DEUTSCHE BÖRSE GROUP

# The European Post-Trade Market

## An Introduction

White Paper

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# Executive Summary

The European post-trade industry, despite its relatively small size of around €17 billion in revenues, plays a vital role in the securities markets. The post-trade industry is highly specialised. Its mechanisms are not sufficiently transparent to outsiders. Even industry insiders have different views, for example, on the scope of the industry, and lack a standardised terminology.

Against this background, and in the light of the current discussion about new regulation, it is crucial to increase the transparency of the European post-trade industry. This document provides a fact-based overview of the market and the players, and elaborates on the safety and efficiency of the European market for post-trade services.

Post-trade services are required to execute the transfer of ownership and cash after a securities trade has been made. There are five distinct post-trade functions: clearing, settlement, custody, safekeeping, and the notary function. A number of ancillary banking services exist in conjunction with post-trade functions. These banking services are comprehensively regulated under banking law. Various providers offer post-trade services: central securities depositories (CSDs), international central securities depositories (ICSDs), different types of custodians (global custodians, sub-custodians, agent banks), and other banks. All these institutions compete in the market for post-trade services, which can thus be considered open for competition.

In general, post-trade services are safe. Acting as agents, post-trade services providers do not assume any principal risk. They bear operational risk, which they cover effectively. Post-trade services providers perform an important role in reducing the credit, market, and liquidity risks of market participants. All of the larger domestic post-trade markets in Europe have become more cost-efficient in the last years and can be considered just as cost-efficient as the US market. These efficiency improvements have been achieved by all players and have resulted in considerable unit-price reductions. Different governance structures have proven equally effective in this regard.

The safety and efficiency of European cross-border post-trade markets could be improved further by a joint effort taken by governments, regulators, and market participants. A step change requires a staged approach, starting with the harmonisation of legal and tax regimes across European countries, before making interoperability imperative for all providers. The cost of potential regulation may be high and undesired side effects may occur (e. g. on the industry's capacity to innovate); the benefits are uncertain and limited. Consequently, any future regulation should be based on a careful cost-benefit analysis.

# 1 Introduction

Largely unnoticed, every securities trade involves a number of activities after the trade has been made, whether it takes place on- or off-exchange. While post-trade services are crucial for an efficient financial system, few outsiders understand the industry's true complexity and mechanisms. Common terminology is scarce and general definitions are rare.

European securities markets have long remained domestic in scope and have attracted little public attention. Recent developments, which are driven by an increasing demand for cross-border investment due to regulatory changes (e. g. investment rules of European life insurance companies), remote access to electronic exchange trading, and the introduction of the euro have raised questions on the efficiency and safety of cross-border post-trade services.[1)]

To address these questions, the European Commission has focused its attention on the cross-border efficiency and safety of the European post-trade industry. This supports the Commission's intent to promote the integration of the European financial market.[2)] To this end, the Commission plans to regulate the post-trade industry by means of a new directive.[3)] While the enhancement of efficiency, competition, and transparency is an agreed objective, opinions differ on how to achieve this goal.

To prepare the ground for a constructive discussion, this document provides a fact-based overview of the post-trade industry. It attempts to make the key mechanisms of the industry more transparent, as well as to present its relevant functions. Moreover, it tries to consolidate the viewpoints shared by the vast majority of market participants, and assesses the efficiency and safety of the European post-trade market in order to provide first indications of the areas where regulatory action could be beneficial.

The document is structured as follows: section 2 gives an overview of the post-trade market. It defines the post-trade functions, describes the players, and estimates the market size. With the appropriate definitions in place, the remaining sections tackle the two issues that dominate the current debate, namely: how does the industry deal with risks, how efficient is the European post-trade industry, and how can its efficiency be improved further? The first question is dealt with in section 3. It develops an overview of the risks related to the post-trade arena and describes how they are mitigated. Section 4 addresses the second question. It assesses the market's competitive landscape, investigates the cost-efficiency of European post-trade services providers, and analyses changes in efficiency over time. Section 5 concludes on the need for regulatory action.

1) See Padoa-Schioppa, 2001, for an account of recent industry trends.
2) In a recent study for the European Commission, London Economics, 2002, p. 123, argues that full integration of the EU financial markets would increase the level of GDP by 1.1 percent in the long run. 20 percent of this effect are said to be attributed to reduced costs of post-trade services.
3) See European Commission, 2004. In particular, it proposes to remove existing barriers to cross-border clearing and settlement, to apply competition policies continuously to address restrictive market practices, to adopt a common regulatory and supervisory framework, and to implement appropriate governance arrangements.

# 2 Overview of the Post-Trade Market

This section describes the market structure of the securities post-trade industry. It identifies five post-trade functions and describes the providers of the respective functions. It briefly assesses key market-structure trends and concludes with an analysis of the market size. Most quantitative analyses and examples in this paper refer to EU15, since comparable data is not yet available for EU25.[4)]

## 2.1 Market basics

Post-trade services are required after two parties have decided to transfer ownership of a security. Post-trade services deal with the execution of a trade, i. e. realising the transfer of ownership of a security from one party to another, and the transfer of cash as payment for the security.[5)] The need for post-trade services arises after any trade, regardless of whether the parties trade over an exchange or over the counter ("OTC"), and whether the trade involves domestic or international securities. Some post-trade services are not related to a securities transaction, but are needed on an ongoing basis to administer securities on behalf of the owner, for example, safekeeping or dividend collection.

Only if a trade requires the transfer of a security, there is a need for post-trade services.[6)] The most common securities are equities (shares) and fixed-income securities (e. g. bonds). Equities record the ownership in a company and document the rights associated with ownership. Fixed-income securities certify the right to obtain interest and the redemption at maturity.

If a buy order matches a sell order, the buyer and the seller conclude a trade. A trade is a contract that establishes an obligation for a seller to deliver securities against cash and for a buyer to pay cash to receive securities. In some European markets, a central counterparty (CCP) guarantees the fulfilment of such obligations by becoming the sole and single counterparty to every buyer and to every seller, thereby assuming the risk that a party to the trade does not deliver.[7)] In most cases, the services are limited to the most important securities on the equity market.[8)] Sometimes, these CCPs are called equity central counterparties (ECCPs). Bonds and equity trades require essentially the same post-trade services. The majority of equity trades takes place on-exchange, while fixed-income instruments are primarily traded over the counter.

[4)] The paper also considers Switzerland, where appropriate, as the post-trade market of Switzerland is closely integrated into the European Union's post-trade market.

[5)] Transfer of ownership may be required for reasons other than trades (e. g. when a party has agreed to provide the other with collateral). In the following, this paper focuses on trades.

[6)] Derivatives usually do not require post-trade services. Even if derivatives have a security as underlying (e. g. stock options, government bond futures), their trade does not entail "settlement" of the underlying immediately. And even if the contract provides for "securities settlement", it is rarely eventually settled, as it is almost always netted out or annulled before maturity. In the rare cases where derivative contracts require physical settlement, their post-trade treatment is identical to that of securities traded on cash markets.

[7)] See also Committee on Payment and Settlement Systems/International Organisation of Securities Commissions, 2004, p. 45.

[8)] 13 countries of the EU25 do not have CCPs for their equity markets. Most existing CCPs were founded in the last few years and industry specialists expect this trend to continue. See, for example, Russo et al., 2004, p. 37.

## 2.2 Five distinct post-trade functions

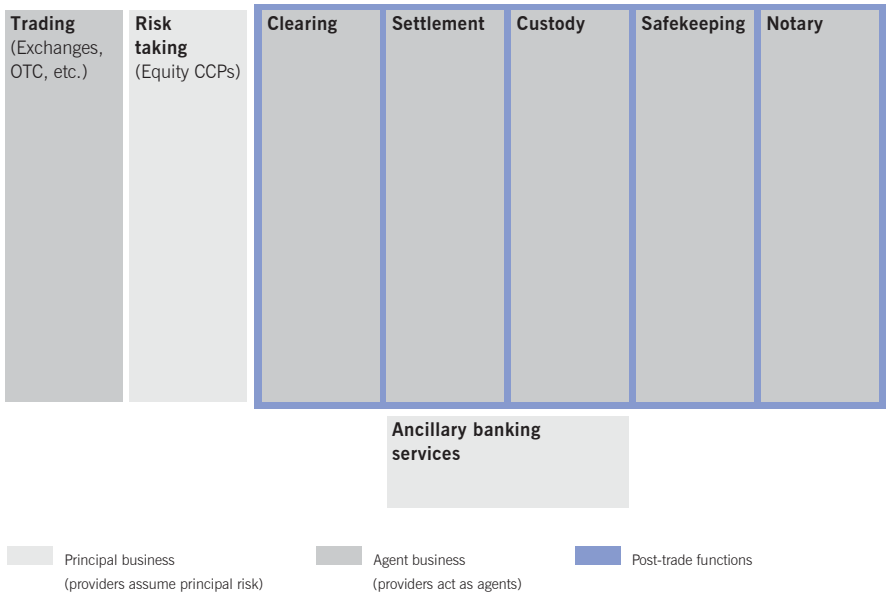
This section takes a functional perspective. It describes five distinct functions, which are relevant for the transfer of ownership and the administration of securities: clearing, settlement, custody, safekeeping, and the notary function (exhibit 1). While different institutions provide one or more of the services associated with these functions, these five functions exhaustively describe the scope of post-trade activities both in a domestic and in a cross-border context. The institutions providing these post-trade services are described thereafter.

### Ancillary banking services

A number of ancillary banking services exist in conjunction with post-trade functions, for example securities lending and overnight credit facilities. These services are important for customers, in particular in the cross-border context. Banking services are comprehensively regulated under applicable banking law.

All five functions have in common that the service provider acts as an agent. The distinction of whether a provider of securities services acts as agent or principal is fundamental, as it involves different risks and public-policy issues. Neither ancillary banking services nor the risk taking – the latter being the main functionality offered by the CCP – are considered as post-trade.[9] Such services, in which the service provider assumes principal risk (e. g. through extension of a credit facility or novation), are not regarded as post-trade functions. Furthermore, these services are not necessary to transfer ownership of securities, but they are facilitators for post-trade processes. They are not always used or even offered.

**Exhibit 1: Overview of post-trade functions**




[9] This position is also shared by regulators and market players, e. g.: 1. Office of Fair Trading, that distinguishes between CCP and clearing services (see Office of Fair Trading, 2003); 2. State Street, that describes the trading cycle as a matter of brokers, exchanges and central counter-parties apart from the post-trading arena (see State Street, 2004).

### Clearing

The clearing function provides the link between trading and settlement.[10] Clearing services comprise the validation of trades and the preparation of the settlement process, that is the enrichment of trades with information required for settlement (e. g. securities identification codes, settlement date, settlement venue), as well as the validation of the existence of sufficient funds and securities. Clearing ensures that all of the prerequisites for the settlement process are in place.

### Settlement

Settlement describes the effective transfer of ownership of securities from a seller to a buyer, and the respective transfer of cash from a buyer to a seller.

Historically, the transfer of ownership in securities between two trading parties involved the physical delivery of the traded securities. Today, physical delivery is still possible for some securities, but it rarely occurs in practice. Issuers typically issue securities in the form of global certificates (e. g. global notes or global bonds), where one certificate does not represent one share or one bond, but an entire issue. In some markets and for some securities, the issue is even "dematerialised", that is the issue is not evidenced in any physical certificate, but exists only as a database entry (e. g. French equities or German government bonds). In all of these cases, securities are not in the physical possession of the owner. This is the main reason why, today, transfer of ownership typically occurs by means of book transfer.

The settlement process can either combine the security and the cash leg in a single legal action or treat them separately. If both legs are linked, transfer of ownership cannot be legally effective without the cash payment and vice versa. The technical term for this procedure is "delivery versus payment" (DvP). Where delivery of securities and cash payment are not linked legally, the technical term "free of payment" (FoP) is used.

To improve operational efficiency and avoid the interruption of usually highly automated settlement processes, the settlement function may be accompanied by a settlement lending facilitation service and overdraft credit facilities. This service ensures that the execution (mostly overnight via an automated batch run[11]) of the settlement process is not interrupted if one party is inadvertently short in the security leg. The provision of settlement lending serves as a facilitator to the settlement process and further increases operational efficiency. It is a pure agent business and does not require the taking of principal risk.[12]

### Custody

The custody function comprises customer account keeping and the administration of securities on behalf of customers. It deals with ongoing services for securities owners, for example, capital increases, redemptions, or the collection of dividends and interest. Custody includes reporting and –

[10] The Committee on Payment and Settlement Systems, 2003, p. 13, uses the word "clearance" to describe what this publication defines as clearing.
[11] A batch run is the process of booking all transactions that have been collected over a certain period of time (usually a day) in one automated processing routine.
[12] In these cases, the post-trade services provider only "arranges" that one customer lends securities to another customer. This is different from so-called "strategic" securities lending, where service providers with a banking license lend securities, thereby acting as principals and offering a regulated banking service.

depending on the provider of custody services – may include value-added services, such as collateral management, proxy voting, income processing, tax services, translations, comprehensive portfolio analyses, etc.

**Risk taking**

CCPs stand between the buyer and the seller as counterparty of both contractual partners and guarantee the fulfilment of all transactions. A CCP provides market participants with new possibilities for making further decisions fully independently of each other and limits counterparty risk to a single contractual partner. This model allows pre- and post-trade anonymity as well as multilateral netting, i. e. position netting, that offsets all open long and short positions in an account. This process decreases the number of transactions to be cleared and settled as well as the amount of open positions.

Contrary to post-trade services providers, where intermediaries act as agents, a CCP takes principal risk. In order to ensure a high degree of safety, CCPs protect themselves against the risk of default by any of its members. In most markets, such CCP members are subject to capital requirements and other regulations (e. g. providing a contribution to guarantee funds or having sufficient financial resources and robust operational capacity).

### Safekeeping

Securities evidenced by physical certificates need to be stored in a safe place. Traditionally, banks have performed this function on behalf of the owners of securities. Although they continue to do so, the demand for these services has decreased significantly over the last twenty years. Today, most securities are issued as global certificates and are kept in a single vault. In the case of a dematerialised issue (e. g. French equities), securities are no longer stored physically.

### Notary

The notary function is the entry point for an issuer into the securities post-trade arena. It verifies whether securities fulfil certain technical and formal requirements to be eligible for post-trade services.[13] It also includes registering any change of the issued amount, e. g. in case of corporate actions such as a stock split.

The notary function is similar to other public registers such as the Internet Corporation for Assigned Names and Numbers (ICANN), which manages domain names; the Internet Assigned Numbers Authority (IANA), which assigns Internet protocol addresses; and SWIFT[14], which registers the Bank Identifier Codes (BIC). While the aforementioned registers are operated by private corporations, there are also public registers, such as land registries, commercial registers, and company registers.

[13] If an issuer wants to issue securities that should be tradable, there are usually two admission processes: the admission to a trading place or market (e. g. an exchange) and the admission to a post-trade services provider.
[14] Society for Worldwide Interbank Financial Telecommunication.

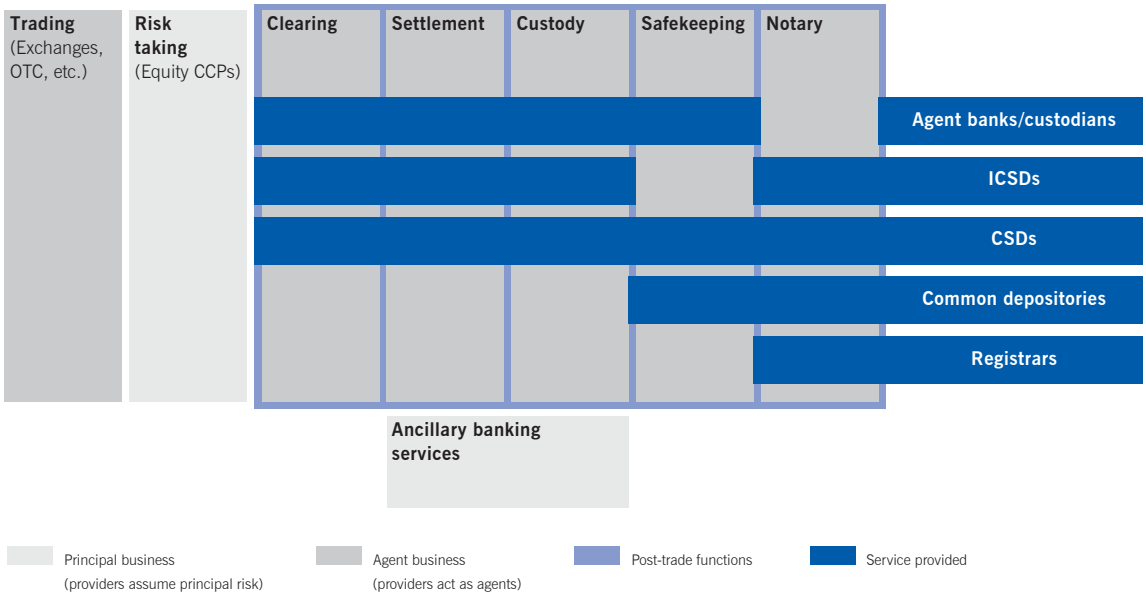
## 2.3 Providers of post-trade services

The previous section explained the five post-trade functions. This section takes an institutional view and describes the providers of post-trade services.

The main types of institutions active in the post-trade market are: agent banks/custodians (such as Citibank, Bank of New York, JP Morgan Chase, BNP Paribas, Dexia, etc.), the international central securities depositories ("ICSDs", such as Clearstream Banking Luxembourg and Euroclear Bank), central securities depositories ("CSDs", such as Euroclear France, Monte Titoli, Clearstream Banking Frankfurt, etc.), common depositories (such as Deutsche Bank, HSBC, etc.) and registrars (such as Capita Registrars, Lloyds TSB, etc.).

Agent banks/custodians, CSDs and ICSDs all offer clearing, settlement, and custody services (exhibit 2).

**Exhibit 2: Several players offer post-trade services**




Most banks and CSDs offer safekeeping services. In the case of securities evidenced by global certificates, all securities of one issue are stored by a single institution, either a CSD, or – in the case of Eurobonds – a common depository. Not all securities of one type are issued in one global certificate. For example, long established joint-stock companies might have issued stocks in the form of physical certificates for each individual share and recently (e. g. as a result of a rights offering) issued only a global certificate for new shares. As a result, the global certificates and some single stock certificates may be stored in a single vault, while other certificates for individual shares continue to be stored with various banks.[15)]

[15)] In the future, ICSDs will also offer safekeeping. Common depositories offer very basic custody services for Eurobonds.

### A typical cross-border trade involves many institutions

An Italian customer wishes to sell shares of a French company, Alcatel, which are traded on Euronext Paris and held for safekeeping by Euroclear France. She asks her bank, Cassa di Risparmio di Firenze (CRF), to sell the shares. Assume that the buyer is a French citizen who holds his securities account at Caisse d'Epargne. CRF employs a global custodian, such as Citibank. Citibank works with a local agent in France, say, Crédit Lyonnais. The latter is a member of Euroclear France and can – on behalf of the Italian customer – realise the transfer of ownership between the Italian and the French customer by transferring the relevant shares from Crédit Lyonnais' omnibus account [1)] at Euroclear France to Caisse d'Epargne's omnibus account at Euroclear France.

[1)] An omnibus account is an account at a CSD in which a member of a CSD holds securities on behalf of all (or at least several) of its customers. In some Nordic countries as well as in Malta, CSDs administer accounts of customers.

In some European countries, CSDs assume the notary function for domestic securities. In some other countries, the public assigns ordinary banks with the notary function. For example, in the UK registrars fulfil the notary function. For Eurobonds, the ICSDs share the notary function with common depository banks.[16)]

In principle, various institutions fulfil the same post-trade functions. However, the range and sophistication of services vary considerably (exhibit 3). Different providers serve different customers, focus on domestic or international transactions, provide different service levels, and charge different prices.

### Exhibit 3: Service levels of different providers

| | Agent banks/ Custodians | ICSDs | CSDs | Sub-custodians |
|---|---|---|---|---|
| Clearing | ++++ | ++++ | ++++ | ++++ |
| Settlement | ++++ | ++++ | ++++ | ++++ |
| Custody | ++++ | ++ | + | ++++ |
| Safekeeping | ++ | – | ++++ | ++ |
| Notary | – | ++++ | ++++ | – |
| Ancillary banking services | ++++ | ++ | + | +++ |

– No service ++++ Full service

Source: Global Custody; Deutsche Börse in-house analysis, 2004

Agent banks/custodians offer higher service levels and provide value-added services, such as translation and tax handling, extensive and customised reporting, master account administration, proxy voting, etc.[17)] CSDs focus on automated, inexpensive, domestic post-trade services. Most CSDs have a rather low number of customers as they deal with intermediaries such as local banks and brokers, global custodians or (sub-)custodians.[18)]

[16)] Under ECB3 standards, only the ICSDs will be responsible for the Eurobond notary function.
[17)] For the service levels of typical global custodians, see the website of Citigroup (www.citigroup.com). For services provided by (sub-)custodians, see the website of BNP Paribas (www.bnpparibas.com).
[18)] Different market models exist, e. g. in Scandinavian countries where CSDs hold end-investor accounts.

Global custodians and ICSDs, which have similar post-trade business models, offer their services across several jurisdictions. Local agent banks, local (sub-)custodians, and CSDs often provide post-trade services only for a single jurisdiction. However, through an extensive network of direct links, the major CSDs can offer cross-border post-trade services as well. To this end, CSDs formally become members of other CSDs. A few CSDs not only maintain links, but have developed inexpensive cross-border services; for example, SIS (the Swiss CSD) or CBF (the German CSD).

## 2.4 Market-structure development

Over the last years, there have been two important structural trends in the market for post-trade services. First, formerly mutual providers have demutualised. Second, the market has consolidated considerably.

Starting in the late 1980s, in many European countries stock exchanges have demutualised. CSDs, such as Iberclear in Spain or Clearstream in Germany, have followed this trend. Others, such as Monte Titoli in Italy[19] and the Depository Trust & Clearing Corporation (DTCC) in the United States, are still user-governed and -owned.[20]

The principal benefit of demutualisation has been that CSDs shifted to the organisational model of private companies and adopted their management methods accordingly. Moreover, demutualisation facilitated a wave of mergers and acquisitions that captured significant synergies by realising economies of scale.

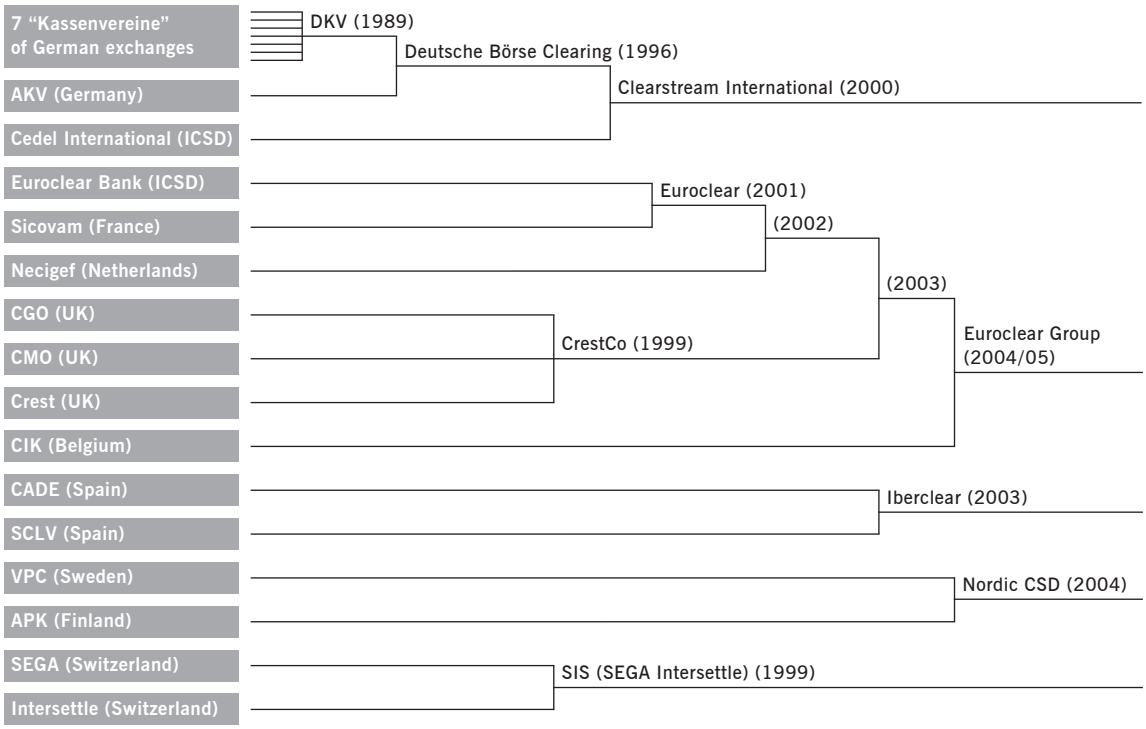
Originally, many countries had more than one central securities depository, as was the case, for instance, in the UK or Germany. In the UK in 1999, the Central Gilts Office (CGO) and the Central Money Markets Office (CMO) merged with Crest to create a single Irish/UK CSD. In Germany, there were seven regional central securities depositories and a special entity dealing with cross-border clearing and settlement, the “Deutscher Auslandskassenverein” (AKV), which merged over time to form Deutsche Börse Clearing in 1996. In 2000, Deutsche Börse Clearing engaged in the first European cross-border merger with Cedel International (Luxembourg) to form Clearstream. The Spanish CSD, Iberclear, is the result of the recent merger between SCLV (Servicio de Compensacion y Liquidacion de Valores) and CADE (Central de Anotaciones del Mercado de Deuda Publica) (exhibit 4).

Regarding further cross-border consolidation, the Belgian ICSD, Euroclear, merged with the Dutch, French, and Irish/UK CSDs into a single entity, Euroclear plc., which has recently been joined by the Belgian CSD. Similarly, the Nordic countries Finland and Sweden have undertaken steps to consolidate their CSDs.[21]

Banks active in the post-trade arena have followed two major trends: first, many banks have outsourced their back-office operations related to (retail) securities transactions (usually called “transaction banking”). This has given rise to specialised transaction banks, such as Xchanging (formerly etb-European Transaction Bank) or DWP, which started to consolidate the industry. Second, providers of custodial services are also undergoing a process of concentration. For example, in 2003, State Street

[19] Monte Titoli is a subsidiary of the Italian Stock Exchange, which is a user-governed and -owned entity.
[20] See Russo et al., 2004, p. 35-36, for details of European CSDs’ governance structures.
[21] Currently, there are also negotiations with the Danish CSD.

Exhibit 4: Consolidation of CSDs and ICSDs in Europe




Not yet undergone consolidation: Monte Titoli (Italy), OEKB (Austria), CSD.SA (Greece), Interbolsa (Portugal), VP (Denmark)

acquired Deutsche Bank's global custody business and, in 2004, ABN AMRO sold its custody operations to Citigroup.

## 2.5 Market size

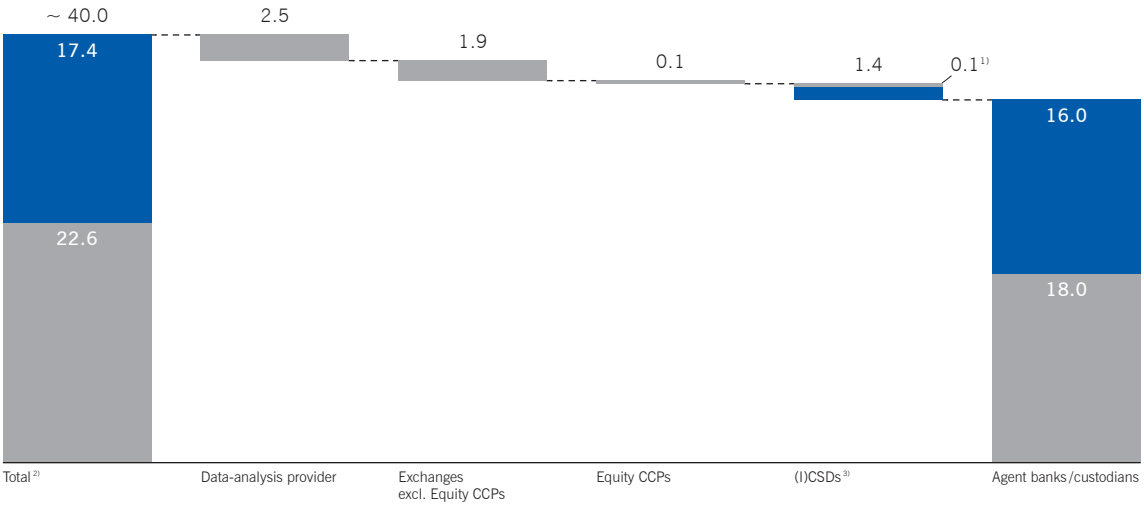
Investors in Europe (EU15) spend approximately €40 billion on activities related to the trading of securities.[22] Approximately €17.4 billion (43 percent of the total) is accounted for by post-trade services (as defined above, comprising clearing, settlement, custody, safekeeping, and the notary function). Fees earned by data analysis providers, such as Bloomberg or Reuters, exchanges, CCPs, and by financial institutions offering related banking services make up the remaining €22.6 billion.

More than 90 percent of those €17.4 billion total post-trade revenues are earned by global custodians and local agent banks/local (sub-)custodians,[23] while CSDs and ICSDs account for €1.5 billion, of which €1.4 billion (i.e. less than 10 percent of the total revenues of €17.4 billion) are related to post-trade services (exhibit 5).[24]

[22] See Morgan Stanley/Mercer Oliver Wyman, 2003, p. 19. Reliable data for EU25 is not yet available.
[23] Post-trade revenues of banks have been estimated bottom-up for EU5 (Germany, France, UK, Italy, and Spain) and then extrapolated to EU15. Clearing and settlement revenues were estimated by multiplying the number of transactions reported by transaction banks and CSDs (accounting for overlaps and for proprietary trading) by average costs per transaction. Custody revenues were estimated using custody volumes and respective margins. Revenues of CSDs and ICSDs have been adjusted for revenues from ancillary banking services.
[24] This includes only revenues of CSDs and ICSDs related to post-trade services. Revenues generated with other services are not included in the analysis.

**Exhibit 5: Estimated total investor spending related to securities in Europe**

Revenue pool 2002, in € billion




1) Non post-trade services offered by (I)CSDs
2) Including commission and spread
3) Excludes revenues not related to post-trade services (e. g. banking services)

Source: Morgan Stanley, Mercer Oliver Wyman, 2003; McKinsey analysis

The total post-trade revenues amount to approximately 0.2 percent of EU15 GDP. Compared to other industries, such as the electricity or fixed-line telecommunication sectors, which are about ten times as large,[25] the post-trade industry is small.

## 2.6 Summary

There are five distinct post-trade functions (clearing, settlement, custody, safekeeping, and the notary function). These functions are provided by custodians, agent banks, CSDs, ICSDs, common depositories and registrars in an agent capacity which involves no principle risk. Starting in the late 1980s, considerable consolidation has taken place for CSDs and ICSDs, as well as for banks in the area of post-trading within Europe. The post-trade market is rather small, representing a revenue pool of approximately 0.2 percent of EU15 GDP.

[25] Electricity providers and distributors generate revenues of €180 billion (Eurelectric, 2004); fixed-line telecommunication services generate a revenue pool of €176 billion (Gartner Research, 2004).

# 3 Safety of Post-Trade Services

This section describes the risks inherent in the market for post-trade services. It first discusses the risks that occur in each post-trade function independent of the risk taker. Then, it elaborates on the differences between the risks of domestic compared to cross-border post-trade services, and describes the risks assumed by parties involved in the post-trade arena. Finally, this section presents how the industry mitigates the existing risks.

## 3.1 Post-trade risks and risk takers

Whenever risk in the post-trade industry is discussed, five risk categories are mentioned: credit risk, liquidity risk, operational risk, legal risk, and – resulting from these – systemic risk.

**A short definition of risks**

Credit risk refers to the possibility that a contractual counterparty does not settle an obligation for full value, either when due or at any time thereafter (e. g. due to a default).

Liquidity risk relates to the possibility that a counterparty does not settle an obligation for full value when due, but only at some unspecified time thereafter.

Operational risk refers to the possibility of human error or a breakdown of the hardware, software, or communication system required for the provision of post-trade services.

Legal risk relates to the unexpected application of a law or regulation or to the possibility that title, a legal interest, or a contract cannot be enforced.

Systemic risk results from the aforementioned risk categories and refers to the possibility that the failure of one institution causes other institutions to fail (“domino effect”), thereby jeopardising the stability of the entire financial system.

The types of risk related to cross-border post-trade services (e. g. risks related to the settlement of a foreign security) are the same as for domestic post-trade services, although the risks are greater in terms of probability (but not necessarily in terms of exposure). Cross-border transactions often involve more parties, require a larger number of interfaces, and are more complex in nature. They often implicate uncertainty about the financial soundness of the parties involved. Most importantly, differences in legal frameworks represent a source of risks that is absent in the domestic context.

The several parties involved in post-trade functions take different risks. There are at least four distinct risk takers: trading parties, (international) central securities depositories, custodians, and the general public (e. g. retail investors). By the nature of their business, trading parties assume credit and liquidity risks. To the extent that custodians, CSDs, ICSDs, and common depositories provide post-trade services, they act purely as agents and only bear operational risks. Custodians and – to a lesser extent – ICSDs, however, also offer ancillary banking services, where they act as principal and assume credit and liquidity risks (these services require a banking license). All parties bear legal risks, in particular in the cross-border context.[26)]

Systemic risk mainly results from credit and liquidity risks, and is therefore practically not manifested in the post-trade functions, but specific to ancillary banking activities related to post-trade.[27)] All parties, including individuals and institutions without a direct stake in the post-trade industry (i. e. the general public), bear systemic risk. Moreover, the more concentrated post-trade-related ancillary banking activities are with a single provider, the more this provider contributes to the build-up of systemic risk.

## 3.2 Risk mitigation

The securities industry has effective ways to mitigate credit risk, liquidity risk, and operational risk.

**Credit and liquidity risks**

As agents, post-trade services providers are not exposed to credit and liquidity risks. Providers of ancillary banking services assume principal risk, but they are tightly regulated by prudential supervision and a number of banking laws.

**Operational risk**

Providers of post-trade services have several ways to mitigate the operational risk they bear. Without taking credit and liquidity risks on their books, they offer services which reduce their customers' risk exposure. For example, they often require the simultaneous delivery of securities against cash payment (DvP). This procedure provides better protection for the parties involved if a counterparty defaults. Moreover, some providers, such as CSDs, require the use of central-bank money payments. Since central banks cannot fail or default, settlement in central-bank money eliminates the risk that the cash leg of a pending settlement will fail. In Europe, all major CSDs use central-bank money, covering 90 percent of the CSDs' transaction volume.[28)]

[26)] For example, for the effective posting of collateral, in some jurisdictions the transfer of ownership of the security is required, in others this is not the case. This may result in legal uncertainty of parties in complex cross-border transactions.
[27)] The European Central Bank, 2004a, p. 137, states that "Overall, the risk that financial instability could be caused by or spread through settlement systems seems to be limited."
[28)] See European Central Bank, 2004, table 17.

Over the last years, the industry has actively addressed operational risks. The almost complete automation of processes – in particular in the domestic context – and the use of straight-through processing minimise the scope of human error. In addition, all providers of post-trade services carry out regular audits of their IT systems to further improve the functioning of all processes. Regular and timely reconciliation helps detect problems almost instantaneously.[29)]

Overall, European CSDs have been successful in addressing operational risk. For example, recent research,[30)] that benchmarks 22 CSDs (13 from the EU25) against each other, concludes that all major European CSDs (France, Switzerland, Germany, and the UK) perform significantly better than the average. The research is based on an operational risk index that combines the overall cost for market participants of failed trades with a survey-based assessment of safekeeping service efficiency.

**What happens if a trading party fails?**

Any trading party is subject to credit and liquidity risks. Delivery of cash or securities may occur late or the counterparty may default. In both cases, additional costs arise as cash or securities have to be replaced. In most cases trading parties are protected by delivery versus payment. If one party defaults, the other party retains ownership of the cash or securities as the transaction can be legally concluded if, and only if, both legs are fulfilled. However, the non-defaulting party, in this case, is exposed to the risk that an alternative transaction with another party may only be concluded at less favourable terms, e. g. because of market price movements.

**What happens if a CSD defaults?**

CSDs do not own the securities of their customers, not even on their behalf. Consequently, the securities cannot be used to satisfy any debt obligations of the CSDs if they default. Hence, even if all mitigating actions fail, a default of a CSD would have operative implications for market participants only.

## Regulation

A number of European directives regulate the securities industry. The Markets in Financial Instruments Directive (MiFID) establishes high standards of prudent business principles for securities services firms across Europe and provides access rights to trading facilities, CCPs, and CSDs. The Capital Adequacy Directives set minimum prudential standards relating to the banking (credit) business.[31)] The Collateral Directive lays down standards for the posting of collateral for securities transactions. In addition, the Settlement Finality Directive aims to reduce the systemic risk associated with participation in payment and securities systems, and harmonises the respective insolvency regulations.[32)]

[29)] In recent years, much of the US debate on operational risk has evolved around possible ways to guarantee business continuity after a major exogenous disaster (e. g. 11 September 2001). In Europe, the debate about this issue is only about to start.
[30)] GSCS Benchmarks, 2002, p. 10.
[31)] The third Capital Adequacy Directive (CAD III) is currently under discussion.
[32)] The respective directives are available from the EU Commission at europa.eu.int/documents/eur-lex/index_en.htm.

On a national level, many countries have laws directly regulating post-trade services providers. These laws establish high standards for clearing and settlement, custody, safekeeping, and the notary function. Examples of such legislation are the German "Depotgesetz" (Custody Act) or the respective provisions in the French "Code Monétaire et Financier" (in particular, titles II and VI).

**Risk mitigation for cross-border transactions**

Cross-border risk is more difficult to cover than the risk associated with domestic transactions. The main reason for this is the large number of organisations that are involved in the cross-border settlement process. A number of institutions (such as ESCB/CESR or CPSS/IOSCO) have already proposed standards and mitigating actions to address cross-border risk further. If the post-trade industry adheres to these standards and tools, it can effectively mitigate cross-border risk.

Currently, for cross-border transactions the use of central-bank money is limited. By 2007, central banks will implement the extended European cash-clearing network, TARGET2, which will make central-bank money available for cross-border transactions within the Euro Zone. In the meantime, following an initiative of Clearstream and Deutsche Bundesbank (the German Central Bank), Austria, Belgium, Germany, Luxembourg, and the Netherlands have implemented a cross-guarantee concept, which allows participants to draw on their respective domestic central-bank accounts even in the case of cross-border transactions.

## 3.3 Summary

This section described the credit, liquidity, operational, legal, and systemic risks inherent in the post-trade functions. The risk related to cross-border transactions is greater in terms of probability, but not different in nature relative to those for domestic post-trade services. Besides systemic and legal risks, providers of post-trade services are exposed only to operational risk (because they act as mere agents). They use effective ways to mitigate their own risk as well as the credit and liquidity risks of their customers.

# 4 Competition, Efficiency and Governance

This section first discusses competition in post-trade services. It then describes the cost efficiency of the industry and, finally, evaluates whether existing governance structures are effective for continuous innovation and efficiency.

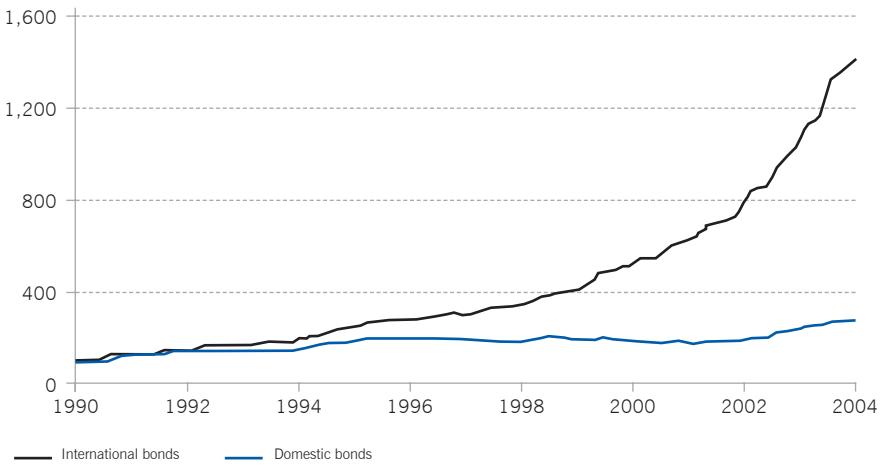
Before describing competition in post-trade services, it is worthwhile considering the choice investors have about where to trade securities, and issuers have about "what" securities to issue and "where" to do so. When making these choices, issuers and investors consider the related post-trade arrangements, thereby submitting post-trade providers to competitive pressure.

In a first step, investors choose whether to trade securities on- or off-exchange. They then make a choice between different exchanges, or between online trading or bank-internalisation platforms, respectively. However, investors do not only choose between different trading markets, but they can also decide to gain exposure to equities via other instruments, such as derivatives or exchange-traded funds (ETFs).

Compared to cash equity transactions, derivatives transactions offer the advantages of higher liquidity, tighter spreads and significantly lower transaction costs. Trading fees are lower and settlement can be avoided altogether. Institutional investors increasingly perceive derivatives, such as single stock futures or options, as substitutes to the cash trading of the respective underlying stock. The daily liquidity of many equity derivatives is more than three times higher than the cash-trading volume of the respective underlying stock, and the derivatives-trading volumes continue to grow faster than the cash trading volumes. While derivatives are important substitutes for institutional investors, retail investors have turned to ETFs. ETFs are index funds or actively managed funds, which are traded on a stock exchange. ETFs are efficient instruments to gain exposure to non-domestic securities without the related cross-border transaction costs as they are traded on domestic exchanges. The number of ETFs traded on European exchanges has increased from five in 2000 to over 120 in 2003.[33)]

**Exhibit 6: Outstanding European bond volumes over time**

EU15 plus Switzerland, indexed: 1990 = 100




Source: Bank for International Settlements, 2003; Deutsche Börse AG in-house analysis, 2004

[33)] For a comprehensive description of ETFs see Fuhr, 2004.

Issuers can decide "what" and "where" to issue. For equities, they usually choose a securities type provided by their domestic legal regime ("what") and register it with their domestic CSD ("where"). For bonds, they have many choices. Today, more and more bonds in Europe are issued as international bonds (exhibit 6).[34)]

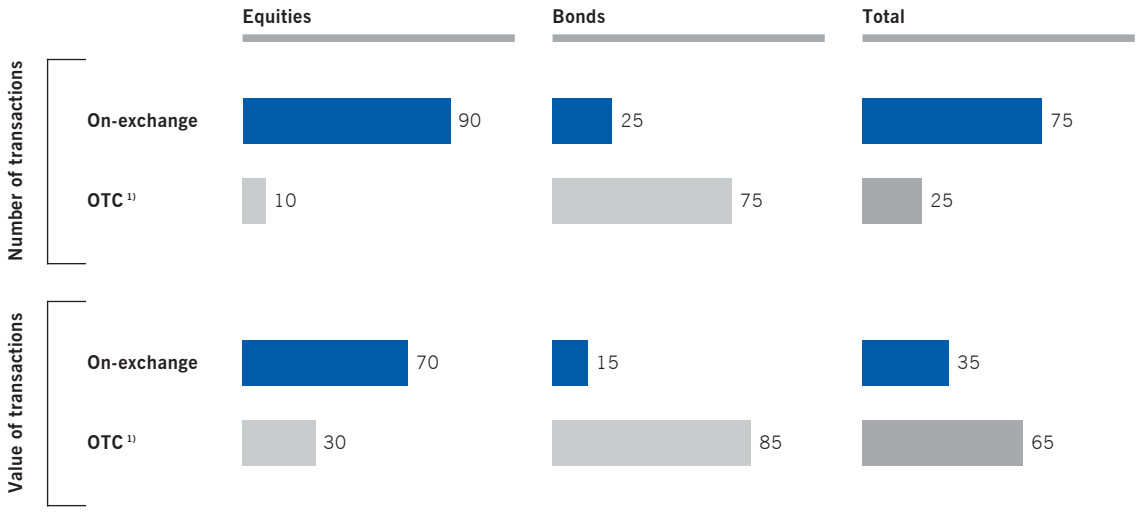
International bonds are primarily bonds which are not only placed with domestic but also with non-domestic, mostly institutional investors. When an issuer decides to issue an international bond, he usually decides to issue it as a bond under applicable domestic law and to deposit it with his domestic CSD. In this case, the CSD provides the safekeeping and notary functions. Or he may decide to issue it as a Eurobond. In this case, a common depository provides the safekeeping; an ICSD, together with a common depository, provides the notary function. Both ways of issuance substitute each other. The choice is driven by the issuer's issuance cost and the preference of bond investors, which is in turn largely driven by their post-trade preferences.

## 4.1 Competition for post-trade services

The following discussion focuses on competition for post-trade services in cash markets. Post-trade functions are the same for bonds and equities and do not differentiate between on-exchange or over-the-counter transactions. Every post-trade function is offered by a number of different post-trade services providers and is open to competition. To understand the competitive dynamics in post-trade services, one needs to differentiate between clearing and settlement, custody, safekeeping and the notary function.

**Exhibit 7: Trades on and off exchanges in Europe**

Figures for 2003, in %




1) Over the counter; does not include internalisation by banks or direct physical exchange

Source: World Federation of Exchanges (www.world-exchanges.org), Deutsche Börse AG in-house analysis, 2004

34) On the definition of international and domestic debt securities used in exhibit 11 see Bank for International Settlements, 2003, p.13. Debt securities include bills, but exclude money-market instruments. International debt securities include Eurobonds.

## Clearing and settlement functions

If retail or institutional investors want to sell or buy securities, they have a wide range of choices. Retail investors can use online trading platforms or call their broker or bank and trade against the books of the broker or bank (i. e. conduct an OTC trade) instead of using an exchange. They can also instruct their broker or bank to sell or buy the security on an exchange. Both options are of quantitative importance (exhibit 7). In the following, competition in clearing and settlement is analysed – first, for on-exchange trading and, second, for OTC trading.

### a) On-exchange trading

Once an investor has decided to trade on a particular exchange, he has to follow the respective requirements asked by market participants. Most European exchanges require clearing and settlement services to be carried out by one domestic CSD, because the use of one CSD allows both the exchange and the CSD to integrate their processes and thus provide market participants with the desired, highly automated straight-through execution process at minimum operational risk and low cost.[35] In most European countries, the use of the domestic CSD for exchange trades is prescribed either by law or by the rules of the stock exchange. Germany and Luxembourg are among the few examples that explicitly allow multiple CSDs; however, in both countries there is only one domestic CSD at present.

Whereas there is currently no possibility to select a post-trade services provider, services are generally subject to competitive forces. The market is largely contestable:[36] one requirement for contestability is that national law or the rules of stock exchanges permit the existence of multiple CSDs. In Luxembourg or Germany any intermediary may apply for a CSD license to get access to the exchange and compete with the existing CSD. This is likely to happen in the case of an inefficient CSD.

Another oft-mentioned requirement for contestability is that entry costs do not deter a potential competitor from entering the post-trade market. Running a CSD requires a high-performance, IT-based transaction system. Transaction banks and transaction providers (such as Xchanging or DWP) have such systems. It appears technically feasible to customise existing transaction systems at relatively low cost and set up a new CSD. This possibility has already been raised by industry experts and transaction banks.[37] Moreover, entry costs have fallen significantly over the last decade. Outsourcing to low-wage countries achieves major cost savings in the development of software and the manual operation of settlement services. Entry costs can also be recovered to a certain extent (e. g. by licensing the IT system), so that even a failed attempt to enter the post-trade market does not entail the complete write-off of an investment. Recent licensing of software to emerging markets provides evidence for this point.

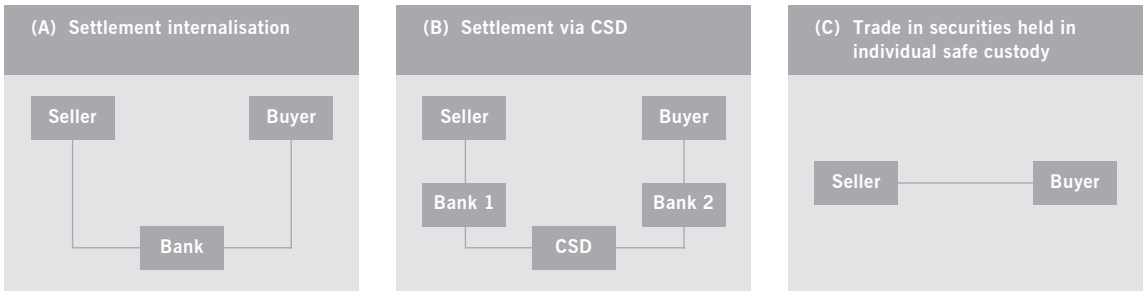
### b) Over-the-counter trading

When a security is traded over the counter, customers can choose their clearing and settlement provider. A classic example concerns Eurobonds. All global custodians, (sub-)custodians, and ICSDs compete for cross-border clearing, settlement, and custody services regarding Eurobonds. While this is widely

[35] See Zentraler Kreditausschuss, February 2004, p. 2ff.
[36] See Baumol et al., 1986, for an introduction to the concept of contestability and Knieps, 2004, as well as Serifsoy and Weiss, 2003, for a detailed application to post-trade markets.
[37] Global Custodian, 8 November 2004 (www.globalcustodian.com).

understood, some believe that CSDs are always involved in the clearing and settlement of securities other than Eurobonds. However, this is not the case, as is illustrated by exhibit 8.

**Exhibit 8: Different ways to realise the transfer of ownership**




(A) Even if safekeeping of a security is centralised at a CSD, transfer of ownership between two customers of the same bank (or custodian) can take place without a CSD. In this case, the bank can "internalise" the settlement of a trade by an internal booking from one customer account to another, and it assumes the clearing and settlement function regarding the customers' trades.[38] The number of banks that hold accounts with a CSD is rather small and has fallen in recent years due to the consolidation and specialisation of the banking industry. Also, many banks have made significant investments to increase the number of internalised trades, thereby directly competing with exchanges and post-trade services providers. As a consequence, the share of internalised trades has increased.[39]

The Markets in Financial Instruments Directive (MiFID) now provides a clear framework for internalisation and, in some markets (e. g. France), for the first time allows internalisation. This will increase internalisation further. But even where customers do not trade via an internalisation platform of a bank, they very often settle through one bank or custodian and do not involve a CSD. For example, institutional trading parties – once they have entered into an OTC transaction – compare where they maintain securities accounts. As they all maintain accounts at various global custodians and ICSDs they are highly likely to use one common institution for settlement.[40]

(B) In the second case, the transfer of ownership involves a CSD. This is the case when the respective security is held for safekeeping at a CSD and the seller and buyer are customers of two different banks.

(C) In the third case, securities that are not held for safekeeping at a CSD are stored privately or by a bank. In this case, transfer of ownership can take place either by physical transfer of the security or by a book transfer by the bank safekeeping the security.

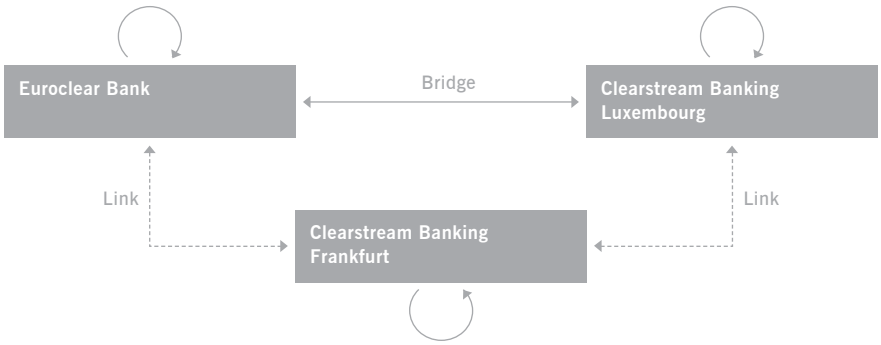
[38] Even if a CSD assumes the central safekeeping function for most securities, it is not always involved in the transfer of ownership. Every bank holds all its immobilised and dematerialised securities in a single "omnibus account" with the CSD, in which it books its own and/or its customers' holdings. The ultimate owner, be it the bank itself or a customer, is not recorded in the omnibus account. Thus, transfers among bank customers or between the bank and a customer do not require a booking at the CSD level.

[39] Other examples for settlement internalisation are a) banks acting directly as sellers or buyers, building up and running down their own stocks; b) netting on the books of an execution broker, clearing agent or custodian, which is not organised in a formal manner, but results directly from a market player offering such attractive execution/custody services that it generates sufficient critical mass on its books (this could occur on any market); c) netting between the execution broker and the custodian, a situation that arises as a result of the takeover of a brokerage firm by a bank (e. g. Cortal, BNP Paribas) – the bypassing of the settlement system to transfer securities from the broker's account to the custodian's account depends on the interoperability of their systems and on the segregation of their clients' assets.

[40] See NERA Economic Consulting, 2004, p. 73. Trading parties select their agent bank/custodian so as to avoid settlement via a CSD, thus saving costs.

### German Bunds

German Bunds are government bonds with a regular ten-year maturity at issuance. These bonds are kept safe in dematerialised form by the German CSD, Clearstream Banking Frankfurt (CBF). Clearing, settlement, and custody services are provided by CBF and the ICSDs (Euroclear Bank and Clearstream Banking Luxembourg). The German CSD is connected to each ICSD via a link, while the ICSDs maintain a special link, the "bridge". The majority of trades are cleared and settled through the ICSDs. The Bunds case provides a good example of how one CSD and the two ICSDs compete for clearing and settlement of OTC-traded bonds.[1)]




[1)] Such a competitive environment does not exist in all European countries. In France and Italy, for example, competition for clearing and settlement of government bonds via EuroMTS is limited due to exclusive arrangements, requiring these services to be provided by the domestic CSDs only.

## Custody function

The custody function is subject to lively competition. Global custodians, (sub-)custodians and (I)CSDs fulfil the same functions, albeit at differing service levels. A large number of banks compete for the administration of security accounts and the associated services, such as reporting, collection of dividends, and interest or tax services, etc. Institutional investors typically require more sophisticated services, such as proxy voting, collateral management, portfolio analyses, etc. Custodians, CSDs, and ICSDs compete for the provision of these services.

## Safekeeping and notary functions

All post-trade services providers compete for the provision of safekeeping services for securities evidenced by physical certificates. For Eurobonds, issuers use common depositories for safekeeping and common depositories, together with ICSDs, for the notary functions. For all other securities evidenced by global certificates, they use CSDs for both the safekeeping and notary function. Similar to the clearing and settlement functions for exchange-traded securities (see above), these functions are subject to competitive forces because they are contestable.[41)]

[41)] See footnote 36.

## 4.2 Efficiency of post-trade services

If a market lacks either a sufficient number of providers or is not contestable, providers may not have sufficient incentives to innovate and invest. The resulting cost inefficiency entails higher prices. This section assesses the efficiency of European post-trade markets from a customer's perspective, benchmarking the major European CSDs against their US counterpart (which is often cited as a showcase for efficiency). Moreover, it compares domestic and cross-border costs, and shows that cost efficiency has strongly increased in the industry during the last years.

From the investor's point of view, there are two main drivers behind the pricing of post-trade services: service providers' operating costs and margins. The first driver closely relates to the overarching objective of a safe and efficient European post-trade market, which is of greater quantitative importance than the second driver. The remainder of this chapter focuses on the operating income of post-trade services providers, which equals the costs that customers incur for these services.

**Efficiency of domestic post-trade services**

In the post-trade industry, three main levers drive efficiency: (1) technologies and processes, (2) administrative costs caused by complex legal and tax procedures, and (3) the number of transactions (due to economies of scale).

CSDs, for example, can influence the first and the third lever (the latter via consolidation); the second lever is out of their control. In comparison to the US, European CSDs are successfully addressing the first lever (technologies and processes). This can be demonstrated by comparing domestic transactions across various countries. In order to isolate the efficiency of technologies and processes, one has to account for differences in the number of transactions handled by each CSD.

To see to what extent transaction prices are driven by economies of scale, it is useful to plot the estimated post-trade income per transaction (as a proxy for the transaction price) against the number of transactions (exhibit 9).[42] The analysis shows that CSDs with larger transaction volumes tend to charge lower transaction costs.[43] Moreover, the estimated curve for customer costs slopes downward, revealing the effects of significant economies of scale. To a large extent, the fact that the US DTCC charges slightly lower fees than European CSDs can be explained by the larger US transaction volume.

The analysis delivers a second insight: the vertical distances between the curve and the scatter points provide information on the efficiency of different CSDs. For example, the curve suggests that – given the number of transactions on the Italian market – the Italian CSD (no. 6 in exhibit 9, Monte Titoli), should have an average transaction price of about €1.00. In reality, the average transaction price is only €0.33. The difference is not explained by liquidity and must be due to the above-average technological efficiency of the Italian CSD.[44] The major European CSDs are below or very close to the curve, suggesting that their level of technological efficiency is comparable to each other and to the US.

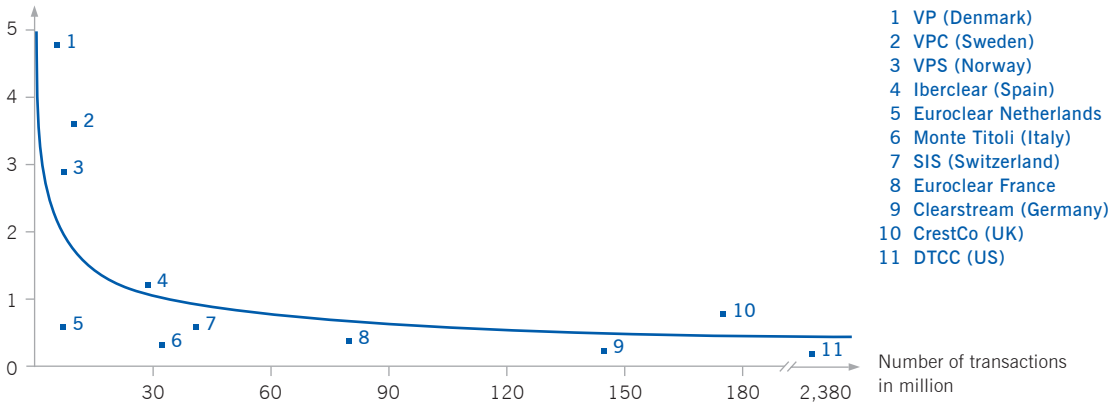
[42] The price data has been estimated using published data on CSDs' revenues (adjusted for banking income) and dividing it by the number of pre-netting transactions. This top-down perspective is usual in the literature; see, for example, Lannoo and Levin, 2001, and the references therein. Bottom-up approaches based on price lists, etc., face the problem that they cannot account for implicit discounts and discontinuities over time, which make meaningful comparisons across players and time difficult. See NERA Economic Consulting, 2004, for a recent discussion.

[43] For more rigorous econometric evidence, see Schmiedel et al., 2002.

[44] Note that this analysis does not take into account differences in service levels and profits. However, the data provided by Schmiedel et al., 2002, suggests that more liquid markets have lower profit margins (CrestCo being a notable exception). Including profit margins as an additional variable in a multivariate regression framework is therefore unlikely to change the results of the univariate exercise.

**Exhibit 9: Cost curve estimate for the post-trade industry[1)]**

Estimated transaction prices (pre-netting) for 2003, in €




[1)] The cost curve arises from running univariate ordinary least squares on a log-linear cost model; the R2 statistic is 0.47 and the t-value of the slope co-efficient is 3.17.
Note: Settlement-related revenue of CSDs divided by the number of transactions (before netting) treated by the respective organisation.

Source: Annual reports; Deutsche Börse AG in-house analysis, 2004

The analysis presented above shows that European CSDs are not systematically less cost-efficient than their US counterpart; cross-border transactions are not taken into consideration.

**Efficiency of cross-border post-trade services**

Based on a bottom-up analysis, it is possible to calculate the estimated average cost per transaction for domestic and cross-border transactions. Transaction costs include expenses for clearing and settlement, but also commission and liquidity costs. Wholesale transaction costs are 29 percent higher and retail transactions are 152 percent higher than the respective domestic transactions (exhibit 10).

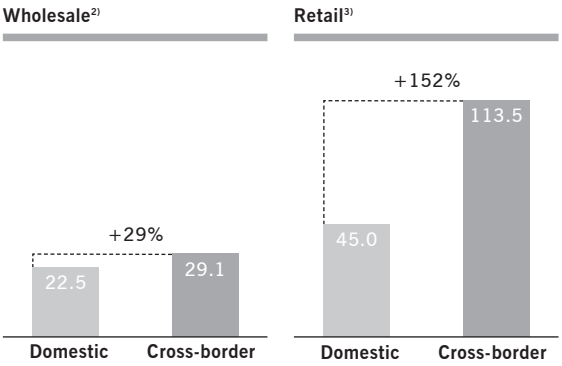
Wholesale transactions dominate the cross-border business by far. This fact is unlikely to change in the near future, given the existing and continuing home bias of retail investors.[45)]

Recent research shows that settlement-related costs are higher in the cross-border context.[46)] As in the domestic context, the prices paid by customers are mainly driven by the providers' operating costs, which in turn depend on (1) technologies and processes, (2) administrative costs caused by complex legal and tax procedures, and (3) the number of transactions. The analysis in exhibit 9 shows that European CSDs possess efficient technologies and processes, which, in principle, could also be applied in the cross-border context. However, compared to domestic transaction volumes, the number of cross-border transactions is low. Moreover, as demonstrated, for example by the Giovannini Group, the cost efficiency of cross-border transactions is impaired by legal and tax complications, which are largely absent in the domestic context.[47)] Since legal and tax regimes relating to the transfer and administration of securities have not been harmonised across Europe yet, the degree of automation

[45)] See, e. g. Warnock, 2002, and the references therein.
[46)] See Lannoo and Levin, 2001, or Giovannini Group, 2003.
[47)] See Giovannini Group, 2001 or 2003.

**Exhibit 10: Costs of wholesale and retail cross-border transactions**

Estimated average cost per transaction, 2001, in basis points[1)]




[1)] 1 basis point is 1/100 of a percentage point
[2)] Example: wholesale trade of €200,000
[3)] Example: retail trade of €5,000

Source: Deutsche Börse AG/Clearstream International S.A., 2002

of cross-border transactions is low and orders have to be processed manually. This increases costs and operational risk. In contrast to the two other cost drivers, the complexity of legal and tax procedures cannot be directly controlled by post-trade services providers. Hence, in order to reduce cross-border post-trade prices, it is imperative to harmonise legal and tax regimes.

## 4.3 Effectiveness of existing governance structures[48)]

Over the last decade, the European post-trade industry has undergone major governance changes, in particular regarding CSDs. Most CSDs have been demutualised and some players have adopted a for-profit orientation. Despite differences in governance structures, all major European CSDs have been able to reduce their unit costs and respective prices. They have successfully improved their technology and settlement liquidity.

### Prices have fallen over the last years

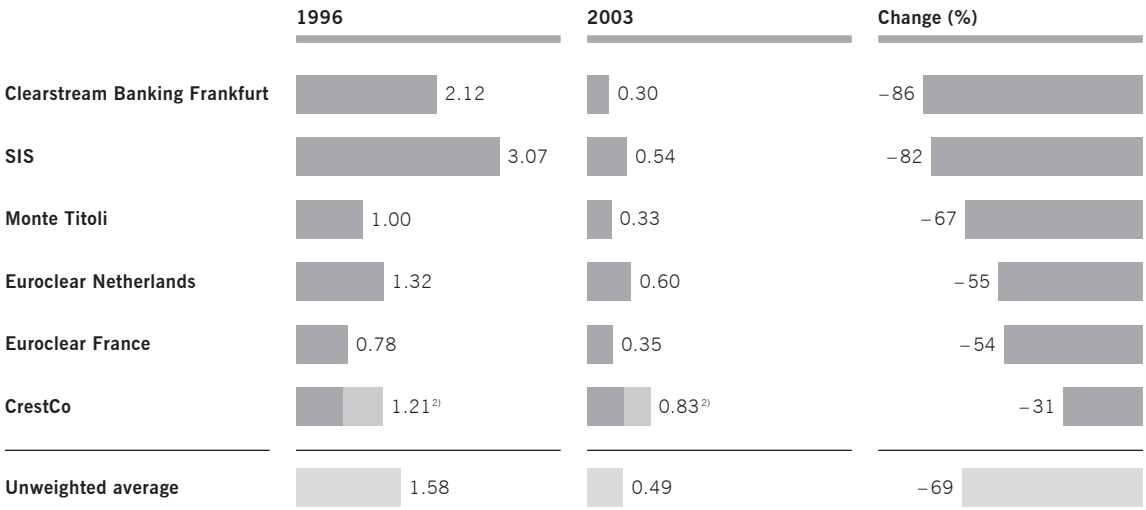
Between 1996 and 2003 settlement prices (approximated by settlement-related revenues of CSDs divided by the number of pre-netting transactions) came down in all major European markets.[49)] The (unweighted) average price fell by 69 percent from €1.58 to €0.49 (exhibit 11). The price decline was strongest for Clearstream Banking Frankfurt, a company with a for-profit orientation.

The above-mentioned analysis suggests that governance structures do not explain differences in the dynamic performance of CSDs. Rather, the efficiency gains are due to innovations and to increased settlement liquidity.[50)]

[48)] This section focuses on CSDs, for the current debate concerns the effect of utility or for-profit governance structures on the efficiency of CSDs.
[49)] See footnote 42 for details on the methodology.
[50)] In Europe (EU15), the number of settlement transactions has increased by 252 percent between 1996 and 2003. The average settlement price has gone down due to large volume-dependent rebates. On average, a 100-percent increase in transaction volume has led to a 28-percent decline in the price per settlement transaction.

### Exhibit 11: Evolution of settlement prices

Estimated settlement prices from a customer's perspective[1], in €




[1] Estimated as settlement-related revenue divided by the number of (pre-netting) transactions processed by the respective CSD. Where pre-netting figures were unavailable, post-netting transactions were used and adjusted by the published netting efficiency
[2] Includes stamp duty

Source: Annual reports; Deutsche Börse AG in-house analysis, 2004

The most prominent driver of technological efficiency was the almost complete automation of the post-trade processes by the implementation of innovative IT systems (for example, in the case of Clearstream, Creation or Vestima+) and new settlement models, delivering substantial savings on transaction costs. Continental European markets adopted paperless processes earlier than other markets (such as the US) and are currently making significant IT investments. For example, Euroclear is currently investing €350 million in the development of its single settlement engine.[51]

The industry has also successfully pooled settlement liquidity. As mentioned above, over the course of the last decades, the post-trade industry has seen a wave of consolidation through mergers and acquisitions on a national and – to a smaller extent – on a European level.[52] Consequently, in most European countries there is only one central securities depository, and fewer sub-custodians and global custodians. This concentration has been pivotal in capturing synergies and improving the efficiency of post-trade services across Europe.

#### Providers can effectively manage European integration

The discussion presented above points out that governance structures were irrelevant for the efficiency improvements in the domestic context over the last decade. The following discussion argues that European CSDs have successfully taken up the challenge of European integration without any specific industry regulation or governance rules.[53]

[51] See Kentouris, 2004.
[52] See also section 2 of this publication.
[53] See Milne, 2004, for arguments in favour of a market-driven solution.

Eurobonds provide a good example of the industry's capability to deal with cross-border transactions. Eurobonds are mostly traded over the counter and their clearing and settlement services are provided mainly by the ICSDs. As discussed above, Eurobonds have increasingly substituted domestic bonds, partially because market participants recognise that post-trade services for Eurobonds provided by ICSDs are efficient and safe.[54] They argue that competition and the absence of innovation-inhibiting regulation have increased efficiency and innovation in this market.

Regarding other instruments, it is worthwhile to apply a forward-looking perspective on the three drivers of post-trade costs: technology, settlement liquidity, as well as tax and legal complexities. Looking at the technology driver, European providers are currently making substantial IT investments to improve their interoperability. The most prominent recent project concerns the improvement of the "bridge" between the two ICSDs. There are numerous other initiatives. In fact, CSDs have continuously upgraded their existing links. For example, in 1997, the link between the French and the German CSDs could handle only 20 different types of securities. This number was up to 538 in 2003.[55] In some partnerships between CSDs, such as between the German and the Swiss CSDs, more than 4,500 different securities are now eligible for transfer via the link.[56] In addition, the number of transactions that run over direct links between CSDs has gone up significantly. For example, in 1997, the German CSD treated 35,900 transactions via its links with other CSDs. In 2003, this number was 482 percent higher and stood at 209,000 transactions.[57] In order to accelerate the automation of cross-border transactions, experts[58] propose uniform data standards and formats. Only then will the industry be able to effectively automate cross-border post-trade services in a way comparable to domestic levels and realise the related savings.

On the settlement liquidity side, the industry has already engaged in pan-European consolidation.[59] Given the economic advantages pertaining to scale, there is no reason why this process should not continue.[60]

Post-trade services providers have only limited influence on back-office costs for cross-border post-trade services due to tax and legal complexities across European countries. The question of governance structures is irrelevant here. Only the harmonisation of legal and tax regimes can lead to an improvement. It is also a key prerequisite for the effective and efficient automation of processes and faster integration of markets. In addition, Giovannini and others have pointed out that tax and legal harmonisation should be implemented first, as this will significantly reduce the complexity of developing common data standards and interoperability thereafter.[61]

[54] See, e. g., International Securities Markets Association, 2004, p. 8.
[55] Clearstream Banking Frankfurt figures.
[56] Link between SIS and Clearstream Banking Frankfurt.
[57] Clearstream Banking Frankfurt figures.
[58] See Committee on Payment and Settlement Systems/International Organisation of Securities Commissions, 2001, 2004; European Central Bank/Committee of European Securities Regulators, 2004; Giovannini Group, 2001, 2003.
[59] See exhibit 4.
[60] See Van Cayseele, 2004, p. 9ff. for a discussion of the optimal consolidation degree of the post-trade industry.
[61] See Giovannini Group, 2003.

## 4.4 Summary

Every post-trade function is offered by a number of different post-trade service providers and is open to competition. Banks can internalise the settlement of a trade by an internal booking from one customer account to another without having to use a CSD or ICSD. Many banks have made significant investments to increase the number of internalised trades, thereby directly competing with exchanges and post-trade services providers. Safekeeping is offered by almost all players. On average, European providers of post-trade services are as cost-efficient as the DTCC in the US, and markets have implemented a number of measures to cope with cross-border inefficiencies. Settlement unit costs have fallen significantly over time. On a cross-border level, tax and legal complexity across different countries are substantial cost drivers. Finally, efficiency improvements have already been achieved and will continue to be made independently of governance structures.

# 5 Conclusion

Over the last decades, the European post-trade industry has significantly enhanced its offering, reduced risks, and achieved major efficiency improvements. Competition, innovation, and consolidation were the main drivers for this development.

Regulation should support these drivers. It should aim to improve the industry's capability to offer innovative, safe, and efficient solutions to its customers. Comprehensive cost-benefit analyses are needed to verify whether proposed regulation meets this criterion.

As advocated by the Giovannini Group, regulation aiming at improving the industry's innovativeness, efficiency, and safety in a cross-border context, is likely to be most effective if a joint effort by governments, regulators, and market participants is taken and conducted in a staged approach. First, governments, regulators, and market participants should co-operate to harmonise legal and tax regimes across Europe, and to define common standards and formats for the transmission of data.

Thereafter, the implementation of interoperability and open access between all kinds of capital-market service providers should be addressed. Realising technical interoperability and IT-supported open access, before legal and tax regimes have been harmonised and common standards defined, would imply excessive implementation costs for customers and providers of post-trade services, with respective consequences for price levels.

The uncertainty surrounding upcoming regulation should be removed as fast as possible as it introduces significant regulatory risk, resulting in a significant delay to investments, research and development efforts, and the consolidation process of the industry. The post-trade industry is mostly a scale business; hence, to exploit these economies of scale, further cross-border consolidation of the post-trade industry would be beneficial.

Finally, adjacent services to the post-trade functions that are covered adequately by existing regulation, such as prudential banking regulation for ancillary banking services, do not need double regulation.

# List of Exhibits

# Glossary[62)]

**Agent bank** A bank, either a local bank or a foreign bank branch, that acts on behalf of a foreign investor's custodian.

**Agent business** Services provided by one party, the agent, on behalf of another party, the principal. Post-trade services providers always act as agents. Some post-trade providers may also take principal risk in offering ancillary banking services, which are regulated under banking law.

**Batch** The processing of a set of payment orders and/or securities transfer instructions at discrete intervals of time (e. g. overnight).

**Bridge** The "bridge" is the name used for the automated interface (link) between Euroclear and Clearstream that permits cross-system settlement of a trade between a customer of one ICSD and a customer of the other ICSD.

**Bunds** German government bonds with a regular ten-year maturity at issuance.

**Business continuity** Arrangements that aim to ensure that post-trade services providers meet agreed service levels even if one or more components of their systems fail or if they are affected by an unusal external event.

**Central-bank money** Settlement is described as being in central-bank money if payment moves directly and irrevocably between accounts on the books of the central bank.

**Central counterparty (CCP)** Legal entity that acts as an intermediary between the parties to a securities trade and is the seller to every buyer and the buyer to every seller.

**Central securities depository (CSD)** An institution that performs, as a mere agent, the whole range of post-trade functions (clearing, settlement, custody, safekeeping, and the notary function).

**Clearing/clearance** The process of transmitting, reconciling, and, in some cases, confirming payment orders or security-transfer instructions prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement.

**Clearing member** A member of a clearing house. All trades must be settled through a clearing member. A direct clearing member is able to settle only its own obligations. A general clearing member is able to settle its own obligations as well as those of its customers.

**Clearstream** The German central securities depository, Clearstream Banking Frankfurt (CBF), and an international central securities depository based in Luxembourg, Clearstream Banking Luxembourg (CBL).

**Collateral** Financial or tangible assets pledged by a borrower to secure an obligation. If the borrower defaults, the collateral is used to repay the obligation.

[62)] With few exceptions, this glossary is based on glossaries of the Group of 30 (2003), the Committee on Payment and Settlement Systems (2003) and the European Central Bank/Committee of European Securities Regulators (2004).

**Collateral management** A service that handles collateral-related functions for a customer, including valuation of collateral, confirmation of valuations with counterparties, optimisation of collateral usage, and transfer of collateral.

**Commercial money** Settlement is described as being in commercial money if the payment moves between the accounts of banks (in contrast to central-bank money).

**Common depository** The institution which provides depository functions for a certain security that the two ICSDs have in common (Euroclear and Clearstream Banking).

**Contestability** In contestable markets, existing suppliers charge competitive prices even if they have high market shares. Existing suppliers set low prices because the excessive profits would induce new firms to enter the market.

**Corporate actions** Actions by the issuer of a security that affect the security; for example, stock splits (existing shares are split into several new ones to increase liquidity), rights issues (the issuer raises new capital), spin-offs (an existing publicly-traded company sells a part of its assets or distributes new shares in order to create a newly independent company), dividends, as well as other events affecting the security such as takeover offers, etc.

**Credit risk** The risk that a counterparty does not settle an obligation for full value, either when due or at any time thereafter (e. g. due to a default).

**CrestCo** The central securities depository for the UK and Ireland; owned by Euroclear.

**Cross-border trade** A trade between counterparties located in different countries.

**Custody** Safekeeping and administration of securities and financial instruments on behalf of others.

**Custodian** An entity, often a bank, that performs custody services for its customers. It may provide various other services, including clearing and settlement, cash management, foreign exchange, and securities lending.

**Delivery versus payment (DvP)** A link between a securities-transfer system and a funds-transfer system that ensures delivery of securities; occurs only together with the delivery of cash. A settlement becomes legally effective only when both legs (security and cash leg) are concluded.

**Dematerialisation** The elimination of physical certificates or documents of title that represent ownership of securities, so that securities exist only as accounting records.

**ECCP** Equity central counterparty; a CCP for cash equity markets.

**Eurobond** Originally, a bond issued by a borrower outside its own country that may be denominated in a currency foreign to the borrower or to the purchaser, or both. Eurobonds are cleared and settled in ICSDs, such as Euroclear and Clearstream, and safekept in common depositories.

**Euroclear** A Brussels-based international central securities depository. Euroclear also acts as the central securities depository for Belgian, Dutch, French, Irish, and UK securities.

**Free of payment (FoP)** Delivery of securities with no corresponding payment of funds. The delivery of securities becomes legally effective without the transfer of cash.

**General clearing member** See clearing member.

**Giovannini Group** The Giovannini Group was formed in 1996 to advise the European Commission on issues relating to the EU financial markets. The Group consists of financial-market participants and is chaired by Alberto Giovannini.

**Giovannini barriers** A collection of 15 legal, tax, and technical obstacles identified by the Giovannini Group that impair the safe and efficient provision of cross-border post-trade services.

**Global custodian** A custodian that provides its customers with custody services in respect of securities traded and settled not only in the country in which the custodian is located, but also in numerous other countries throughout the world.

**Iberclear** The Spanish central securities depository.

**Immobilisation** Placement of physical certificates for securities and financial instruments in a central vault to facilitate book-entry transfers.

**Interoperability** The ability of participants to communicate and work with service providers and other participants without special effort on the part of the user. Interoperability requires the technical compatibility of systems and a standardised interface and transfer procedure.

**Legal risk** The risk of loss because of the unexpected application of a law or regulation, or because a contract cannot be enforced.

**Liquidity risk** The risk that a counterparty does not settle an obligation for full value when due, but only at some unspecified time thereafter.

**Local agent** A custodian that provides custody services for securities traded and settled in the country in which it is located to counterparties and settlement intermediaries located in other countries.

**Netting** An agreed offsetting of positions or obligations by trading partners or participants. Netting reduces the number of individual positions. If two parties agree to net their positions, this is called bilateral netting. If three or more parties' positions are netted by a central counterparty, this is called multilateral netting.

**Notary function** The entry point into the post-trade arena. Performs the authentication and registration of new issues.

**Novation** A legal term that describes the substitution of a new obligation for an old one and/or the substitution of new parties to an obligation.

**Omnibus account** An account in which the securities are held by a participant in which its own securities and the securities held by it on behalf of its customers are kept.

**Operational risk** The risk that deficiencies in information systems or internal controls, human error, or management failure will result in unexpected losses.

**Over the counter (OTC)** Bilateral transactions not conducted on a formal stock exchange.

**Overnight lending** A loan with a maturity of one business day. Also called day-to-day money or overnight credit facility.

**Participant/member** A party who participates in a transfer system and is allowed to send payments and delivery orders directly to the system on behalf of customers.

**Principal business** Activities carried out by a party on its own behalf, possibly employing an agent. It involves the taking of principal risk from selling/buying or lending/borrowing from own accounts for position and risk, expecting to make a profit.

**Proxy** Authorisation given by a shareholder to another party to represent the shareholder and vote on the shareholder's behalf at a company's shareholder meeting.

**Real-time gross settlement (RTGS)** Denotes the continuous (real-time) settlement of funds or securities transfers individually on a transaction-by-transaction basis (without netting).

**Registrar** An entity that administers the record of the owners of securities on behalf of the issuer.

**Safekeeping** Storage of physically evidenced securities in a vault.

**Securities lending** The lending of securities in exchange for a fee. Securities lending is mostly facilitated by CSDs, but not offered directly. (I)CSDs and banks, such as custodians that directly offer securities lending, possess a banking license and are regulated by existing banking law.

**Settlement** The payment of cash for securities or, conversely, the delivery of securities against payment.

**SIS** The Swiss central securities depository.

**Straight-through processing** The fully automated completion of clearing and settlement processes based on trade data, that is only once entered into the system manually.

**Sub-custodian** A custodian who provides custodial services for another custodian.

**SWIFT** Society for Worldwide Interbank Financial Telecommunication: a co-operative organisation, created and owned by banks, that operates a network facilitating the exchange of payments and other financial messages between financial institutions throughout the world.

**TARGET** Trans-European Automated Real-Time Gross Settlement Express Transfer: the TARGET system is a payment system composed of one RTGS system in each of the European Monetary Union member states. The domestic RTGS systems and the European Central Bank payment mechanism are interconnected according to common procedures to allow cross-border transfers.

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