commonly cash or high-quality liquid securities, subject to an agreed haircut, for example collateral posted at 102–105%

of the market value of the lent shares. The borrower then sells the borrowed shares in the market and holds the resulting cash proceeds.

Over the life of the loan, the position is marked to market and margin calls are exchanged to maintain the agreed level of collateralisation. The borrower pays a lending fee and, in the case of cash collateral, receives a rebate rate that implicitly determines the economic cost of borrowing. If a dividend is paid during the loan, the borrower, as temporary legal owner, receives it but must compensate the lender through a manufactured dividend that can be paid right away or at maturity. Finally, when the hedge fund decides to close the short position, it repurchases the shares in the market and returns equivalent shares to the lender, at which point the collateral is released and the transaction terminates.

From a contractual standpoint, securities loans are most commonly structured as open transactions, meaning that the lender may recall the securities at any time, typically with short notice. Fixed-term loans exist but are less prevalent. The open structure provides lenders with flexibility to sell the securities, meet internal settlement needs, or reduce counterparty exposure rapidly, which can be particularly valuable in stressed market environments.

Because the market value of both the lent securities and the collateral can fluctuate materially over time, securities lending relies on regular mark-to-market valuation and collateral maintenance. Valuations are typically performed daily and, in some market segments, intraday. When valuations move beyond agreed thresholds, margin calls are exchanged to restore the contractual level of collateralisation.

Compensation to the lender generally takes the form of a lending fee, payable periodically, for example monthly, or at termination. The fee is primarily driven by supply and demand dynamics for the security. Scarce securities that are difficult to borrow command higher fees, while widely available securities trade at lower fees.

In transactions collateralised with cash, a common market convention is that the lender pays interest on the cash collateral at an agreed rebate rate. Economically, the rebate rate is inversely related to the lending fee: all else equal, a lower rebate implies a higher net return to the lender, reflecting the scarcity value of the borrowed security.

As in repo transactions, securities lending typically involves transfer of title. Ownership of the loaned securities passes to the borrower for the duration of the transaction, and ownership of the collateral passes to the lender. This legal structure has several important implications. First, the borrower acquires the right to sell or re-use the borrowed securities. Second, voting rights associated with equities pass to the borrower; therefore, if the lender

wishes to vote, the securities must be recalled before the relevant record date, or an appropriate substitution must be arranged. Third, although the borrower receives coupons or dividends during the term as legal owner, the borrower is contractually required to compensate the lender through manufactured payments, ensuring that the lender remains economically neutral with respect to income distributions.

Finally, securities lending and repo are often used sequentially within broader financing strategies. For example, a dealer may borrow or source securities through the lending market in order to obtain repo-eligible collateral, such as government bonds, and then use those bonds in the repo market to raise secured cash funding. This interaction illustrates the complementarity of the two markets within the broader collateral ecosystem.

2.2.1. General collateral and specific securities

Market practice in securities lending sometimes borrows the terminology of *general collateral* (GC) versus *specials*, by analogy with repo. Conceptually, GC would refer to loans of securities that are broadly available in the lendable universe and therefore command low and relatively stable fees, whereas *specials* (also referred to as *specifics* or *hot securities*) are names for which borrowing demand is high relative to supply, so that the borrowing cost rises and becomes more volatile.

However, it is important to emphasise that this distinction is less structural in securities lending than in repo. Repo GC is a dominant segment precisely because repo is primarily cash-driven and can be organised around baskets of substitutable collateral. Securities lending, by contrast, is inherently security-driven: borrowers typically seek temporary access to a *particular* instrument to cover a short position, satisfy a delivery obligation, or support market-making and hedging activity. As a result, most loans are negotiated and risk-managed at the level of the individual security, and the economic dispersion of lending fees across names is a defining feature of the market.

In practice, the GC label in securities lending is therefore best interpreted as a shorthand for the “low-fee, easy-to-borrow” part of the inventory rather than as a true basket-based market segment comparable to GC repo. Conversely, the notion of specials captures the economically relevant cases: securities whose scarcity generates a meaningful incremental borrowing cost. Finally, because each loan remains shaped by bilateral constraints—eligible collateral, haircuts, concentration limits, credit limits, and recall conventions—even loans of widely available securities remain bespoke at the trade level, despite being documented under a standard master agreement.

2.2.2. Tri-party securities lending

The logic of tri-party arrangements in securities lending is closely related to the tri-party repo framework discussed above: the purpose is to *externalise operationally intensive collateral-management tasks* to a specialised third party. The underlying securities loan nevertheless remains a bilateral contract between lender and borrower (typically documented under a GMSLA), so tri-party lending should be understood as an *operating model* rather than as a distinct economic instrument.

In practice, tri-party securities lending is mainly used to industrialise the collateral leg of the loan. This is particularly relevant when the borrower posts *non-cash collateral* and when the lender accepts a broad collateral set, since both features require frequent valuation, eligibility controls, and substitution capabilities. In those cases, the parties agree *ex ante* a collateral schedule (eligible assets, concentration and issuer limits, haircut grids, valuation sources, and operational cut-offs), and the borrower delivers collateral into the tri-party environment. The tri-party agent, typically a custodian bank or an (I)CSD providing collateral-management services, then allocates collateral to loans and maintains the required level of over-collateralisation by applying haircuts and monitoring valuations through time. As exposures move, margin is implemented operationally through collateral reallocation (posting additional collateral or releasing excess), and, where permitted, substitutions can be performed within the collateral pool without disrupting the economic terms of the loan.

Relative to repo, however, tri-party arrangements are generally *less defining* for securities lending market structure always because of the fact that securities lending is intrinsically security-driven and frequently features open terms, recalls, and corporate-action processing, a significant part of the operational complexity remains bilateral between lender (or its lending agent) and borrower even when collateral is held in a tri-party set-up. Accordingly, tri-party in securities lending is best viewed as a scalable mechanism to manage collateral eligibility, valuation and margining, rather than as the dominant execution channel.

2.3. Regulation and reporting in European securities finance

Physical securities finance sits at the intersection of two complementary layers. The first is a *public-law layer*, which defines how securities financing activity is reported, observed and monitored by supervisors. In the European Union this layer is centred

on the Securities Financing Transactions Regulation (SFTR), which imposes detailed, transaction-level reporting to authorised trade repositories and enables market monitoring on the basis of observed data rather than proxy estimates. The second is a *private-law layer*, which defines how repo and securities lending transactions actually function and remain enforceable in practice: the contractual allocation of rights and obligations, the mechanics of collateral and margining, the treatment of income and corporate actions, and the default and close-out process.

This distinction matters because the two layers answer different questions. SFTR primarily addresses *transparency and oversight*: it standardises *what* is disclosed to authorities and *how* it is reconciled and stored. By contrast, the economic viability and operational robustness of repos and securities loans depend on the legal architecture that governs the transaction lifecycle between counterparties. In practice, market participants therefore rely on standardised master agreements, signed once per relationship and then used as the contractual framework for many trades over time. This contractual standardisation is also a practical enabler of regulatory reporting: when lifecycle events (margining, substitutions, recalls, terminations) follow well-defined contractual conventions, mapping them into harmonised reporting fields becomes more consistent and reconciliation rates tend to improve.

2.3.1. Trade repositories and the SFTR reporting layer

Trade repositories (TRs) are centralised electronic infrastructures that receive, validate, reconcile and store transaction reports for regulatory use. Under SFTR, counterparties report securities financing transactions on a $T+1$ basis to an authorised TR, using a harmonised data model (with a large set of mandatory fields capturing trade economics, collateral, lifecycle events and counterparty identifiers). This architecture is designed so that supervisors can monitor activity and exposures consistently across institutions and across market segments, and so that aggregated statistics can be produced on a reliable perimeter.

Within the EU supervisory architecture, the ESMA plays a central technical and supervisory role for SFTR. ESMA develops and maintains the SFTR reporting standards and validation rules, registers and supervises trade repositories for SFTR purposes, and supports national competent authorities by facilitating access to the dataset and publishing aggregated analysis. In this sense, ESMA acts as both a *standard-setter* for reporting specifications and a *data hub* for market monitoring.

Importantly, SFTR does not replace market documentation. It does not determine the

legal enforceability of repos or securities loans, nor does it prescribe the contractual close-out mechanism, the detailed margining process, or the legal treatment of title transfer. Those elements remain a matter of private contracting, typically under industry master agreements.

2.3.2. Private-law foundations: GMRA and GMSLA

The private-law layer of securities finance is dominated by two global master agreements. Repos are typically documented under the Global Master Repurchase Agreement (GMRA), while securities lending is documented under the Global Master Securities Lending Agreement (GMSLA). Both follow the same structural logic: the master agreement is negotiated and signed once per counterparty relationship, and individual transactions are then executed through trade confirmations that incorporate the economic terms of each deal while relying on the master agreement for lifecycle rules (collateralisation, valuation, substitution, manufactured payments, dispute resolution, events of default, close-out valuation and netting).

This standardisation is not merely administrative. It is a prerequisite for scalable secured financing, because it supports enforceable close-out netting and consistent margining discipline, and it creates a common contractual vocabulary that can be used across jurisdictions and across operational setups (bilateral, tri-party, and, where applicable, centrally cleared structures). While adoption is particularly strong in Europe, reflecting the cross-border nature of the market and the need for consistent documentation, both GMRA and GMSLA are used globally, especially for international counterparties that require a single framework capable of functioning across different legal systems.

The GMRA

The GMRA is published and maintained by the International Capital Market Association (ICMA), a market association active in wholesale fixed-income markets. The GMRA is designed for title-transfer repos, consistent with the legal form of a classic repo as an outright sale of securities combined with a forward commitment to repurchase equivalent securities. Contractually, it defines the delivery-versus-payment obligations and the treatment of settlement fails, establishes the legal basis for collateral maintenance through valuation and variation margin provisions (including dispute mechanics), and, where agreed, formalises substitution rights so that collateral can be replaced during the term while preserving eligibility and coverage requirements. Because title is transferred, the GMRA also specifies how income on the collateral (coupons, dividends) is treated

through compensating flows (manufactured payments) so that economic ownership remains with the original seller. Finally, it sets out events of default and the close-out mechanism, including close-out valuation and netting of mutual obligations, so that the exposure can be reduced to a single net amount upon default.

The GMRA is intentionally modular: elections and schedules allow counterparties to tailor operational parameters (notice periods, thresholds, eligible collateral profiles) while keeping a standard core. This modularity helps explain why the GMRA can function as a global template across heterogeneous repo markets.

A practical implication is the distinction between *documented* and *undocumented* buy/sell-backs. A documented buy/sell-back relies on a written master agreement (often the GMRA plus an annex), supporting enforceable margining rights and more reliable netting. An undocumented structure is closer to two separate outright trades (spot and forward) with weaker contractual machinery for margining and less certainty around netting and income treatment, making it materially riskier from both legal and operational perspectives.

The GMSLA

The GMSLA is published and maintained by the International Securities Lending Association (ISLA), the main industry body representing the securities lending ecosystem (beneficial owners, lending agents, custodians, broker-dealers, prime brokers and other intermediaries). Like the GMRA, the GMSLA is signed once per relationship and then governs multiple loans executed via confirmations. It is particularly important because securities lending embeds lifecycle features that are less prominent in repo: loans are often open and callable, they interact with corporate actions and voting rights, and they require legally predictable entitlement processing.

At the core of the agreement, the GMSLA defines the delivery and redelivery of *equivalent* securities, sets the collateral framework (eligible collateral, valuation conventions, margining mechanics and dispute procedures), and provides the contractual foundation for manufactured payments so that dividends and coupons received by the borrower as legal owner are passed back economically to the lender. It also formalises remuneration via lending fees and, where cash collateral is used, rebate mechanics that determine the economic cost of borrowing. As with the GMRA, default and termination provisions are central: the agreement specifies events of default and close-out procedures that convert multiple outstanding loans and collateral balances into a single net obligation. Under effective daily margining, the lender's residual credit exposure is primarily the risk that

collateral becomes insufficient to repurchase the securities and settle outstanding entitlements during stressed conditions (for example because of large market moves between margin calls or illiquidity during liquidation).

2.3.3. From private-law standardisation to post-crisis regulation: a short timeline

The evolution of securities finance governance can be read as a sequence in which contractual standardisation preceded, and then interacted with, post-crisis regulatory transparency.

In the late 1980s and 1990s, early versions of cross-border repo master documentation were developed under ICMA's predecessor frameworks and progressively converged into the GMRA as the dominant international repo master agreement during the 1990s. Over a similar period, securities lending documentation evolved into the GMSLA as the standard cross-border framework for lending relationships. This phase can be viewed as the *private-law foundation* period: title transfer conventions, close-out netting architecture and standard lifecycle clauses were developed to make secured financing scalable across counterparties and jurisdictions.

After the global financial crisis, the regulatory agenda expanded from contractual robustness to systemic oversight and transparency. The 2009 G20 commitments on market transparency and the use of central clearing infrastructures set the political and supervisory direction for subsequent EU reforms [7, 8].

In the European Union, EMIR (Regulation (EU) No 648/2012) established the supervisory and risk-management regime for central counterparties (CCPs) and clearing members, including governance requirements, default management frameworks, and margining standards [7]. Although EMIR was initially focused on derivatives, its CCP rulebook is highly relevant for repo transactions where central clearing is used. A CCP-cleared repo is shaped not only by the bilateral economics of the trade but also by the CCP's novation mechanism, margining framework, default waterfall structure, and multilateral netting arrangements [8].

SFTR then introduced a dedicated transparency regime for securities financing transactions. Adopted in 2015, SFTR created harmonised reporting obligations for repos, securities lending, buy/sell-backs, sell/buy-backs and margin lending, as well as disclosure requirements related to the reuse of collateral. ESMA subsequently developed the detailed regulatory and implementing technical standards that specify reporting fields,

identifiers and validation rules, and SFTR reporting went live in phased waves from 2020 into early 2021 (starting with credit institutions and investment firms, then expanding to CCPs and CSDs, other financial counterparties and finally non-financial counterparties).

In the years following SFTR go-live, industry bodies increasingly focused on operational alignment between day-to-day market practice and regulatory data requirements. On the repo side, ICMA's ERCC maintained and updated market best-practice guidance (confirmations, lifecycle events, open trades, fails management and settlement discipline) to support consistent implementation across participants and to reduce operational fragmentation. On the securities lending side, ISLA similarly expanded best-practice guidance (recalls, returns, collateral schedules, entitlement processing) to ensure that securities lending lifecycle events are operationally standardised and can be represented consistently in SFTR reporting.

Over time, this interaction has effectively produced a layered architecture for European securities finance: contractual enforceability and lifecycle rules are anchored in GMRA/GMSLA documentation and industry practice, while regulatory transparency is delivered through SFTR reporting to trade repositories under ESMA's technical standards. The two layers are complementary: the private-law foundation makes the transactions workable and enforceable; the public-law layer makes the market observable and therefore monitorable from a supervisory and macro-prudential perspective.

2.4. Brief history of physical securities finance

The historical development of securities finance is inseparable from the evolution of securities trading and from the continuous need to obtain secured short-term funding, ensure settlement efficiency, and access scarce securities. While the economic intuition behind collateralised borrowing is very old, the modern securities finance ecosystem emerged through a sequence of market innovations and stress episodes that progressively shaped documentation standards, operational infrastructures, and regulatory attention.

2.4.1. Origins and early market functions

In its modern form, the repo market is generally identified as a twentieth-century innovation that gained traction in the United States and progressively became a core component of money markets. Securities lending is often traced back to nineteenth-century practice in the United Kingdom, where intermediaries sourced government bonds (gilts) to support market making and reduce settlement frictions. From the outset, the activity already

exhibited key structural features that remain central today: a temporary transfer of securities and a collateral mechanism, often non-cash, aimed at mitigating the lender's exposure to counterparty default. This early phase also foreshadowed a persistent segmentation between transactions motivated by the need for a *specific* security (specials) and activity in widely substitutable collateral (general collateral).

Repos institutionalised later, and their development was strongly shaped by their role in liquidity management. A decisive acceleration occurred in the United States in the 1970s and 1980s, when high inflation and regulatory constraints on bank deposit rates fostered disintermediation.

As short-term interest rates rose and Regulation Q limited the ability of banks to offer competitive deposit rates, liquidity increasingly migrated from traditional deposits toward market-based instruments, including repurchase agreements [9]. This shift contributed to the rapid expansion of the repo market as a flexible and collateralised funding mechanism for securities dealers and institutional cash investors.

During the same period, repo markets benefited from legal and operational evolution. Repos on U.S. Treasuries and certain other securities were progressively treated in ways that improved creditors' ability to liquidate collateral upon default, strengthening the attractiveness of secured funding relative to unsecured alternatives. In parallel, the tri-party model introduced a specialised agent, typically a clearing bank or tri-party service provider, that sits operationally between the two counterparties and administers collateral for the duration of the trade. By centralising and automating collateral processes, tri-party repo improved scalability and operational reliability, supporting larger volumes and broader participation, as discussed in previous sections.

Securities lending expanded significantly in the United States from the 1960s onward, driven by rising short selling, increasing intermediation complexity, and the need to prevent settlement failures. Over time, the business became increasingly institutional. By the 1970s, custodian banks began to lend securities on behalf of pension funds and insurance companies, shifting activity from primarily dealer-to-dealer arrangements toward structured programmes operated for long-term investors [10].

This institutionalisation also reinforced the importance of robust entitlement processing and operational discipline (recalls, corporate actions, collateral maintenance), which later became integral features of standard master documentation.

The collapse of Drysdale Securities in 1982 is frequently cited as an important catalyst for strengthening counterparty risk controls and margining discipline. Drysdale was a small

firm that used complex repo strategies in U.S. Treasuries, and its failure exposed critical flaws in early repo market practices, particularly in the treatment of accrued interest and in the absence of systematic margin controls [9]. The episode accelerated the shift away from fragile bilateral dealer arrangements toward more structured models, including the increased use of custodians and, later, clearing mechanisms for institutional investors.

At the core of the episode was a loophole in market convention. Prior to 1982, some Treasury repos were settled on a flat-price basis, effectively ignoring accrued interest between coupon dates. Drysdale exploited this by borrowing Treasuries via reverse repos priced without accrued interest while simultaneously short-selling equivalent bonds in the cash market at prices reflecting accrued interest, capturing the differential and scaling the strategy aggressively. With a very small equity base, Drysdale reportedly built positions amounting to several billions of dollars, leaving it highly exposed to adverse mark-to-market movements. When rates rose sharply in May 1982 and bond prices fell, accumulated losses became unsustainable and the firm ultimately defaulted, transmitting losses to its clearing and settlement counterparties.

The broader significance lay not in the credit quality of the collateral, but in the market structure in which it occurred. Bilateral repo relationships relied heavily on trust, with limited use of haircuts and systematic margining, and with collateral reuse chains that obscured where exposures ultimately resided. The default illustrated how large secured positions could be built with minimal capital and weak shock absorbers, and how sudden repricing could propagate through interconnected funding chains. In response, three enduring changes gained momentum: more consistent dirty-price valuation conventions, more systematic daily margining, and stronger incentives to migrate from purely bilateral processing toward structured arrangements, including tri-party frameworks and, where feasible, central clearing.

On the European side, repo markets developed later and were influenced by U.S. investment banks that imported repo activity during the 1980s[10]. This development partly compensated for limited domestic securities lending in some jurisdictions and supported the growth of government bond futures trading, including the launch of Bund futures in 1988. By the early 1990s, repo had become an increasingly standard funding and collateral management tool for major European banks. Regulatory and market-structure reforms played a key role in this process, including the reform of the French market in 1994 and the creation by the Banque de France of *Spécialistes en pensions sur valeurs du Trésor* (SPVTs), the opening of a sterling repo market in the United Kingdom in 1996, and regulatory changes in Germany in the same year that reduced frictions for repo intermediation[10].

As volumes and cross-border activity increased, standard documentation became essential. Repos increasingly relied on robust master agreements, most notably the GMRA, first published in 1992 and later updated (with a major revision in 2011) to incorporate lessons from stress episodes and evolving market practice. Over time, securities lending similarly converged toward standardised documentation under the GMSLA, supporting cross-border scaling of lending programmes and more consistent management of collateral and entitlement processes.

2.4.2. The global financial crisis and the Lehman Brothers stress test

The turmoil that began in August 2007 and culminated in the collapse of Lehman Brothers in September 2008 marked a structural breakpoint for both repo and securities lending. As unsecured money markets deteriorated, many participants shifted more heavily toward secured funding, and repo and securities lending became essential channels for liquidity provision. At the same time, the crisis demonstrated that secured funding is only as robust as the risk management and operational infrastructure that supports it.

Lehman's failure was a defining moment because it revealed how reliance on short-term repo financing can become a systemic vulnerability when it is used to fund long-dated or illiquid positions. In the years preceding its default, Lehman Brothers depended heavily on repo markets to refinance large inventories of securities. When confidence evaporated in 2008, counterparties tightened terms, demanded higher levels of collateral, shortened maturities, and in some cases withdrew funding altogether. This dynamic has been characterised as a "run" on repo funding, whereby secured lenders reduced their exposure in response to concerns about asset quality and counterparty solvency [11]. The resulting liquidity shock forced asset sales into falling markets and amplified stress through feedback loops between funding access, market prices, and balance-sheet solvency. Beyond the firm itself, Lehman's default stress-tested close-out processes and highlighted the operational importance of timely valuation, disciplined margining, effective collateral control, and reliable settlement arrangements. Critically, the episode also exposed a transparency gap: supervisors and market participants had limited visibility into the scale, maturity structure, and interconnectedness of securities financing chains, especially when collateral was being reused through complex intermediation networks.

2.4.3. Post-crisis constraints: Basel III liquidity and the changing economics of secured funding

In the post-crisis environment, securities finance remained central, but its economics increasingly reflected tighter regulatory and balance-sheet constraints. A key reform was the Liquidity Coverage Ratio (LCR), introduced under Basel III [12].

The LCR requires banks to maintain a sufficient stock of high-quality liquid assets (HQLA) to withstand a severe 30-day liquidity stress scenario, measured as the ratio between available HQLA and projected net cash outflows over the horizon. Formally, the ratio must be at least 100%, meaning that the stock of HQLA must be greater than or equal to total net cash outflows under stress conditions [12].

This framework reshaped incentives in secured funding markets in two closely related ways. First, it increased the strategic value of liquid government bonds and other HQLA as balance-sheet resources, because holding them supports liquidity resilience under the regulatory stress scenario. Second, it made the funding and collateral choices embedded in repos and securities lending more explicitly *regulatory-sensitive*: secured transactions can transform the composition and availability of liquid assets and can alter the timing profile of cash inflows and outflows that drive the LCR calculation. In practice, this contributed to a shift in how major intermediaries use repo and securities lending: beyond their traditional roles as funding tools and market-utility instruments, they increasingly became levers for balance-sheet optimisation, liquidity management, and collateral strategy.

These structural changes provide the natural bridge to the contemporary market analysis developed in the next section. The European repo market today must be understood not only as a funding market, but as a core mechanism for collateral transformation, liquidity distribution, and regulatory optimisation, operating within a framework of enhanced transparency and reporting.

2.5. The today EU market physical SecFin

A structured description of the European securities finance market is now possible because the post-crisis transparency agenda has substantially expanded the empirical information available to both supervisors and market participants. Building on the concepts introduced in the previous sections, the analysis of the European market in this chapter relies on a combination of regulatory reporting and industry sources, which are complementary in scope and level of detail.

At the regulatory layer, the main reference is the SFTR reporting dataset and the related publications that synthesise it, in particular ESMA’s *EU Securities Financing Transactions markets 2024* report. SFTR-based evidence anchors the discussion in observed aggregates and allows a consistent view across the main SFT segments, including repos and securities lending. A practical limitation is that publicly available SFTR statistics are released in aggregated form and, for market-wide totals, the post-Brexit split between EU SFTR and UK SFTR requires care when interpreting “European” levels and time series.

To complement this supervisory perimeter, the chapter draws on the two principal industry benchmarks used in European market practice. For repo, the reference is the *International Capital Market Association (ICMA) European Repo Market Survey*, No. 49 (conducted June 2025, published November 2025) [5], which provides a stable and granular structural breakdown based on a panel of 59 major institutions. For securities lending, the reference source is the *Securities Lending Market Report* (ISLA, 23rd Edition, H1 2025) [13], which provides a market-wide view of lending activity and collateral patterns based on the reporting and analytics conventions used by the securities lending community.

Methodologically, these sources serve different purposes. SFTR-based evidence provides the broad coverage and the harmonised definitions required for a supervisory view of market size and segmentation. The ICMA and ISLA publications, while based on industry reporting and therefore not identical in perimeter to SFTR aggregates, are particularly valuable for interpreting market structure and practice, because they offer richer breakdowns and consistent benchmarks over time. Accordingly, the sections that follow develop the European market picture through two dedicated subsections: one focused on the repo market (primarily using ICMA Survey No. 49, benchmarked where relevant to SFTR/ESMA aggregates), and one focused on securities lending (primarily using ISLA’s H1 2025 report, again interpreted consistently with the SFTR/ESMA perimeter where appropriate).

2.5.1. The EU today market of Repo

Market size and growth

The June 2025 ICMA European Repo Market Survey reports that the total outstanding value of repos and reverse repos on the books of the 59 participating entities reached EUR 12,435.9 billion, representing an all-time high. This level corresponds to a sharp rebound from the corrected December 2024 figure of EUR 10,956.7 billion, implying an increase of 13.5% over the half year and 11.9% on a year-on-year basis[5].

The survey attributes this acceleration to a macroeconomic environment characterised by heightened uncertainty and ongoing risk repricing, which increased precautionary liquidity demand and enhanced the attractiveness of money market instruments, including repo.



Figure 2.6: Outstanding value of the European repo market based on ICMA survey data (EUR billions).

A notable structural feature of the European repo market is the persistent imbalance between repo and reverse repo positions within the survey sample. In June 2025, repos represented 47.8% of the outstanding positions, while reverse repos accounted for 52.2%. This implies that, in aggregate, the survey sample acts as a net cash lender to the rest of the market, providing more cash through reverse repos than it borrows through repos, and correspondingly receiving more collateral than it delivers.

The survey notes that this configuration has held continuously since 2012, a period during which central banks supported European markets through longer-term liquidity provision following the euro area sovereign debt crisis. Conceptually, this pattern is consistent with a market structure in which many large intermediaries act as liquidity distributors, using reverse repos to place cash against collateral and to support client activity, market making, and collateral transformation.

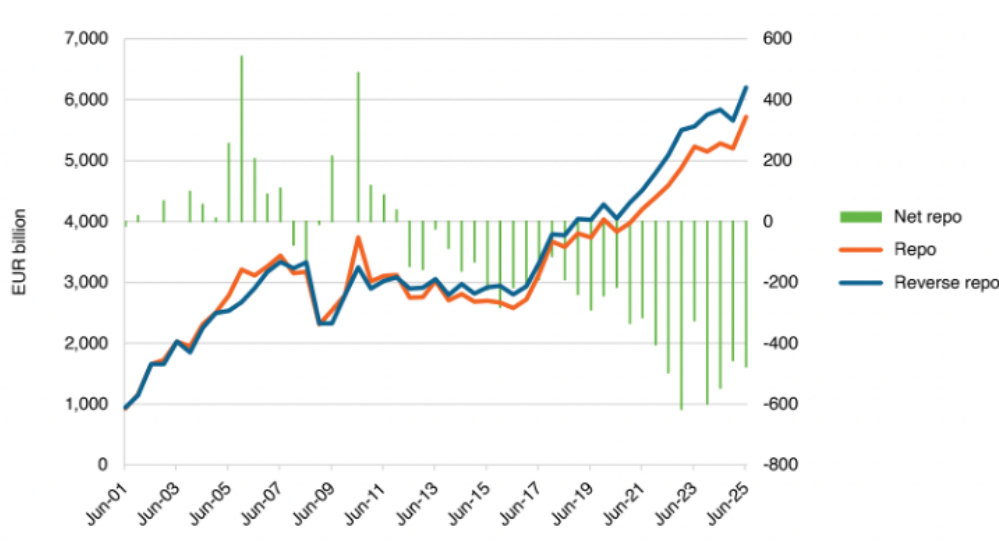


Figure 2.7: Evolution of repo, reverse repo, and net repo positions in the ICMA survey sample (EUR billions).

The ICMA survey[5] also provides insight into the execution channels through which repo transactions are conducted, highlighting a gradual but persistent structural shift toward electronic trading. Direct trading, excluding tri-party transactions, remains the dominant channel, accounting for around half of outstanding volumes. This reflects the continued importance of bilateral relationships and negotiated trades, particularly for less standardised transactions and for counterparties with established credit lines.

At the same time, electronic trading venues have increased their role. Automatic Trading Systems (ATS) are electronic multilateral platforms on which dealers and clients post firm executable quotes and transact in a highly standardised and automated manner, typically for liquid general collateral repos. In June 2025, the ATS share increased to 26.5% from 26.0%, with platform-reported outstanding volumes reaching EUR 1,862.9 billion, corresponding to a 18.2% increase relative to December 2024. This growth outpaced the overall expansion of the repo market, confirming the structural momentum of electronic execution for standardised products. By contrast, voice-brokered repo refers to traditional interdealer broking, where specialised brokers match counterparties, historically by telephone. While this channel remains useful for negotiated, bespoke, or less liquid trades, it continues to face structural pressure from the rise of electronic execution. Its share has declined steadily over time as automation and standardisation have expanded across the most liquid segments of the market.

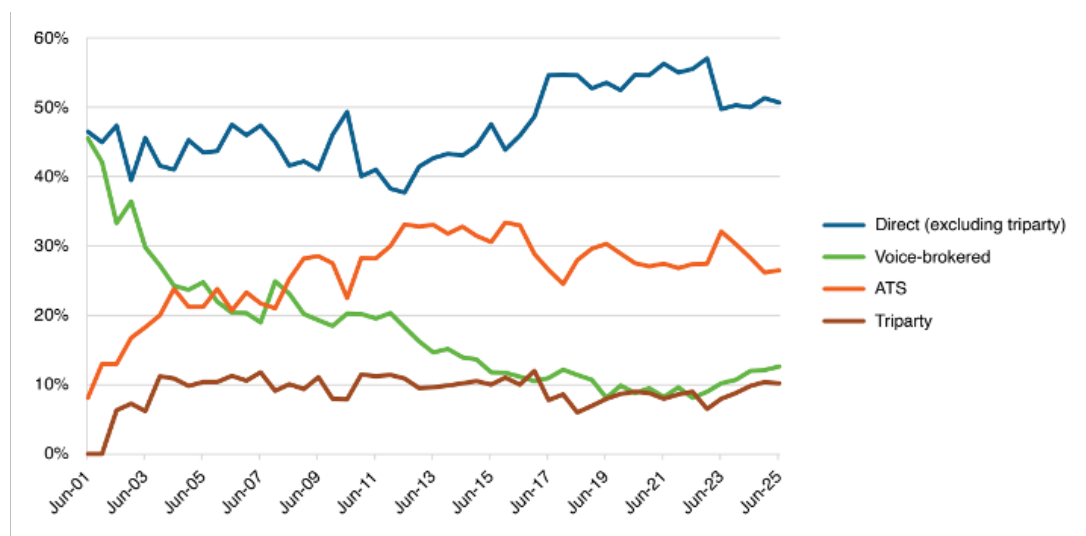


Figure 2.8: Distribution of European repo activity by execution channel (ICMA survey, percentage of outstanding amounts).

Within this broader market expansion, tri-party repo reached an all-time high outstanding value of EUR 1,267.3 billion in June 2025, increasing by 11.5% from a revised EUR 1,136.8 billion in December 2024. Despite this growth in absolute terms, the share of tri-party repo within the survey sample declined slightly to 10.2% from a revised 10.4% in December, as other market segments expanded more rapidly.

This pattern illustrates that, while tri-party repo continues to grow and remains an important operational segment, its relative importance within the overall market can fluctuate depending on the growth dynamics of bilateral and electronically executed repos.

Collateral composition

Collateral composition is economically central to the repo market because it links funding conditions to collateral scarcity, regulatory liquidity preferences, and the feasibility of balance-sheet-intensive intermediation. The choice of collateral determines not only pricing differentials across repo transactions, but also their regulatory treatment, particularly with respect to liquidity and capital requirements.

In June 2025, the same survey indicates^[5] that the largest collateral segment on the books of the survey sample consisted of U.S. Treasuries, which accounted for 19.8% of outstanding collateral. This reflects the global role of U.S. government securities as the dominant high-quality liquid asset and their extensive use in secured funding and collateral transformation activities. Italian government securities represented the second-largest segment at 15.4%, followed by UK gilts at 12.8%.

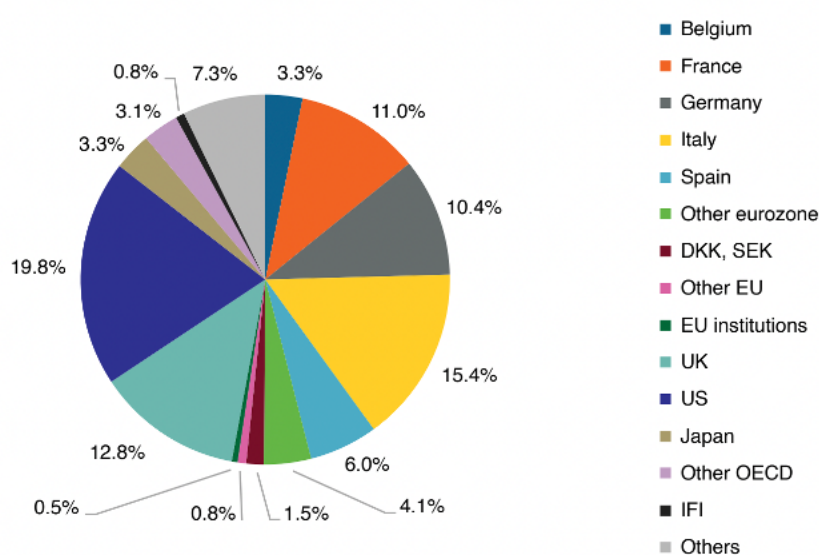


Figure 2.9: Geographical composition of collateral in the European repo market (ICMA survey, June 2025).

The growth in Italian and Spanish collateral offset a marked decline in the share of German and French government bonds. Consequently, the share of core eurozone government securities in the collateral pool contracted to 27.6%, while the share of peripheral issuers, defined as sovereign issuers with higher spreads at the edge of the euro area, expanded to 22.5%.

This inversion reflects shifting fiscal concerns and relative value assessments by market participants. Overall, government securities of all types continued to dominate the collateral pool, constituting 86.2% of total European collateral in the survey.

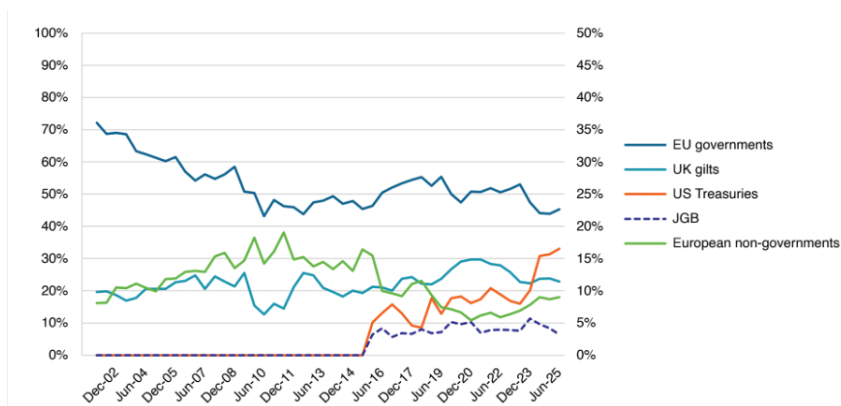


Figure 2.10: Evolution of collateral composition by asset class in the European repo market.

Collateral patterns differ meaningfully between bilateral and tri-party segments. In tri-party repo collateral managed by the main agents reporting into the ICMA survey, government securities represented 41.1% of tri-party collateral, followed by covered bonds at 17.5%, corporate bonds at 9.3%, and supranational or agency-related assets.

This composition is informative because tri-party frameworks often support collateral allocation across broader eligibility sets, and because tri-party usage is closely linked to operational efficiency and collateral optimisation.

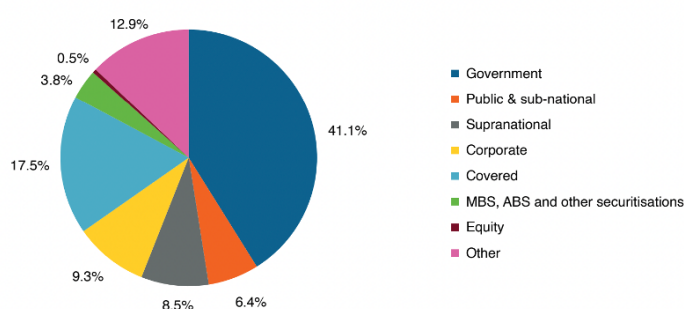


Figure 2.11: Collateral composition of tri-party repo transactions (ICMA survey, 2025).

Repo rate

While the repo rate is ultimately an equilibrium price reflecting both cash conditions and collateral considerations, an informative first cut is the split between fixed-rate and floating-rate structures. In June 2025, fixed-rate repo represented 84.3% of outstanding positions in the main survey sample, while floating-rate repo accounted for 15.7%.

The survey also notes that floating-rate usage, which increased after 2020 as policy rates rose, remained well below its recent peak. The June 2025 configuration appears consistent with market expectations regarding the path of central bank rate cuts and longer-term inflation risks.

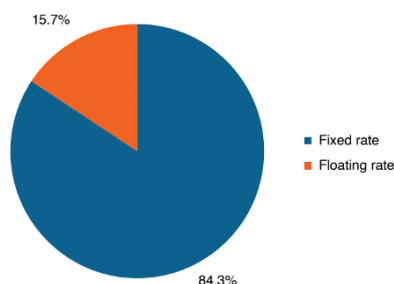


Figure 2.12: Fixed-rate and floating-rate repo as a share of outstanding positions (ICMA survey, 2025).

Maturity analysis

Repo maturity is a key determinant of liquidity risk and balance-sheet usage. The survey methodology, which measures outstanding stock rather than transaction flows, inherently underweights the volume of very short-term transactions compared to turnover-based data. Nonetheless, the maturity profile reveals important trends.

In the first quarter of 2025, there was a pronounced seasonal shift back into short-dated transactions, defined as those with one month or less remaining maturity. The share of these short-dated repos increased to 68.4% of the survey book. This shift occurred largely at the expense of positions with one-to-three months remaining maturity and forward-starting repos. As a result, the weighted-average remaining maturity shortened slightly.

A significant structural feature is that the survey sample provides substantial maturity transformation to the wider market. This role was accentuated in the latest period, as the sample became a net cash borrower at the very shortest maturity, specifically overnight, while remaining a net lender across all other maturities. This maturity mismatch, which is a core function of dealer intermediation, rebounded to a record level in the June 2025 survey.

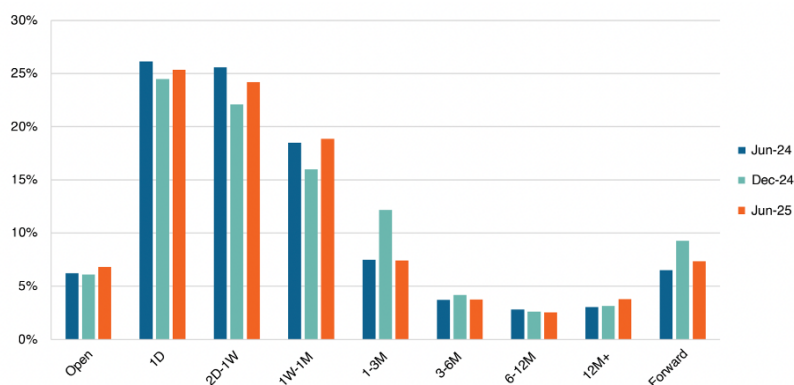


Figure 2.13: Maturity distribution of outstanding repo positions (ICMA survey, 2025).

2.5.2. EU today Market of Security Lending

A market-wide view of securities lending is inherently more fragmented than repo, because activity is distributed across agent lenders, prime brokers, custodians, and multiple post-trade channels. As a result, no single reporting source provides the same level of comprehensive coverage as is available for repo markets under regulatory reporting frameworks.

This section focuses on the ISLA Securities Lending Market Report for the first quarter of

2025[13]. The report consolidates high-frequency benchmarking datasets (DataLend, S&P Global, FIS Global) and incorporates information from the principal European tri-party service providers (BNY Mellon, Euroclear, Clearstream, and J.P. Morgan). The analysis therefore reflects a global broad cross-section of market activity and not just an European overview like the report before. The discussion though will focus on the European context, drawing primarily from the “European Fixed Income” and “EMEA Equities” segments of the report, while global aggregates are used where regional breakdowns are provided.

Gblobal Market size and activity

Globally, the securities lending market in the first half of 2025 remained robust. Total lendable assets across all securities reached EUR 37.4 trillion, while on-loan balances stood at EUR 3.0 trillion, generating EUR 5.6 billion in revenue for lenders.

Global Lendable Revenue by Asset Type				
Asset Class	Lendable (€ tn)	On-Loan (€ tn)	Revenue (€ bn)	Lendable Revenue BP
All Securities	37.4	3.0	5.6	1.6
Equities	28.4	1.3	4.2	1.6
Fixed Income	4.3	1.4	1.3	1.6

Figure 2.14: Global lendable assets, on-loan balances, and securities lending revenue by asset class (H1 2025).

In Europe specifically, the fixed income lending market experienced a decline in on-loan balances for European government bonds (EGBs), which fell from approximately EUR 420 billion at the end of 2024 to around EUR 380 billion in the first half of 2025. This decline was attributed to the European Central Bank’s rate-cutting cycle, which reduced the deposit facility rate to 2%.

The resulting lower-rate environment caused most EGBs to trade at, or close to, general collateral (GC) levels, with only a limited number of “special” securities continuing to command scarcity premia. These were typically bonds approaching maturity or securities affected by temporary supply constraints.

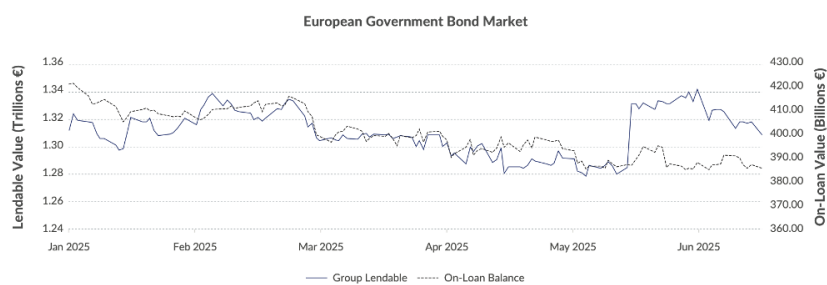


Figure 2.15: European government bond lending: lendable value and on-loan balances (H1 2025).

Conversely, Europe as a region has been a beneficiary of the perceived volatility in the United States and demonstrated relative strength against the headwinds of U.S. trade tariffs and broader economic uncertainty.

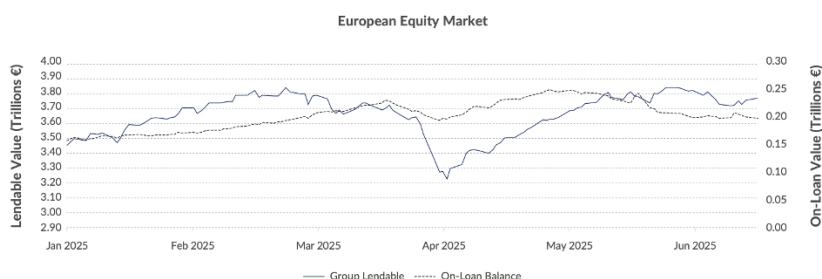


Figure 2.16: European equity lending: lendable value and on-loan balances (H1 2025).

Indeed, on-loan balances for European equities increased by approximately 30% in the first half of 2025. Balances started the year at around EUR 155 billion, peaked at nearly EUR 257 billion in early June, and subsequently stabilised at elevated levels, supported by strong utilisation rates.

Collateral composition

The preference for non-cash collateral remains a dominant and defining feature of the European securities lending market, particularly in fixed income. Approximately 95% of European government bond lending transactions were conducted against non-cash collateral in the first half of 2025. This trend is driven by borrowers' ongoing focus on regulatory optimisation, notably under the Net Stable Funding Ratio (NSFR), and broader balance sheet efficiency considerations. Demand for collateral upgrade trades persisted, whereby borrowers exchange lower-quality assets for high-quality collateral, such as government bonds, through securities lending. The tri-party collateral landscape in Europe shows a

strong concentration in government bonds. Data from tri-party agents indicates that a significant portion of European non-cash collateral held in securities lending transactions is issued by eurozone governments.

2.6. Market participants

The securities finance ecosystem brings together institutions with different objectives, ranging from long-term investors seeking incremental yield to intermediaries optimising funding and balance-sheet usage. Although repo and securities lending are often discussed under the same “securities finance” umbrella, the two markets differ in their primary economic motivation. Repo activity is typically cash-driven and closely linked to secured funding and liquidity management, while securities lending is more often securities-driven and linked to the temporary sourcing of specific instruments for settlement, hedging, and short-selling. As a result, the same participant categories can appear with different typical roles depending on whether the transaction is a repo or a securities loan.

A useful way to describe the market is to distinguish five groups of actors: buy-side institutions, sell-side intermediaries, market infrastructure providers, service providers, and technology and data providers.

2.6.1. Buy-side institutions

Asset managers, including mutual funds and large institutional managers, are often long holders of securities and can participate in securities finance either to generate incremental return or to manage cash efficiently. In securities lending, they frequently appear as net lenders of securities, usually via organised lending programmes run internally or outsourced to agent lenders. In repo markets, asset managers may instead participate primarily as cash investors, using reverse repo to invest short-term liquidity on a secured basis.

Pension funds and insurance companies are typically long-horizon investors and participate in securities finance in a more governance-driven manner. When they lend securities, it is usually through conservative programmes with strict collateral and counterparty requirements. When they use repo, the typical motivation is cash investment or liquidity management rather than balance-sheet-intensive intermediation.

Hedge funds are structurally important on the demand side. In securities lending, they are major borrowers because borrowing is required to establish short positions and to implement many arbitrage strategies. Their access is most often mediated through prime

brokers. In repo markets, hedge funds may use secured borrowing to finance long positions, to manage collateral across strategies, or to support relative value trading in fixed income markets, depending on their funding model and clearing constraints.

2.6.2. Sell-side intermediaries

Banks and broker-dealers are the central intermediaries in both repo and securities lending. In repo markets, they use repos to finance trading inventories, manage liquidity buffers, and intermediate between cash-rich and collateral-rich counterparties.

In securities lending, dealer securities finance desks borrow securities to meet delivery needs and client demand, and lend securities to clients and internal trading desks. They therefore play a key role in matching supply and demand and in forming lending fees, particularly for “special” securities.

Prime brokers are specialised sell-side units that provide financing and operational services to leveraged clients, especially hedge funds. In securities lending, the prime broker often sources securities borrowing from agent lenders or dealer inventory and delivers that borrow to clients, managing collateral and the risk of recalls. In repo markets, prime brokerage overlaps with the financing and margining of client positions and, more broadly, with the management of secured funding for portfolios held at the prime broker. Prime brokers also act as a bridge between physical and synthetic financing, offering alternatives such as swaps when physical borrowing is scarce or operationally inefficient.

2.6.3. Market infrastructure providers

Central counterparties (CCPs) reduce counterparty risk by interposing themselves between trading parties, applying standardised margining, and managing default procedures. Their role is particularly prominent in repo markets, especially in dealer-to-dealer segments and in markets where electronic trading platforms are tightly recognised with clearing. Central clearing can materially affect netting efficiency and therefore balance-sheet usage. In securities lending, central clearing exists in some segments, but the market remains more frequently bilateral and bespoke, which generally implies lower CCP penetration.

Tri-party agents provide operational infrastructure for collateral management. Their role is especially significant in repo markets, where the tri-party agent holds collateral in custody, applies eligibility criteria, performs valuation and margining operations, and facilitates substitutions. This reduces settlement frictions and supports scalability, which

is critical in markets dominated by short maturities and high collateral turnover. In securities lending, tri-party structures can also be used, but the operational centre of gravity more often remains with custodians and agent lenders, particularly because of the importance of corporate actions processing and recall management.

2.6.4. Service providers

Custodian banks support securities finance by providing settlement, safekeeping, corporate actions processing, and reporting. They are foundational for securities lending because they hold securities on behalf of beneficial owners and can operationally support loan lifecycle events. Custodians may also facilitate access to repo markets by connecting clients to tri-party arrangements or by supporting collateral management workflows.

Agent lenders manage securities lending programmes on behalf of beneficial owners. Their functions include identifying borrowers, negotiating terms, managing collateral and margin calls, processing recalls, and ensuring operational and legal compliance. Agent lenders are therefore central to the functioning of securities lending markets, particularly for large institutional portfolios, and they can also interact with repo markets when cash collateral reinvestment or collateral transformation strategies involve reverse repos. Finally, technology and data providers support the end-to-end lifecycle across both repo and securities lending markets, including trade capture, confirmation, collateral eligibility management, margining workflows, settlement integration, risk measurement, and regulatory reporting. Their role has become increasingly important as securities finance markets have grown more operationally intensive and as regulatory requirements such as SFTR demand high-quality data, consistent reporting, and robust controls. In practice, the efficiency and resilience of repo and securities lending operations increasingly depend on the quality of the underlying technology stack as much as on the economic design of the transactions.

3 | Synthetic Security Finance

3.1. Synthetic products

Synthetic securities finance products replicate the economic effects of cash securities financing without relying on the physical transfer of securities through settlement systems. In practice, they allow two counterparties to exchange the economic return of an asset (price variation plus coupons or dividends) against a financing leg, while keeping legal ownership of the underlying with the party that holds or hedges it. As a result, synthetics can deliver exposure, leverage, and financing in a form that is often operationally simpler than physical repo or securities lending, but that concentrates risk on counterparty credit and margining discipline rather than on the enforceability of collateral title transfer.

As introduced at the beginning the two product related to this are the Total Return Swap (TRS) that is the most used and the Total Return Future (TRF) less used and for this not developed so much.

3.1.1. Total Return Swaps (TRS)

A Total Return Swap (TRS) is the core contractual technology behind most *synthetic* securities finance structures. It is an over-the-counter (OTC) derivative in which two counterparties agree to exchange, over a specified horizon, the total return of a reference asset and a financing leg. The total return leg comprises both price performance and any cash distributions generated by the reference asset (e.g. coupons on bonds or dividends on equities), while the financing leg is typically an overnight or term money-market index plus a contractual spread. Under standard market practice, Total Return Swaps (TRS) are documented under an ISDA Master Agreement and confirmed using standardised documentation, such as the 2007 Master Bond Total Return Swap Confirmation [14].

Collateralisation is typically governed by a Credit Support Annex (CSA), under which variation margin (and, where applicable, initial margin) is exchanged over time in order to mitigate counterparty credit exposure throughout the life of the transaction.

The economic roles are defined as follows. The *total return payer* pays the realised total return of the reference asset and receives the financing rate; the *total return receiver* receives the asset total return and pays the financing rate, and therefore bears the economic risk of negative performance. Because the transaction is OTC, its terms are highly customisable: beyond notional and maturity, parties can negotiate reset frequency, payment frequency, the choice of financing index, spread levels, valuation methodology, and the detailed treatment of distributions and corporate actions. This flexibility is one reason why TRS can be used to engineer exposures that resemble either a cash-market holding or a financing-style position, depending on the objective.

The same structure applies across asset classes, with naming conventions reflecting the underlying. When the reference asset is an equity or an equity index, the transaction is commonly referred to as an *equity return swap*. When the reference asset is a bond, the TRS is often used as a *bond replica* (sometimes referred to as a bond return swap), providing the economic profile of holding the bond without requiring physical ownership, settlement, or custody. In this configuration, coupon cash flows are reflected in the total return leg, while the contractual maturity and reset mechanics are typically aligned with the intended investment horizon and risk management needs.

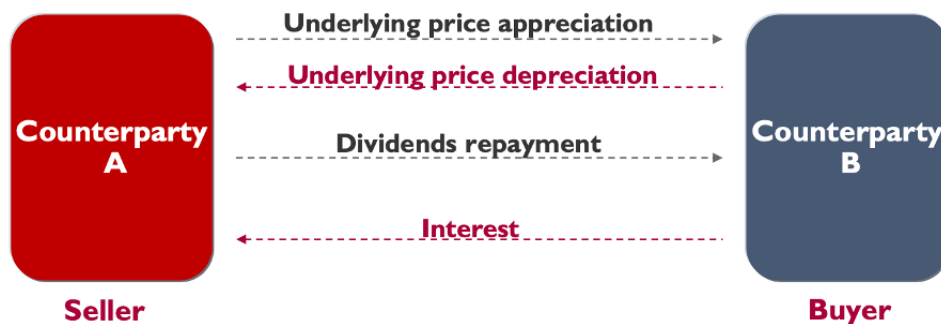


Figure 3.1: Economic cash flows in a Total Return Swap structure.

In its *standard* (or “delta-one”) interpretation, a TRS is primarily an instrument for synthetic replication: it transfers the economic exposure to the reference asset *without* requiring any exchange of the underlying security. The receiver obtains a payoff that is economically close to a funded position in the asset, while the payer retains the operational burden (if any) of sourcing or hedging the exposure on its own balance sheet. This should be distinguished from the *synthetic repo* interpretation introduced above. A synthetic repo is not a different contract type, but a specific *use* of TRS economics to replicate secured funding: the exchange of “cash versus collateral” typical of physical repo

is approximated through a

1. TRS paying asset return against financing
2. The payer's corresponding hedge or inventory position

In other words, while a plain TRS is best understood as a mechanism for transferring total-return exposure, a synthetic repo is a structured application of the same mechanism whose economic objective is to reproduce repo-style financing without a title transfer of collateral.

Finally, the risk mechanics differ from physical securities finance. In a repo, credit protection is primarily achieved through direct control of collateral under a title-transfer structure, supplemented by margining. In a TRS, by contrast, the primary protection comes from the derivative collateral framework (CSA), i.e. from variation margin (and, where applicable, initial margin) rather than from direct control over the underlying asset. As a result, TRS-based structures can reduce settlement frictions and broaden access to exposures, but they place greater weight on counterparty credit quality, margining discipline, and the operational effectiveness of collateral and dispute processes.

3.1.2. Total Return Futures (TRF)

A second important development is the migration of part of the synthetic ecosystem from bilateral OTC swaps to exchange-traded and centrally cleared instruments. Total Return Futures (TRFs) are designed to provide an equivalent economic exposure to a TRS but within a futures framework. The key difference is the market infrastructure: TRFs are exchange-traded, centrally cleared, and subject to daily margining through the CCP, which standardises risk management and reduces bilateral counterparty exposure.

The product rationale is closely linked to the post-crisis regulatory environment, where uncleared swaps became more expensive to maintain due to margin requirements, and participants sought instruments that preserved delta-one exposure while improving collateral and capital efficiency. This thesis does not dive into the detailed pricing methods of these products, as this will be done for repo products.

3.2. Historical overview of synthetic securities finance

The origins of synthetic financing are closely linked to the broader expansion of OTC derivatives markets in the early 1980s[10]. This period was characterised by heightened interest-rate volatility, accelerating globalisation of investment flows, and a growing de-

mand among institutional investors for more efficient ways to manage risk, obtain exposure, and optimise the use of capital. Traditional mechanisms for cross-border investment and financing were often constrained by domestic ownership rules, settlement barriers, and the cost of transacting physically in foreign markets. Against this backdrop, derivatives emerged as an enabling technology. They provided a contractual mechanism to transfer risk and return profiles without requiring the delivery of the underlying asset, thereby allowing exposure management to evolve faster than the legal and operational harmonisation of securities markets.

Within this environment, synthetic securities finance took shape as a practical innovation. Its central economic idea was straightforward: the performance of an asset could be replicated through cash flows, rather than through ownership. This shift was significant. It implied that institutions could obtain the return profile of a security while avoiding some of the frictions of custody, settlement, and market access. As the derivatives ecosystem expanded, synthetics moved from being an incremental tool to becoming an increasingly strategic component of modern financial intermediation.

Significant advances in synthetic financing occurred during the 1980s and 1990s, alongside the rapid growth of prime brokerage services and derivatives market liquidity. Institutional investors began using swap contracts as alternatives to outright securities purchases and sales. Early equity swap structures demonstrated that an investor could receive the total return of a stock or index in exchange for paying a financing rate, without ever taking delivery of the underlying. These early equity swaps provided the conceptual and operational foundation for what became known as the Total Return Swap (TRS).

TRS proved particularly useful where direct ownership was constrained. In particular, European banks were instrumental in developing and distributing these products to foreign investors who faced regulatory ownership limits or capital restrictions in domestic markets. By interposing a bank as the contractual counterparty and hedging agent, the structure allowed a client to obtain synthetic exposure while the dealer retained legal ownership and managed the hedge through its trading book. In effect, the TRS became a mechanism for packaging market access, financing, and exposure transfer into a single OTC contract.

As hedge funds expanded rapidly in the 1990s, major institutions such as Morgan Stanley and Goldman Sachs, together with other prime brokers, offered synthetic products at scale as an alternative to traditional margin financing and stock borrow. TRS structures provided balance-sheet efficiency, operational simplicity, and access to restricted or hard-to-borrow securities. They enabled hedge funds to take long or short positions with

relatively limited initial funding, while the dealer retained the underlying assets on its own balance sheet and transmitted only the economic performance through the swap. Over time, the scope of TRS usage broadened beyond single-name equities. Dealers structured swaps on indices, custom baskets, and portfolios, and extended the same economic logic to credit and fixed-income references, including CDS-linked exposures, loan portfolios, and structured credit products. By the 2000s, synthetics had become a core pillar of prime brokerage, alongside cash financing and physical securities lending. Dealers developed increasingly tailored solutions, including portfolio swaps aligned with client strategies and risk targets. In parallel, large asset managers integrated TRS into fund structures and ETFs in order to achieve synthetic index replication and efficient market access within applicable European regulatory constraints. This dual adoption, sell-side distribution of financing and risk transfer on the one hand, and buy-side optimisation of exposure and implementation on the other, helped establish synthetics as a mainstream tool in global securities finance.

In addition, TRS facilitated access for investors to restricted, illiquid, or operationally burdensome markets without title transfer. Banks also used synthetic structures to shift exposures and optimise regulatory capital, particularly as Basel I and Basel II shaped incentives around balance-sheet usage. Insurance companies and pension funds adopted TRS to gain or hedge exposures while respecting investment mandates that could restrict direct holdings of certain asset classes or instruments.

By the mid-2000s, TRS and related delta-one instruments were widely used across markets, including within structured finance. In particular, synthetic instruments were embedded in synthetic collateralised debt obligations (CDOs) that referenced tranches of subprime mortgage-related risk. During this period, major financial institutions, including Bear Stearns and Lehman Brothers, used TRS to build leveraged credit exposures, often without full external transparency regarding the size and concentration of positions. The flexibility of the OTC framework allowed exposures to accumulate across counterparties in ways that were difficult to aggregate at the system level.

The Global Financial Crisis represented a structural break. Although synthetic securities finance was not the sole cause of the crisis, the episode demonstrated that OTC derivatives could generate hidden and concentrated exposures when transparency, margin governance, and counterparty risk controls were insufficient. The crisis highlighted that a contractual transfer of exposure does not eliminate risk; rather, it reallocates it through a network of bilateral relationships whose stability depends on collateralisation practices, valuation discipline, and robust close-out mechanisms. These lessons fundamentally reshaped the subsequent regulatory and market infrastructure for synthetics.

3.2.1. Post-crisis reforms and modernisation

Following the 2008 crisis, regulatory frameworks intensified materially. In the United States, the Dodd–Frank Act (2010) introduced comprehensive reforms aimed at strengthening financial stability, including enhanced transparency, mandatory clearing, and trade reporting requirements for standardised derivatives under Title VII [15]. In Europe, EMIR (2012) [16] established a parallel infrastructure regime, centred on counterparty risk mitigation through clearing of standardised contracts and robust margin requirements for uncleared OTC derivatives.

Transparency obligations and risk-mitigation standards became central to the synthetic market’s evolution. The introduction and phased implementation of the Uncleared Margin Rules (UMR) between 2016 and 2022 transformed the economics of non-cleared OTC swaps by requiring the exchange of initial margin in addition to variation margin [17].

Through a series of implementation phases (1–6), counterparties exceeding specified aggregate average notional amount (AANA) thresholds became subject to mandatory bilateral initial margin requirements, materially reducing the capital efficiency of purely bilateral structures and increasing incentives to migrate standardisable exposures toward centrally cleared formats [17].

During the same period, TRS usage expanded further, including on ETFs, reflecting continued demand for flexible index and portfolio exposure without direct trading in the underlying securities.

One structural response to the post-crisis margin environment was the “futurisation” of synthetic exposure: the migration of economically similar payoffs from OTC swaps to exchange-traded derivatives that are centrally cleared. A key development in Europe was the introduction of Total Return Futures (TRFs) by Eurex in 2016. TRFs aim to provide an economic exposure comparable to an equity-index TRS, but in a listed format with central clearing. As a result, TRFs offered the perceived benefits of reduced bilateral counterparty risk, standardised margining, and potentially improved balance-sheet efficiency relative to uncleared OTC swaps, while preserving the essential delta-one exposure profile that users sought.

Recent years have reinforced both the importance and the risk sensitivity of synthetic financing. A defining event was the collapse of Archegos Capital Management in 2021 [18]. Archegos used Total Return Swaps (TRS) to build very large and highly concentrated equity exposures across multiple prime brokers, allowing it to accumulate significant positions without public disclosure of underlying share ownership.

The fragmentation of exposures across several counterparties limited the ability of any single institution to observe the aggregate concentration risk. Subsequent investigations highlighted weaknesses in counterparty risk monitoring, margining discipline, and exposure aggregation across prime brokerage relationships. Because these positions were distributed across dealers and did not translate into equivalent public ownership disclosure in the same way as physical holdings, no single counterparty had a complete view of the aggregate leverage and concentration. When underlying prices moved adversely and margin calls intensified, the subsequent deleveraging triggered rapid forced selling, generating losses of more than USD 10 billion across major banks, including Credit Suisse, Nomura, and Goldman Sachs. The episode triggered renewed regulatory and supervisory attention on disclosure, exposure aggregation, and the management of counterparty concentration risk in prime brokerage.

Since then, the market has continued to move toward more standardised post-trade infrastructures and, where feasible, greater use of clearing and service models that reduce operational fragmentation. At the same time, TRS remains a cornerstone of prime brokerage and delta-one activity, widely used in long/short equity, event-driven strategies, and credit relative-value approaches. New applications have also emerged, including ESG-linked baskets, cross-asset overlays, and other tailored exposures, reflecting that the core value proposition of synthetics—flexible exposure transfer without physical ownership—remains structurally embedded in modern securities finance.

3.3. The synthetic securities finance market today

The contemporary market for synthetic securities finance is most clearly illustrated by developments in the United States, where equity swaps and related delta-one structures have become a core component of prime brokerage. According to Finadium (*Prime Brokerage Equity Finance Revenues in 2025*, published August 2025), global equity financing revenues are expected to reach approximately USD 37 billion in 2025, representing an increase of about 18% relative to 2024 [19]. The report links this growth to three reinforcing drivers: higher hedge fund leverage, rising assets under management in the alternative investment segment, and recurring episodes of market volatility that generate tactical trading opportunities and increase demand for financing and hedging solutions.

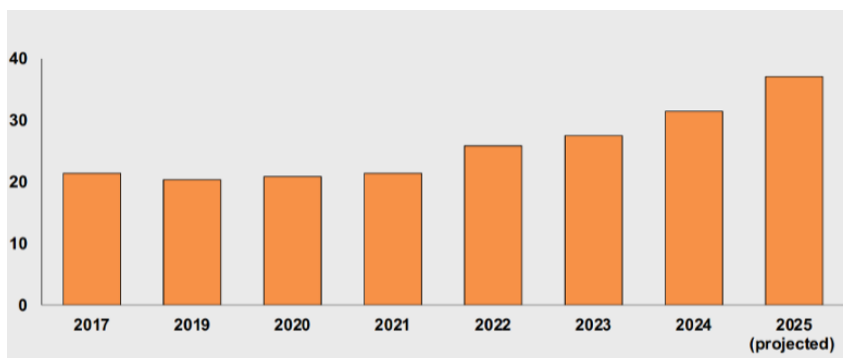


Figure 3.2: Prime brokerage equity financing revenues, 2017–2025 (USD billions).

A notable structural feature of this evolution is the growing predominance of synthetic channels within prime services. By 2024, synthetic financing accounted for roughly 59% of global equity prime brokerage revenues, overtaking physical channels such as securities lending and margin loans, which represented about 41%. In practice, this shift reflects both demand-side preferences and supply-side constraints. For hedge funds, TRS and related structures allow rapid and scalable implementation of long and short exposures without the operational complexity of sourcing and settling the underlying in the cash market. For prime brokers, synthetics can offer a more flexible way to intermediate exposure under modern balance-sheet constraints and internal funding frameworks, provided that margining and risk controls are robust.

Two broad factors help explain why synthetics have gained ground relative to traditional physical financing tools. First, the economics of traditional secured financing have become less attractive in certain contexts. Funding desks face a more binding balance-sheet cost of carrying physical inventories, and the overall cost of intermediation can rise when regulatory constraints and internal allocation of scarce balance-sheet resources become tighter. In this environment, a TRS can represent a comparatively efficient mechanism to intermediate exposure, as it relies on derivative margining rather than on the operational and settlement chain of a physical repo or stock borrow. Second, the U.S. regulatory environment for swaps has reinforced the importance of strong broker-dealer infrastructure. In particular, regulatory rules and margin frameworks encourage daily collateralisation discipline and can shape how equity swap activity is organised and intermediated, contributing to a market structure in which prime brokers either expand in-house synthetic capabilities or rely on established intermediaries and service models for scale and operational resilience.

Beyond revenue composition, quantitative indicators also suggest the scale of synthetic usage by leveraged investors. Finadium reports that hedge fund borrowing balances rose

from around USD 3 trillion in 2019 to roughly USD 4.5 trillion in 2024, with approximately half of this activity increasingly implemented synthetically. Moreover, daily TRS trading exposures in the United States reached about USD 6.7 billion in May 2025, up from around USD 4.6 billion in 2024, highlighting the mainstream role of swaps in day-to-day hedge fund portfolio implementation.

Figure 3.3: Equity financing business conducted by hedge funds (USD billions).

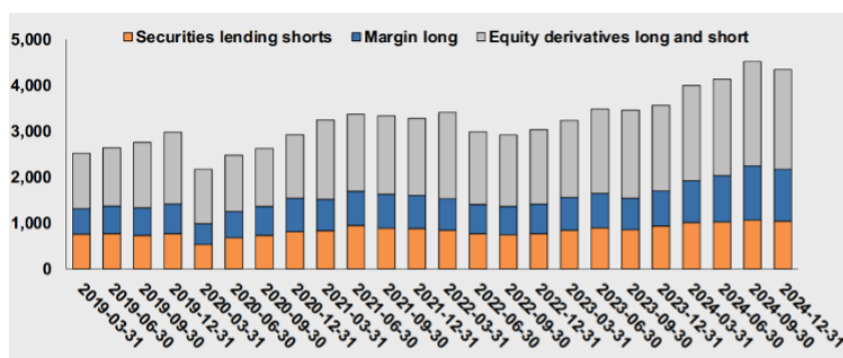


Figure 3.4: Equity financing business conducted by hedge funds (USD billions).

From an industry-structure perspective, the U.S. market is also defined by competitive dynamics among prime brokers. Hedge funds typically diversify their activity across several prime brokers in order to manage counterparty risk, preserve financing optionality, and avoid excessive dependence on a single dealer. In response, banks have invested in strengthening prime services platforms, including synthetic financing capabilities, to capture a larger share of client flow. A related organisational trend has been the consolidation of funding management within centralised teams. Rather than leaving financing decisions fragmented across desks, some institutions have introduced coordinated funding units that seek to optimise financing allocation across products and businesses, reduce internal inefficiencies, and identify the most cost-effective channels for client facilitation.

Finally, regulatory constraints on bank balance sheets remain a key variable shaping the evolution of synthetic and physical financing offerings. In the United States, the Supplementary Leverage Ratio (SLR) is frequently cited as an important constraint on balance-sheet usage for large dealers, including their capacity to intermediate secured financing and hold large positions. Market participants therefore monitor the policy debate around potential adjustments to the calibration or treatment of certain exposures (for example, holdings of U.S. Treasuries), since any loosening could increase balance-sheet flexibility and indirectly affect the economics and competitiveness of financing businesses. Overall,

the U.S. market today can be characterised by synthetics taking a leading role, hedge funds driving demand, and balance-sheet regulation continuing to shape how financing capacity is supplied and priced.

3.3.1. Regulation and reporting in the EU for synthetic securities finance

In the European Union, the relevant regulatory perimeter for TRF and TRS is primarily the *derivatives* framework, centred on EMIR.

The European Market Infrastructure Regulation (EMIR) (Regulation (EU) No 648/2012) [16] is the core EU rulebook for derivatives markets. It establishes the main pillars that shape synthetic securities finance: (i) risk-mitigation obligations for OTC derivatives, including timely confirmation, portfolio reconciliation and dispute resolution, (ii) collateralisation of uncleared derivatives through variation margin and, where applicable, initial margin under the EU margin rules, (iii) central clearing where a clearing obligation applies and clearing services are available, and (iv) transaction reporting to trade repositories.

In practice, OTC TRS are typically documented under an ISDA Master Agreement with a Credit Support Annex (CSA) [17]. The CSA governs collateral exchanges over time and is the key mechanism that mitigates counterparty exposure in synthetics: credit protection arises from legally enforceable margining (variation margin, and potentially initial margin), rather than from holding title-transferred collateral as in a physical repo. Where a TRS is centrally cleared, counterparty exposure is novated to the CCP and managed through the CCP margin framework and default management arrangements. TRFs, by construction, sit closer to this cleared model: they are listed instruments executed on venue and cleared, so the risk-control architecture is anchored in CCP margining and market infrastructure rules.

Finally, while SFTR is primarily discussed in this thesis as the reporting regime for physical SFTs, it is relevant for synthetics mainly through *disclosure* when TRS are used by funds (e.g., UCITS/AIFs), ensuring investor transparency on the use of TRS techniques rather than duplicating EMIR derivatives reporting.

3.3.2. Market participants

The participant set mirrors, to some extent, the physical securities finance ecosystem, but with important shifts in roles driven by the derivative nature of the contracts.

On the buy side, hedge funds are typically the most intensive users of synthetics, be-

cause TRS and related products provide leveraged long or short exposure while avoiding the operational frictions of settlement and, in some cases, reducing constraints linked to physical borrowing availability. Asset managers also use synthetics, often for index replication, portfolio overlays, or exposure management when physical holdings are costly or inefficient. Insurance companies and pension funds may use synthetic exposure in a more constrained manner, typically driven by mandate restrictions, capital considerations, and governance requirements.

On the sell side, investment banks and broker-dealers manufacture and distribute synthetic exposures, intermediate flows, and manage the resulting market risk through hedging in cash markets or internal netting. Prime brokers play a central role for leveraged clients, embedding synthetics within broader financing relationships that combine margining, collateral optimisation, and cross-product netting. For dealers, synthetics are not only client solutions but also balance-sheet tools: they can be used to repackage exposures, optimise funding, and manage inventory risk while generating financing spreads.

Market infrastructure is more selective than in repo. Central counterparties matter primarily for standardised products such as total return futures and, in some cases, for cleared swap services, while tri-party agents are less central because collateral is typically managed bilaterally under CSAs rather than through classic tri-party repo settlement chains. Custodians remain important as service providers for collateral accounts and operational support, especially for buy-side institutions that rely on custody infrastructure to manage margin movements and reporting. Agent lenders, by contrast, are structurally less relevant because synthetics bypass the need to borrow and deliver specific securities, although they may become indirectly involved when dealers hedge synthetic exposures through physical borrowing.

4 | Pricing and Valuation of Securities Finance products

4.1. Physical Security Finance Pricing

4.1.1. Profit and Loss Framework

For repo and securities lending transactions, pricing is often presented as conceptually simple because the instruments are economically close to collateralised loans. In practice, however, institutions do not focus only on the value at inception, but on the day-to-day evolution of Profit and Loss (P&L), which must be consistent with the timing of cash settlements and with the valuation conventions used on the desk.

The Profit and Loss (P&L) of a position represents the cumulative gains or losses generated by the contract over a given horizon and is obtained by combining realised cash flows with the change in the value of the remaining position. Two complementary perspectives are commonly used: *Accounting P&L*, which follows an accounting-style decomposition and is convenient for reporting, and *Economic P&L*, which adjusts the accounting view to make all components comparable at a common valuation time.

Accounting P&L

Accounting P&L is built as the sum of three components:

- Past cash proceeds,
- Future cash proceeds,
- Market value.

$$\text{P\&L}_{\text{accounting}} = \text{Past Cash Proceeds} + \text{Future Cash Proceeds} + \text{Market Value} \quad (4.1)$$

The key limitation of this decomposition is that the three components are not, in general, evaluated on the same time basis. Past cash proceeds are realised amounts observed at their payment/value dates; future cash proceeds are contractually determined amounts that will occur at future dates that are already fixed but not yet paid and will explained better in a few what do this involve and the market value is a valuation-time measure (at t_{eval}) of the remaining position. As a consequence, accounting P&L is best viewed as a *static* metric: it aggregates quantities that are economically comparable only after time-value-of-money adjustments.

4.1.2. Economic P&L

Economic P&L starts from the accounting P&L and corrects it so that all components are interpreted consistently on a common economic basis. The adjustment accounts for the fact that realised cash flows could be reinvested (or must be funded) between their payment dates and the horizon date, and that the valuation of future cash flows and the remaining position changes mechanically as time passes.

$$\text{P\&L}_{\text{economic}} = \text{P\&L}_{\text{accounting}} + \text{Financing} + \text{PV Effect} \quad (4.2)$$

Intuitively:

- the *financing* term represents the time-value adjustment applied to *past* cash flows (already paid/received);
- the *present value effect* represents the time-value adjustment applied to *future* cash flows and to the *market value* component.

Financing Adjustment

The financing component assumes that all past cash flows (with payment date strictly before the horizon date) are reinvested (or funded) daily at the overnight financing rate until the horizon date t .

Let $\lambda(t_i, t)$ denote the daily compounded financing factor between the cash flow value date t_i and the horizon date t . The financing adjustment is therefore:

$$\text{Financing} = \sum_{t_i < t} CF_i (\lambda(t_i, t) - 1) \quad (4.3)$$

where:

- CF_i is the cash flow paid or received at date t_i ,
- $\lambda(t_i, t)$ is computed from the overnight rate curve.

Present Value Effect

The *Present Value (PV) effect* captures the purely *time-driven* revaluation that occurs as the valuation date moves forward. It adjusts both the market value of the remaining position and the future cash proceeds that are contractually due after t_{eval} . In other words, even if market conditions were unchanged, the passage of time alone would modify discounted values through the shortening of maturities and the accrual/discounting mechanics.

In practice, these adjustments depend on the discount factors implied by the relevant curve(s) used by the institution for valuation. Depending on the product setup and the internal valuation framework, the same curve may be used consistently across all components, or different curves may be applied to different cash-flow families (for example, to reflect distinct funding or discounting conventions).

In accrual mode that will be explained in the next sections, the PV effect is not computed and is set equal to zero.

The PV effect is defined as:

$$PV_{\text{effect}} = NPV_{t_{\text{settle}}} (Df_{t_{\text{eval}} \rightarrow t_{\text{settle}}} - 1) + \sum_{\substack{t_i > t_{\text{eval}} \\ \text{flows}_i \in \text{FutureCash}}} \text{flows}_i (Df_{t_{\text{eval}} \rightarrow t_i} - 1). \quad (4.4)$$

Past Cash Proceeds

Past cash proceeds represent all cash flows that have already been paid or received, with value date on or before the valuation date t_{eval} :

$$\text{Past Cash Proceeds} = \sum_{t_i \leq t_{\text{eval}}} CF_i \quad (4.5)$$

Future Cash Proceeds

Future cash proceeds are contractual cash flows that are already fixed and known with certainty at the valuation date, but whose payment date lies strictly after t_{eval} .

They therefore represent deterministic amounts that will be paid in the future and do not depend on any remaining market variable. Typical examples include bond coupons whose ex-dividend (or fixing) date precedes t_{eval} , even if the actual payment date occurs afterward.

Formally, future cash proceeds are defined as:

$$\text{Future Cash Proceeds} = \sum_{\substack{t_j > t_{\text{eval}} \\ t_j^{\text{fix}} < t_{\text{eval}}}} CF_j \quad (4.6)$$

where:

- t_j is the payment date of cash flow CF_j ,
- t_j^{fix} is the fixing (or ex-dividend) date determining the amount of CF_j ,
- CF_j is the contractual amount, already known at t_{eval} .

The two conditions ensure that:

- the payment occurs in the future ($t_j > t_{\text{eval}}$), and
- the amount is already determined ($t_j^{\text{fix}} < t_{\text{eval}}$).

For example, consider a bond coupon whose ex-dividend date precedes t_{eval} while the payment date follows it. The coupon amount is already fixed and no longer subject to market risk. Consequently, it does not contribute to the market value (which reflects only remaining uncertain cash flows), but is instead classified under future cash proceeds.

Market Value

The *market value* is the value of the remaining position measured *at the valuation date* t_{eval} . It represents the replacement value of the trade (or, equivalently, the amount that would be exchanged to unwind and re-establish an economically equivalent position under prevailing market conditions).

Operationally, market value depends on the chosen evaluation mode. At a high level, it may be computed either:

1. in an *accrual* manner, where value is proxied by accrued carry up to t_{eval} (suitable for contexts where market-risk revaluation is not required);
2. as a *net present value (NPV)*, where the remaining contractual cash flows are projected and discounted using market curves to obtain a market-consistent value at t_{eval} .

The details of these two approaches are developed in the next sections. For physical securities finance (repo and securities lending), the underlying valuation problem is typically tractable because the economics resemble a secured loan with well-identified cash flows (principal exchanges, interest or fee legs, and manufactured payments where relevant). As a result, the NPV calculation does not require complex option-style modelling.

Accrual Mode

In accrual mode, the market value corresponds to the nominal amount plus the accrued components.

For a repo transaction:

$$MV = \text{Interest}_{\text{Accrued}} + \text{StartNominal} \quad (4.7)$$

For a securities lending (or borrowing) transaction:

$$MV = \text{Interest}_{\text{Accrued}} + \text{Fee}_{\text{Accrued}} + \text{StartNominal} \quad (4.8)$$

The accrued components are computed as follows:

$$\text{Interest}_{\text{Accrued}} = \text{StartNominal} \cdot \text{Rate}_{\text{trade}} \cdot \frac{\text{AccrualDate} - \text{CalculationStartDate}}{\text{RateConvention}} \quad (4.9)$$

$$\text{Fee}_{\text{Accrued}} = \text{StartNominal} \cdot \text{Rate}_{\text{fee}} \cdot \frac{\text{AccrualDate} - \text{CalculationStartDate}}{\text{RateConvention}} \quad (4.10)$$

where:

- StartNominal is the initial nominal amount of the transaction,
- $\text{Rate}_{\text{trade}}$ is the contractual repo rate,

- Rate_{fee} is the securities lending fee rate,
- AccrualDate is the valuation date adjusted for any contractual accrual delay,
- $\text{CalculationStartDate}$ is the start date of interest or fee accrual,
- RateConvention represents the day-count convention denominator used to compute the year fraction.

The day-count convention determines how the accrual fraction is computed. Common market standards include:

- **ACT/360**: the actual number of calendar days between two dates divided by 360. This convention is widely used in money markets, including repo transactions denominated in EUR and USD.
- **ACT/365 (Fixed)**: the actual number of days divided by 365, commonly used in sterling money markets.
- **ACT/ACT**: the actual number of days divided by the actual number of days in the relevant year (or coupon period, depending on the specific ACT/ACT variant). This convention is frequently applied to sovereign bonds and long-dated fixed-income instruments.

The choice of day-count convention directly affects the accrual fraction and therefore the computed accrued interest or fee. In secured financing markets, ACT/360 is typically the prevailing standard for short-term transactions.

This mode is typically used in banking book and treasury contexts where full market revaluation is not required.

Net Present Value Mode

In NPV mode, the market value is computed as the discounted value of all remaining future cash flows that are not classified as past cash proceeds or future fixed proceeds. The valuation is performed using the *trade discount curve*, that depends on the framework used.

Let's clarify that we have t_{eval} that denotes the valuation date at which we are evaluating the deal and t_{settle} that is the settlement date inherited from the underlying, typically defined as:

$$t_{\text{settle}} = t_{\text{eval}} + \text{SettlementDelay}.$$

where the settlement delay, as said comes from the security of the case and it's ususally 2 Business days.

The Net Present Value (NPV) is then given by:

$$NPV = \sum_k CF_k \cdot DF(t_k, t_{\text{settle}}) \quad (4.11)$$

where:

- CF_k are future contractual cash flows (excluding already fixed future cash proceeds),
- t_k is the payment date of CF_k ,
- $DF(t_k, t_{\text{settle}})$ is the discount factor from payment date t_k to the settlement date t_{settle} , derived from the trade discount curve.

The discount factor is generally defined as:

$$DF(t_k, t_{\text{settle}}) = \frac{P(t_{\text{settle}})}{P(t_k)},$$

where $P(\cdot)$ denotes the discount curve associated with the trade.

For a classic repo transaction, the cash-flow structure is typically composed of:

- an exchange of nominal at inception,
- a reverse exchange of nominal at maturity (with opposite sign),
- an interest (repo fee) leg.

If the nominal exchanged at inception is denoted by $-N$, the maturity cash flow consists of:

$$CF_{\text{maturity}} = N + \text{Interest}.$$

The interest component is generally calculated as:

$$\text{Interest} = N \cdot r \cdot \frac{\text{NumberOfDays}}{\text{DayCountBasis}}, \quad (4.12)$$

where:

- r is the contractual repo rate (fixed or floating),

- NumberOfDays is the accrual period length,
- DayCountBasis is the applicable day-count convention.

In the case of a floating-rate repo, the rate is typically defined as:

$$r = \text{ReferenceIndex} + \text{Margin},$$

where the reference index may be a money-market benchmark (e.g. LIBOR, ESTR, SOFR) fixed at the relevant reset date.

The NPV therefore reflects the discounted value of the remaining nominal exchange and accrued fee components.

For securities lending or borrowing transactions, the structure is conceptually similar but operationally more flexible.

In many cases:

- there is no exchange of nominal cash at inception (unless cash collateral is posted),
- the primary cash flow is the lending fee,
- collateral exchanges are handled separately under the collateral agreement.

The lending fee is typically calculated analogously to repo interest:

$$\text{Fee} = N \cdot r_{\text{fee}} \cdot \frac{\text{NumberOfDays}}{\text{DayCountBasis}}, \quad (4.13)$$

where r_{fee} may be fixed or floating.

Obviously these are really seriously customizable products so the NPV calculation must reflect the specific contractual configuration and any projected future fee accrual periods.

Repo Rate Determination

The fair repo rate is determined by imposing a par condition on the net present value:

$$NPV(r_{\text{repo}}) = 0 \quad (4.14)$$

The repo rate r_{repo} is solved such that the discounted value of the cash leg equals the discounted value of the collateral leg.

4.2. Synthetic Securities Finance Pricing

Synthetic securities finance instruments replicate the economic effects of physical repo or securities lending without transferring legal ownership of the underlying asset. In this framework the pricing analysis focuses in particular on the *Total Return Swap (TRS)*, which represents the standard synthetic structure used to reproduce exposure and financing effects.

In contrast to physical securities finance where valuation largely resembles that of a secured loan with clearly identified principal and interest cash flows, the pricing of synthetic instruments is inherently more complex. This complexity arises because a TRS contains two distinct economic components:

- a *financing leg*, which exchanges periodic cash flows typically linked to a fixed rate or to a floating benchmark plus margin; and
- a *total return leg*, whose cash flows depend on the realized performance of the underlying asset.

A Total Return Swap therefore provides synthetic exposure to the full performance of an underlying security, which may be a bond, an equity, an index, or a basket of assets and for this reason we are adding a layer of randomness due to the fact that we have to compute the forward value of the underlying.

The detailed pricing mechanics of the TRS structure are developed in the following sections.

4.2.1. Total Return Swap (TRS)

As in the physical case, the profit and loss (P&L) of the transaction can be analysed either from an accounting or an economic perspective, but the same general decomposition applies:

$$\text{P\&L}_{\text{accounting}} = \text{Past Cash Proceeds} + \text{Future Cash Proceeds} + \text{Market Value} \quad (4.15)$$

For the past and future cash proceeds the procedure is the same as described before so we will focus on the pricing of the Market Value.

4.2.2. Market Value

As in the repo case, two valuation methodologies are commonly used for the Market Value:

- the Net Present Value (NPV) method,
- the Accrual method.

These two approaches correspond to different assumptions regarding early termination of the swap. Under the NPV method, the two counterparties exchange the net present value of the remaining cash flows. Under the Accrual method, the termination amount is limited to the accrued cash flows up to the termination date.

In the case of a TRS, an additional layer of complexity arises because valuation depends on the estimation of the future price of the underlying asset.

4.2.3. Market Value at Net Present Value

Bond Total Return Swaps

A bond Total Return Swap (TRS) exchanges the economic performance of a reference bond against a financing leg. From a valuation perspective, the key challenge is that the total return leg depends on the bond value at the end of the accrual period as well as on any coupons paid during the period. As a result, pricing a bond TRS requires a consistent projection of the bond value at the relevant horizon. In practice, this is achieved by computing a *forward* bond price.

Forward Price Evaluation

To obtain the forward price *as of today* of the underlying bond, market practice typically relies on two main methodologies:

- **Forward Mode,**
- **Discounting Mode,**

Among these, the Discounting Mode is the most used also for its transparency in the way the risk is treated.

1. Forward Mode

The forward mode is based on the *cash-and-carry* method is based on the no-arbitrage intuition that a forward position on the bond can be replicated by holding the bond

over the forward horizon. Conceptually, one starts from the bond *spot* value at the valuation date and transforms it into the equivalent value at the forward settlement date by accounting for the financing of the spot position and the intermediate cash flows generated by the bond.

More precisely, the spot bond is purchased and financed until the forward date at a relevant financing rate. During this holding period, the bond may pay coupons. These coupon payments reduce the value of the bond but are received as cash and can be reinvested. Therefore, when computing the forward price, the initial (dirty) bond value is capitalised to the forward date, while each coupon is separately capitalised from its payment date to the forward date and subtracted from the forward value of the holding strategy. Finally, because market bond prices are typically quoted as clean prices, the result is converted back from a dirty value to a clean forward price by removing accrued interest at the forward settlement date.

The forward clean price F of the bond is given by:

$$F = (P^S + \text{Acc}^T) \Phi_{T_v \rightarrow T_f}^R - \sum_{i=1}^n C_i \Phi_{T_{c_i} \rightarrow T_f}^R - \text{Acc}^{T_f}, \quad (4.16)$$

where the summation runs over all coupons with payment dates $T_{c_i} \leq T_f$.

Where:

- T is the valuation (horizon) date,
- T_v is the standard settlement date of the bond for spot settlement at date T ,
- T_f is the forward settlement date,
- T_{c_i} is the payment date of coupon i ,
- P^S is the clean valuation price of the bond at date T (depending on the valuation mode and the spread assumption),
- Acc^T is the accrued interest at date T ,
- Acc^{T_f} is the accrued interest at the forward settlement date T_f ,
- C_i is the amount of coupon i ,
- $\Phi_{t \rightarrow t'}^R$ is the capitalisation factor between dates t and t' computed at the relevant financing rate R , ususally as will be seen after it's used the *repo rate*.

This formulation reflects the economic replication of holding the bond until the forward date: the spot dirty value is financed up to T_f , intermediate coupons are received earlier and reinvested to T_f , and the forward value is finally expressed as a clean price by subtracting accrued interest at the forward settlement date.

The capitalization factors used in the forward pricing incorporate almost everytime the repo rate in order to avoid arbitrage opportunities between the cash bond market, the repo market, and the synthetic structure. This will be explained better when describing the Forward Equity Value.

2. Discounting Mode

When using this framework, the bond forward value is computed by discounting the future cashflows of the bond on a yield and a credit curve depending on how the Credit Risk of it is considered. Indeed at BRS level there are different ways to handle the credit risk of a bond. The main one is to consider the BRS as a hedging product that includes a credit default swap function. In this case the party buying protection get also a protection against the credit risk and so the other party is exposed to both the market and credit risk.

For this reason we have to distinguish whether we integrate a CDS as protection for the bond or no.

Price without the embedded CDS If credit risk of the CDS is not explicitly taken into account, the bond forward price is computed by discounting future cash flows using the yield curve plus the Z -spread. In this case, the discounted clean bond price is given by:

$$P_F = \sum_i C_i \cdot DF(T_v, T_{c_i}) + \text{Nominal} \cdot DF(T_v, T_N) - \text{Acc}^{T_v} \quad (4.17)$$

Price embedding the CDS When credit risk is explicitly considered, discounting is performed using the yield curve plus the Z -spread and the credit curve. In this framework, the discounted clean bond price incorporates non-default probabilities and recovery assumptions.

The forward bond price becomes:

$$\begin{aligned}
 P_F = & \sum_i C_i \cdot DF(T_v, T_{c_i}) \cdot NDP(T_v, T_{c_i}) \\
 & + \text{Nominal} \cdot DF(T_v, T_N) \cdot NDP(T_v, T_N) \\
 & + RR \int_{T_v}^{T_N} DF(T_v, t) dNDP(t) - \text{Acc}^{T_v}
 \end{aligned} \tag{4.18}$$

This formulation reflects the possibility of default prior to maturity and explicitly accounts for expected recovery in the event of default.

Notation

- P_F : Forward bond price,
- P_S : Bond spot price,
- T_v : Bond standard settlement date,
- T_{fv} : Forward settlement date,
- T_N : Face value (nominal) payment date,
- Acc^t : Accrued interest at date t ,
- C_i : Coupon paid at period i ,
- T_{c_i} : Coupon payment date i ,
- $DF(t, t')$: Discount factor between dates t and t' , computed on the yield curve,
- $NDP(t, t')$: Non-default probability between dates t and t' , computed from the credit curve,
- RR : Recovery rate.

Market Value of the Performance Leg

The market value of the performance leg on NPV mode is then composed of the discounted coupon flows and the variation of the bond price over the periods. As discussed previously, whether credit risk is taken into account or not determines whether credit-adjusted prices and discount factors are used.

The market value is computed as:

$$MV_{\text{Perf}} = \varepsilon \left(\sum_{i=0}^n Q \cdot C_i \cdot DF_{i+1} + \sum_{i=0}^n Q \cdot (P_{i+1} - P_i) \cdot DF_{i+1} \right) \quad (4.19)$$

Where:

- $\varepsilon = -1$ if the performance leg is set to *pay return*, and $+1$ if it is set to *receive return*,
- P_i is the bond price at the beginning of period i ,
- C_i is the coupon paid during period i ,
- Q is the quantity of bonds,
- DF_{i+1} is the discount factor applicable to cash flows paid at the end of period $i + 1$.

Do not forget that besides the Market Value of the performance leg there is that of the fees paid, the so called Financing leg. The calculation of this is pretty easy and is the same as for the Physical Products shown above so for this reason will be skipped. The total MV will then be the sum of the two.

Equity Total Return Swap

Also in the case of an Equity Return Swap (ERS) priced with NPV model pricing it's required the computation of forward prices of the underlying equity. For equities, the forward valuation is typically performed using a single approach, namely the cash-and-carry model.

Equity Forward Price: Cash-and-Carry

Equity Forward with Zero Dividends For equities that do not pay dividends over the life of the forward, the forward price is given by:

$$P_F = P_S \cdot \Phi_{T_v \rightarrow T_{fv}}^{ERR} \quad (4.20)$$

Equity Forward with Dividends For equities that pay dividends between the spot settlement date and the forward settlement date, the forward price is computed by subtracting the capitalised value of dividends from the spot price before applying the capi-

talisation factor:

$$P_F = \left(P_S - \sum_{i=1}^n \frac{Div_i}{\Phi_{T_i \rightarrow T_v}^{ERR}} \right) \cdot \Phi_{T_v \rightarrow T_{fv}}^{ERR} \quad (4.21)$$

Where:

- P_S : Equity spot price,
- P_F : Equity forward price,
- T_v : Equity settlement date,
- T_{fv} : Forward settlement date,
- Div_i : Dividend paid at date T_i ,
- n : Number of dividends between T_v and T_{fv} ,
- T_i : Dividend payment date i ,
- $\Phi_{t \rightarrow t'}^{ERR}$: Capitalisation factor between dates t and t' , based on the equity repo rate.

Role of the Equity Repo Rate

The equity repo rate is used in the capitalisation factor applied in the equity forward computation in order to ensure arbitrage-free pricing.

When replicating the forward position, it is possible to lend the equity to a bank until the forward maturity date and simultaneously borrow cash at the equity repo rate. The forward replication therefore naturally embeds the equity repo rate as the relevant financing rate.

This can be understood by revisiting the forward replication strategy and enhancing it by lending the stock to the bank between the equity settlement date and the forward settlement date, while borrowing the corresponding cash amount at the equity repo rate.

Arbitrage argument and forward replication

To replicate the equity forward payoff, consider the following strategy.

- At time t_0 :
 - Buy one share of the stock.
- At time $t_0 + \varepsilon$:
 - Pay $S(t_0)$ to the stock seller and receive the stock.

- Lend the stock and borrow $S(t_0)$ from a bank at the equity repo rate.
- At time t_m :
 - Sell the stock to the equity forward buyer.
- At time $t_m + \varepsilon$:
 - Repay $S(t_0) \Phi_{t_0+\varepsilon \rightarrow t_m+\varepsilon}^{ERR}$ to the bank and take the stock back.
 - Receive $F(t_0, t_m)$ from the equity forward buyer and deliver the stock.

Absence of arbitrage implies equality between the terminal cash flows of the replication strategy and the forward contract payoff. Therefore, the equity forward price satisfies:

$$F(t_0, t_m) = S(t_0) \Phi_{t_0+\varepsilon \rightarrow t_m+\varepsilon}^{ERR} \quad (4.22)$$

Otherwise, an arbitrage opportunity exists by exploiting the above replication strategy.

Market Value of the Equity Return Swap

In Net Present Value (NPV) evaluation, the market value of the performance leg of an Equity Return Swap is composed of two elements:

- the discounted dividend flows paid by the underlying equity over the life of the swap;
- the discounted variation of the equity price between consecutive valuation dates.

Accordingly, the market value offers a decomposition that mirrors the economic total return of the underlying equity.

The market value of the performance leg is therefore computed as:

$$MV_{\text{Perf}} = \epsilon \left(\sum_{i=0}^n Q \cdot \text{Div}_i \cdot DF_{i+1} + \sum_{i=0}^n Q \cdot (P_{i+1} - P_i) \cdot DF_{i+1} \right) \quad (4.23)$$

where:

- $\epsilon = -1$ if the performance leg pays the equity return (pay return), and $\epsilon = +1$ if it receives the equity return (receive return);
- Q is the quantity of shares referenced by the swap;
- Div_i is the dividend paid during period i ;
- P_i is the equity price observed at valuation date i ;

- DF_{i+1} is the discount factor from valuation date $i + 1$ to the valuation date of the swap, computed on the appropriate funding curve.

This formulation highlights that, in an NPV framework, the equity performance leg replicates exactly the discounted total return of the underlying equity, combining income (dividends) and capital appreciation. As with bond return swaps, counterparty exposure is mitigated through collateralisation under the Credit Support Annex (CSA), and the market value represents the amount exchanged upon early termination of the swap.

Obvioulsy also in this case the financing leg is composed by the discount at settlement date of all the cashflows on the fee paid in the life of the instrument and the Market Value will be the sum of this and the one of the performance leg shown above.

4.2.4. Market Value with Accrual Evaluation

Under the accrual evaluation method, the Total Return Swap (TRS) is valued as the sum of the accruals on the security (performance) leg and on the financing leg. This approach assumes early termination occurs through the exchange of accrued amounts rather than the net present value of future cash flows.

Security leg accruals are computed between the previous fixing date and the spot (valuation) date, while financing leg accruals are computed from the start of the calculation period to the accrual date. The accrual date is shifted from the evaluation date by the accrual delay defined in the swap template.

Security Leg Accrual

The security leg accrual corresponds to the realised performance of the underlying security between the previous fixing date of the current period and the spot date.

For a mono-currency Equity Return Swap (ERS), the accrued performance is defined as:

$$\text{Security Leg Accrual} = Q \times (P_{\text{spot}} - P_{\text{fix}}) \quad (4.24)$$

where:

- Q is the quantity of underlying securities,
- P_{spot} is the spot price at the accrual date,
- P_{fix} is the fixing price at the start of the current calculation period.

Financing (Interest) Leg Accrual

The financing leg accrual is computed using the notional amount, the applicable interest rate convention, the number of days accrued in the calculation period, and the reference rate (including any contractual margin).

The interest rate is typically floating, based on a money market index, but may also be fixed.

For each calculation period, assuming linear accrual, the interest flow is computed as:

$$\text{Interest Flow} = N \times (R_{\text{fix}} + m) \times \frac{\Delta d}{\text{Basis}} \quad (4.25)$$

where:

- N is the nominal amount,
- R_{fix} is the fixing rate applicable to the period,
- m is the contractual margin,
- Δd is the number of accrued days in the calculation period,
- Basis is the day-count convention.

Before payment, fixed and estimated interest flows are included in the market value of the interest leg. After payment, these flows are recorded as past cash proceeds.

4.2.5. Fair Rate Determination

A Total Return Swap is structured such that, at inception, its net present value is zero. The fair financing margin (or fee rate) is therefore obtained by equating the value of the performance leg and the value of the financing leg.

Formally, the fair rate satisfies:

$$MV_{\text{performance}} + MV_{\text{financing}} = 0 \quad (4.26)$$

Solving this condition for the margin m yields the fair contractual spread that ensures a zero net present value at trade inception.

5 | Conclusions and future developments

This thesis has examined securities finance as a structural layer of modern market-based finance, demonstrating that repurchase agreements, securities lending, and synthetic instruments are not peripheral money-market techniques but foundational mechanisms for liquidity distribution, collateral allocation, and balance-sheet optimisation. By separating economic exposure from legal ownership, these instruments enable settlement efficiency, sustain market-making activity, and support the continuous circulation of cash and securities across heterogeneous market participants.

A central finding of this work is that the resilience of securities finance depends on a multi-layered architecture. At the contractual level, master agreements such as the GMRA, GMSLA, and ISDA Master Agreement provide legal certainty and enforceable close-out netting. At the infrastructural level, central counterparties, central securities depositories, and tri-party agents ensure operational robustness and scalable collateral management. At the regulatory level, post-crisis transparency and risk-mitigation frameworks—most notably EMIR and SFTR, embed securities finance within a supervisory perimeter that combines micro-prudential discipline with macro-prudential visibility. The interaction of these layers defines the stability of the ecosystem.

The gradual transition from a predominantly physical model toward a hybrid physical-synthetic architecture represents the most significant structural shift in the industrialisation of prime brokerage. Synthetic instruments have become central tools for implementing leverage, short exposure, and portfolio replication. The rise of synthetics does not displace physical securities finance; rather, it complements it, creating a layered market in which exposure and funding are increasingly modular.

Looking ahead to the 2026–2030 horizon, several structural forces are likely to reshape the implementation and infrastructure of securities finance. First, the industry appears to be approaching a “tokenisation tipping point.” Market projections suggest that by 2030 a meaningful share of turnover may occur through tokenised securities and digital

representations of traditional assets, with aggregate tokenised asset values potentially reaching multi-trillion-dollar levels [20]. If realised, this transformation would materially enhance collateral mobility by enabling near-instantaneous delivery-versus-payment and reducing settlement frictions. In particular, tokenised money market fund shares are emerging as potential high-quality liquid asset instruments usable in both physical and synthetic financing chains.

Second, the European policy agenda centred on strategic autonomy and market integration will likely influence the geographical distribution of clearing and collateral management. Under EMIR 3.0, the Active Account Requirement encourages greater utilisation of EU-based central counterparties, while broader initiatives aimed at harmonising reporting under MiFIR, EMIR, and SFTR point toward a more consolidated data architecture [21]. The evolution from rule proliferation to data-driven supervision suggests that data quality, reconciliation accuracy, and reporting consistency will become structural competitive factors for market participants.

Finally, technological innovation, particularly the integration of artificial intelligence into post-trade and risk-management functions, has the potential to transform lifecycle management. In both physical and synthetic markets, AI-driven systems can enhance collateral optimisation, automate documentation and trade processing, and support predictive margin analytics. In synthetic structures such as TRS, where valuation depends on multiple evolving inputs and bilateral collateral exchanges, advanced analytics may reduce operational risk and improve exposure aggregation across counterparties.

Taken together, these developments support a coherent conclusion: securities finance will remain essential because it addresses a structural feature of modern markets—the need to mobilise liquidity and collateral efficiently in an environment characterised by regulatory constraints, capital optimisation, and continuous trading. The future of the market is unlikely to be defined by the dominance of either physical or synthetic techniques, but by their increasingly integrated coexistence within a technologically enhanced and transparently supervised framework.

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