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DISCUSSION PAPER

Cross-Border Securities Clearing and Settlement Infrastructure in the European Union as a Pre-requisite to Financial Markets Integration:

Challenges and Perspectives

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Introduction

The significant progress on the unification of cross-border securities trading infrastructure within the European Union (EU) has been paving the road to an integrated EU financial market. However, more dynamic changes towards integration are happening a level below, namely at the clearing and settlement arrangements. Financial liberalization, the information technologies development, progress in the common regulatory framework across the European Union and the introduction of the euro are examples of the several driving forces which have also been influencing in this process.

The importance of an efficient securities clearing and settlement system lies on the safer transfer of ownership of assets against payment. Such a system must be developed in a way to minimize the risks involved on securities transactions, and it must still offer lower costs, which do not hinder the intention to acquire or dispose securities. Financial integration in Europe is still far from being achieved and it is not a common currency alone that may change this scenario. In general, the arrangements between actors in the trading, clearing and settlement systems within any country have been organized on the basis of direct or indirect access to the local Central Securities Depository (CSD) and by accounts hold at the Central Bank. Gaining access in this local market by a foreign investor involves costs in establishing relationship with a local agent, which financial institutions are ready to pass them over to the investor. The costs of a cross-border securities clearing and settlement within Europe are 42% higher than if cleared and settled domestically. Nevertheless, cross-border transactions within the EU have increased by 20-25% annually between 1996 and 2001 (Mario Monti 2002). In order to promote the integration of financial markets in Europe, this fragmented structure based on access must be integrated or consolidated in a way that investors may enjoy opportunities throughout Europe without being threat by higher settlement fees, risks or increased need for collateral. Thus a smoothly functioning integrated infrastructure for clearing and settlement within the European Union is a precondition to further developments of the single financial market.

Chapter 1 will present a general definition of financial integration and its benefits, and then the focus shall turn to the progresses in the course of the European financial integration. First, an overview of the developments in the money, bond and equities markets after the introduction of the euro will be given. Afterwards, the purpose and achievements of the main policy initiatives to improve financial integration in Europe will be briefly described.

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ABSTRACT

The importance of an efficient securities clearing and settlement system lies on the safer transfer of ownership of assets against payment. Such a system must be developed in a way to minimize the risks involved on securities transactions, and it must still offer lower costs, which do not hinder the intention to acquire or dispose securities. The cross-border securities clearing and settlement transactions within Europe, especially equities transactions, are still much higher and riskier than if cleared and settled domestically. The fragmented structure of local securities depositories is hindering the integration of financial markets in Europe, because investors are not stimulated to enjoy opportunities cross-border. Thus a smoothly functioning integrated infrastructure for clearing and settlement within the European Union is a precondition to further developments of the single financial market. The immediate benefits of financial integration in Europe are economic growth. Benefits under the investors' perspective are higher risk-adjusted returns on savings, better position to diversify portfolio, as well as higher liquidity and competition in the capital markets. On the other hand, corporations would also be favored with better access to financing capital, and competition would force financial intermediates to offer a wider range of financial products at lower prices.

JEL Classification: F30, G21, O33

Key words: Securities settlement systems, settlement designs, models for consolidation of depository institutions, costs of cross-border securities transactions, financial integration

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In chapter 2, the concepts and all steps of post-trading transactions (clearance and settlement) will be reviewed, for understanding purpose, first in a national market. The role of each local agent shall be identified and the implications of risk assessed. A practical example will serve to explain the differences, advantages and disadvantages of the various settlement system designs in use. Then the requirements and procedures of a cross-border clearing and settlement of securities will be appraised. The last point in this chapter shall describe the risks involved in settlement systems, followed by risk management tools chiefly promoted by the Bank of International Settlements and IOSCO.

While chapter 2 presents the theoretical approach to understand clearance and settlement, chapter 3 will make good use of these definitions, in order to present the arrangements in the European Union. Groups with common features in terms of trading, clearing and settlement systems will be presented in order to demonstrate the fragmentation within Europe and the efforts already made towards integration. Then, the challenges for further integration and efficiency will be identified and perspectives of future consolidation approaches offered. Finally, the recent initiatives undertaken by market participants, as well as by regulators will be identified before the conclusions.

The aim of this work is to offer the reader interested in the development of the securities settlements systems in Europe, a detailed overview on the functionalities, risks and costs involved in securities transactions. This background will enable the reader to accompany the debate on the future post-trade architecture which will serve the European financial market. This paper argues that an efficient integrated or consolidated system for Europe is a precondition to the single European financial markets, since it is part of the basic infrastructure required to regulate the transfer of ownership and payments of traded securities.

1. Financial integration in Europe

The financial integration of an economic area is recognized by the absence of barriers that discriminate economic agents in their access to funds or to invest within this area, on the basis of their location. Consequently, a financial instrument with similar credit risks and returns should have the same price, and there should not be any systematic differences in portfolio allocation and source of funding of economic agents within the area, if the securities are substitutable (Hartmann et al. 2003, pg.17). Therefore, if similar financial instruments offer different returns, it must arise from barriers to free capital flows among countries, including legal differences in

accounting systems, taxation, bankruptcy and ownership laws, or information asymmetries.

A Single Market for the financial services is an objective pursued by the EU. In a Single Market, a financial institution authorized to provide financial services in one member state would be allowed to provide the same service throughout the EU. It would compete in a level playing field with local institutions without being threat by unfair practices because a consistent regulatory environment exists.

Concerning to the benefits of financial integration, the most obvious is economic growth, which is spurred by the reduction of the cost of capital and its better allocation. The results of a simulation of macroeconomic impacts of integration in the European financial markets point out a long-run increment of the real GDP as 1.1%[1]. Business investments would raise 6.0% and private consumption is up by 0.8% (London Economics 2002, Executive Summary). Benefits under the investors' perspective are higher risk-adjusted returns on savings, better position to diversify portfolio, as well as higher liquidity and competition in the capital markets. On the other hand, corporations would also be favored with better access to financing capital, and competition would force financial intermediates to offer a wider range of financial products at lower prices.

The present stage of financial integration in Europe was heavily fostered by the European Monetary Union, which resulted in some direct effects immediately noticed. The first of them was the shrinking of foreign exchange markets from $1.49 trillion to $1.21 trillion in 2001 (BIS 2002: Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity, pg.2).[2] Second, the reduction of the cost of cross-border transactions within the euro-area due to the decrease in the cost of currency conversion and currency risk. Still, the cross-border securities settlements are riskier, lengthier, more expensive and less standardized than equivalent domestic transactions. How to address to such barriers is thoroughly discussed on the fourth chapter. The third impact was the increase in the demand for every asset traded in the euro-zone, because investors are on a better position to assess prices and return of assets formerly traded in a different currency. This leads to a path where similar

[1] The increase in real GDP is a compilation of the following factors: 0.5% due to reduction in the costs of equity financing including reduction of the costs of cross-border clearing and settlement, 0,3% related to the decline in the cost of bond finance plus the increase in the share of bond finance in total debt finance and 0,3% assumed by the reduction of cost of bank finance.

[2] However, these figures are contested by Reszat (1998), who claims that the methodology applied by BIS is not appropriate to assess such a dynamic market. BIS analyzes once in 3 years, during a single month, the transaction in a FX market and request the central banks and monetary authorities to characterize the turnover on the last six months. Moreover, Reszat (2003, P.27) refers to observations of Persaud (2001) that trading values in FX have instead increased in 5 to 10% after the introduction of the euro.

assets independent of origin in the EMU may become closer substitutes for investors portfolios (Adjaoute & Danthine et al. 2000, pg.28); and cross-border trades of securities are more oriented on industry sectors EU-wide than by home-countries (Adjaoute & Danthine 2000, pg.21). Finally, an important effect of the euro has been to expose inefficiencies and barriers to further market integration and to put pressure on the politicians and market participants to adopt measures to further harmonization.

Improvements on the wholesale payment systems promoted by the monetary integration are worth to be regarded. Already in 1999, the ECB introduced the Trans-European Automated Real-Time Gross Settlement System (TARGET), a wholesale payment system[3] with a real-time gross settlement design[4]. TARGET consists of a connection of national payment systems of the European System of Central Banks; therefore the demand for low risk and a high degree of liquidity were fundamental aspects in the decision-making process of the settlement design chose. The high liquidity demand is met through basically three sources (ECB: TARGET Report 2001, pg.37): Minimum resources can be used as liquidity buffer during the day, possibility of intraday repos, and intraday overdrafts from the reserve accounts of participating banks against collateral. An important feature in this case is the fast and cost effective management of collateral. Because TARGET never credits an account before debiting the account of the sending institution, credit and liquidity risks are eliminated.

1.1 Financial markets

This section shall briefly present the major changes observed in the European financial markets since the implementation of the euro. In sum, the main findings are related to the decreasing of government bonds and their considerable yield integration cross-countries; a significant increase in corporate bonds, although the European corporate source of finance is still based on loans and private equities. Considerable progress towards integration was seen in the unsecured bond market, but not in the repurchase market, as a result of fragmented securities settlement industry and the deficient management of collateral cross-border. A positive aspect is concerned to the reduction of underwriting fees and in the integration of some stock exchanges. In retail banking, cost of cross-Europe money transfers has not reduced, but some spur of integration was noticed - inter-banking lending increased with the introduction of the euro.

[3] In the context, wholesale transactions mean exclusive for “large- value” transactions between commercial banks and the European Central Bank (ECB).

Table 1: Financial structure in the euro area. Values expressed in % of GDP. Figures of 2001.

	Assets	Liabilities	Net Position
Households	202	57	145
Non-financial corporations	147	240	-93
Financial corporations	371	369	2
Government	28	80	-52
Total	748	746	2

Source: ECB, Hartmann et al. 2003, pg.9

Before going through investigations on specific financial markets, one should look over the financial structure in Europe, in this case, in the source of financing in the region. As presented in table 1, households are the main providers of funds to non-financial corporations and to the government. A second observation is concerned to the role played by financial corporations - their net position close to zero reflects their role as financial intermediaries. Non-financial corporations are the biggest receiver of funds and the negative net position may show the indebtedness of these entities, since in Europe as in Japan, banks are providing loans to enterprises and the corporate bond market and stock market capitalization are by far not as developed as in the United States (Hartmann et al. 2003, pg.8-17). Moreover, non-resident financial corporations have become a driving force of European markets, since the ownership share of international institutional investors account for 74% in Helsinki; from 40% to 30% in Sweden, Madrid, Paris, Norway, and London; and from 30% to 18% in Denmark, Portugal, Athens, Germany and Italy (FESE 2002, Share ownership structure in Europe).

The introduction of the euro influenced the development of the money markets in following ways: almost all 3-months interest rates were converged in 1999; and the standard deviation of cross-country rates basically collapses to zero, indicating full money market integration (Adam et al. 2002, pg. 18). Yet Greece was not able to fulfill the convergence criteria laid down by the Maastricht Treaty until 2000; consequently, it became a qualified member to join the euro area only in 2001. Thereafter, the market for unsecured interbank deposits was fully converged, thanks to the introduction of the euro, the common monetary policy and the common trading infrastructure –TARGET and EURO1[5].

[4] Instead of accumulating bilateral or multilateral claims and netting the end position in determined periods, wholesale payments are settled individually between participants (on a gross basis) immediately after confirmation of the transaction, and with finality.

[5] EURO1 is the Euro Banking Association's net settlement system, which attend mainly retail transfers of commercial banks. (Source: http://www3.oup.co.uk/iclqaj/hdb/Volume_51/Issue_03/pdf/510745.pdf)

The interbank money market consists of unsecured deposits, short-term repos (liquidity exchanged against collateral) and foreign securities swaps, in which future payments are exchanged for payments in another currency (Reszat 2003, pg.27). Although unsecured deposits represent the major part of the cross-border transaction[6], its market share came slightly down from 71% (1999) to 68% (2000), while the integration process in the euro-zone contributed to an increase in the cross-borders repo market from 56% to 60%[7] during the same period. Nevertheless, the preference to trade repos with a domestic counterparty remains (ECB 2001: The Euro Money Market, pg.25). Obstructions in the settlement system, due to the coexistence of several Central Securities Depositories (CSDs) are negatively interfering in the further development of the repo market, additionally the management of cross-border collateral is inefficient and collateral repo rates vary[8], apart from the lack of uniform fiscal treatment and legal regulations.

Broadly defined, bonds are debt securities issued for longer than a year. The seller of the bond agrees to repay the principal amount of the loan at a specified time and periodically pays interest to the buyer. They are mainly classified as public bonds (Treasury, federal agency and municipal) or corporate bonds. Institutional investors adjust their holdings of bonds in response to expectations of future interest rates.

Convergence in government bond is taking place, however with some disparities in the prices of bonds rated with the same credit risk. Such differences are associated with liquidity risks in smaller markets or different, *de facto*, credit risk among different sovereign debts. This is also a result of different borrowing requirements, issuance, strategies and procedures of twelve separate agencies issuing government bonds. Roberto Blanco (2001, pg.2) confirms that the "spread over German bonds of previously high-yield debt have narrowed, whereas the spread of all other euro-area sovereign debt has widened".

The reduction in the supply of government bonds is associated to the Stability and Growth Pact, which imposed constraints to reduce budgetary deficits to 3% of GDP and debt exposure up to 60% of GDP. Indeed, government debt fell from 75% of GDP in 1996 to 69 ½ % in 2001 (Deutsche Bank Research: EU Monitor, March 2003, pg.9). On the other hand, corporate bonds have been increasing in an astonishing rate since the introduction of the euro, even overtaking the position of

[6] Cross-border transactions are defined as lending transactions (cash) with euro area counterparties and non-euro area counterparties.
[7] It is important to mention that the increase of the cross-border repo market was mainly driven by the increase within the euro area from 36% to 40% in 2000. ECB: The Euro Money Market 2001, pg.26
[8] Canoy et al. (2001, table 7.2) demonstrates that the origin of the collateral (all European government bonds) influences on the repo rates charged by a large Dutch Bank.

government in the volume of issuance (Deutsche Bank Research: EU Monitor, March 2003, pg.16). The main reasons are: the reduction of underwriting fees across Europe, enlargement of the pool of potential investors, and investors' willingness to diversify investments.

The majority of eurobonds have been traditionally settled by international securities depositories like Clearstream and Euroclear. The benefits of using an International Central Securities Depository (ICSD) are directly related to the simplicity of the process, because of integration and access that these institutions maintain with local CSDs in different countries. Additionally, ICSD benefits from economies of scales reducing the fixed costs for processing in large quantities. Electronic trading platforms are widely used for trading of bonds, and to some extent ICSDs provide clearing and settlement services for them.

The introduction of the euro did not contribute much to the integration of the equities markets. There was no evidence of decline on the share of domestic stocks in the households' portfolios; furthermore, there are price variations according to location of equities with similar returns and risk rates. Market information is essential in the decision of allocation of investment. Consequently, corporations reporting under different accounting standards, being subject of different legal and taxation systems and disclosing such information in a foreign language definitely do not encourage investors to look for cross-border investments. Not to mention the limited access for trading in the stock exchange where the securities are listed, and the high costs of settlement. However, positive results can also be seen. Federation Internationale des Bourses de Valeurs (www.fibv.com) reports that the annual growth of capitalization in the European stock markets was higher than in the USA and Japan. Slowly, investors are shifting from country-based to sector-based investments. Equally positive is the increase of equity related derivatives, enhancing primary equity market liquidity.

In 2000, the French, Belgian and Dutch national stock exchanges merged into a single entity called Euronext. Further expansion of Euronext took place in 2001, when it took over the London Derivatives Market LIFFE and in 2002 the Portuguese Stock Exchange and Derivative Market merged with Euronext. Cross-membership was signed with HEX, the Helsinki Exchange, in 2001. The consolidation of stock exchanges in Europe has a peculiar impact on the integration of financial markets in Europe. Specifically, it fosters the further development towards interoperability of clearing and settlement systems provided by different depositories, resulting in a cost-efficient euro area-wide mechanism. Before such consolidation of stock

exchanges started to take place, the post-trading infrastructure was heavily a national vertical national line.[9]

1.2 Policy initiatives to improve financial integration in Europe

The Financial Services Action Plan, the Commission's main instrument for achieving the Single Market in financial services, was published in May 1999, and endorsed by the Lisbon European Council in March 2000. It consists in a set of measures to remove barriers, so as to provide a legal and regulatory environment that supports the integration of the EU financial markets. In particular, objectives are divided in three main categories: a single wholesale market; an open and secure retail market; and a state-of-the-art prudential rules and supervision (European Commission 1999). The FSAP covers a wide range of measures. Among the ones to promote a single wholesale are: enabling corporate issuers to raise finance on competitive terms throughout the EU; provision of access for investors and
intermediaries to all markets with a single point of entry; creation of a level playing field for providers of financial services to exercise their activities independent of the country of origin in the EU; and enforcement of legal certainty to protect securities trades and settlement from counterparty risk.

According to the Commission's Eighth Report on the FSAP (June 2003), much has already been achieved of the original 42 measures proposed. Until the publication of the report, 36 measures have been finalized, 3 were under negotiation and 3 proposals still had to be made. These measures must be adopted no later than mid-2004, so that 18 months are allowed to transpose the directives into national law before the end of 2005.

Among the specific measures to the securities settlement, the "Settlement Finality Directive", of May 1998, implemented on December 1999, aims to reduce systemic risk in payments and securities settlement systems in the case of insolvency of market participants. The "Collateral Directive" of June 2002 due to be implemented by December 2003, shall provide legal certainty about the validity and enforceability of collateral backing transactions across borders. The "Prospectus Directive", adopted in July 2003 and due to be implemented by May 2005 must also be regarded. It is designed to provide a "single passport" for issuers of equity and debt securities in a way that, once a security meets the prospectus requirements in one country, the security can be sold across the EU. Likewise, there is a Communication being

[9] A vertical structure reflects the exclusive arrangements between trading (stock exchange), clearing and settlement with a local central securities depository and payment transfers mainly with Central Bank's money.

assessed by the European Commission on improving the efficiency of clearing and settlement of cross-border securities transactions, although it is not a part of the original FSAP.

The implementation of the FSAP measures takes place through EC Regulations, which are applied directly to all member states; through EC Directives that must be transposed to the national law within a period pre-established by the EU Council; and Communications, which has the role to recommend practices, though with any sanction clause. Among the Directives of the FSAP, the Investment Service Directive (ISD) is of distinctive interest.

The 1993 ISD sets the conditions for the organized securities markets in the EU, and the single license of investment firms. Subject to complying with certain business conditions, an investment firm or exchange is granted a single license to offer its services in any member state of the EU. However, the ISD has excessively relied on minimal harmonization of core concepts, and on mutual recognition of national authorization, which has shown inefficient; therefore, it needed to be revised. The role of revision of the ISD was conferred to the Committee of Wise Men on the Regulation of European Securities Markets to develop a series of detailed guidance for legislation implementation.

The Committee of Wise Man chaired by Alexandre Lamfalussy was appointed by the ECOFIN[10] in July 2000 in order to support the extensive program of FSAP. The priorities were set on the completion of the single EU capital markets by 2003. The Lamfalussy Committee recommended a new decision making procedure for the adoption of EU legislation affecting securities markets – Final Report of Wise Men on Securities Markets Regulations, which was endorsed by the Stockholm European Council in March 2001.

The final report reiterates that the current regulatory system is too rigid and slow, that the legislation goes too much into details, and implementation is inconsistent in member states. The proposed conceptual framework for legislative implementation has 4 levels: 1) a broad framework principles of securities market regulation to be agreed by normal EU procedures (Regulations, Council Resolution and Directives); 2) An EU Securities Committee (ESC) to decide on technical implementation; 3) Framework of enhanced cooperation and networking between regulators to ensure consistent and equivalent transposition of levels 1 and 2; 4) Strengthened enforcement of EU law with vigorous action by the Commission on infringements.

[10] Committee of Economic and Financial Affairs of the EU Commission.

Specific recommendations of the final report, which refers to clearing and settlement, target to the necessary systems restructuring because of the high costs of cross-border settlement. Although the consolidation should be driven by the private sector's forces, public policy will be needed in removing the obstacles to consolidation. Among the most important policy requiring assessments are: open and non-discriminatory access to CSDs, exclusive agreements, the soundness of technical linkages and the implication of a single central counterparty. The Report also mentions the possible need to separate clearing system issues from settlement, understanding that an efficient clearing is of public utility. Additionally, it is mentioned that according to the results of the Giovannini Group and the updating of the Investment Services Directive, it shall be considered whether the EU needs to establish a framework for clearing and settlement activities. Finally, competition among market participants must also be addressed in order to avoid practices which are not consistent with the Community's competition policy (Final report of the Committee of Wise Men, pg. 16-17).

The Giovannini Group, chaired by Alberto Giovannini, was formed in 1996. Its work is focused on the identification of inefficiencies in the EU financial markets, and on the formulation of practical solutions to improve market integration. The Group was assigned by the Commission in January 2001 to analyze the current situation for cross-border clearing and settlement in the securities markets, to consider the requirements against which the efficiency of possible alternative arrangements for clearing, settlement and depository services can be assessed, and to identify some possible alternative arrangements for clearing, settlement and depository functionalities (Giovannini 2001, Annex 2 - Commission's Mandate, pg.64).

The first report on EU cross-border clearing and settlement arrangements was published in November 2001, describing the functions of clearing & settlement systems, the arrangements in Europe and the barriers to integration. The second report of April 2003 brought proposals to overcome the barriers evidenced in the previous work, followed by an assessment of current models of consolidation. An extremely optimistic time framework of 3-years was recommended by the group, to market participants and regulators, for the execution of the necessary steps to create a level field, where efficient clearing and settlement systems could co-exist or consolidate.

Furthermore, the European Commission has adopted a Communication which considers the need for EU level actions to improve clearing and settlement in the European Union. In May 2002, a consultation named "Clearing and Settlement in the

European Union Main Policy Issues and Future Challenges" was prepared to gather the positions of market participants. Meanwhile, the Commission has published a summary of the 61 responses it has received to a consultation on clearing and settlement vital processes by which transactions in securities and derivatives are finalized. For the moment, the Commission is expected to publish a policy paper, in which it will set out any measures it considers necessary to achieve the objective of integrated, competitive, safe and cost-effective clearing and settlement in the EU (http://europa.eu.int/comm/internal_market/en/finances/mobil/clearing/index.htm).

In this chapter, the broad definition and benefits of financial integration were presented. In Europe, financial integration is a catalyst to promote growth of the whole economy, as well as to increase competitiveness of the European financial markets. Subsequently, the impact of the euro in promoting financial integration was appraised in the money, equity and bond markets. This review gave hints of obstructions to further progresses on integration. The most evident barrier, on the scope of this work, was the fragmented structure of the clearing and settlement systems (C&SS), hindering the development of the European equities market. According to Alberto Giovannini, brokers prevent from cross-border trading, even if there are price asymmetries in the same securities because of high costs of cross-border settlement[11]. Therefore, specific policy initiatives were undertaken by the European Commission to assess, among other hurdles, the clearing and settlement arrangements in the EU and to propose solutions to overcome barriers to the market consolidation.

2. Securities settlement systems

"Securities clearance and settlement systems are a major component of a nation's financial sector infrastructure and need to be closely integrated with the national payment systems to ensure that the critical need for safety, soundness, certainty and efficiency are achieved at a level of cost that is acceptable to all market participants." (Guadamillas & Keppler 2001, pg.i)

Specific objectives of this chapter include: (1) to distinguish market participants and present the steps of trade, clearance and settlement; (2) to compare settlement designs; (3) to present the alternative channels through which cross-border settlement

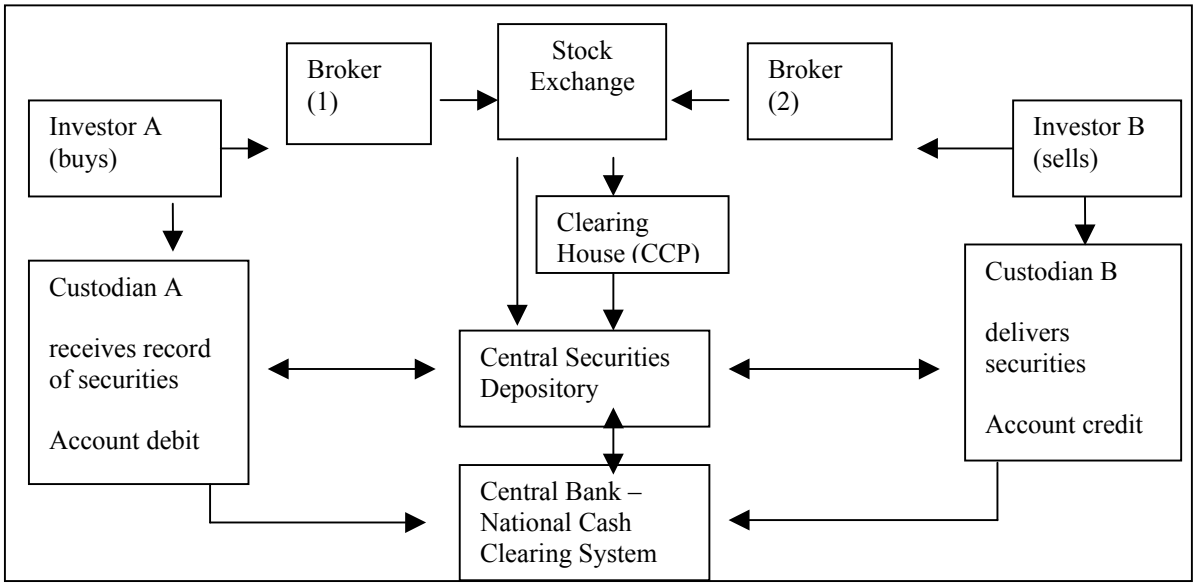
[11] The inefficiencies of the C&SS costs an "unquantifiable opportunity loss through the non-allocation of resources to potentially dynamic parts of the economy" Giovannini; Alberto: "Improving Clearing and Settlement: benefits for an integrated financial markets", Minutes of the meeting of the European Parliamentary Financial Services Forum on February 19th, 2003.

takes place, and; (4) to assess the risks involved in securities settlement and instruments in order to reduce their effect.

2.1 Trade, clearing and settlement of securities

Colloquially the clearing and settlement systems are addressed by market participant as the pipelines of the financial markets because of the flow of instructions associated to transfer of ownership, order of payments, and confirmation of receipt. So, efficiency, reliability and lower costs are expected from such systems, especially due to the enormous volume of payments flowing constantly through their channels. If one of these channels is obstructed and the payments or securities do not reach the destination agreed on, default on payments and in a series of other associated payments (systemic risk) may happen causing significant liquidity pressures and losses, in extreme cases even instability in the whole market (BIS 1995, pg.7).

Chart I: Flow of instructions for domestic trade, clearing and settlement



Source: Based on Guadamillas & Keppler 2001, pg. 6

Concisely the market participants can be divided in two groups: the users of the financial market and the providers of services for the market's functioning. Users are basically investors, which are represented by **individual investors** or firms that intend to invest their surplus units in order to earn returns on their investments. Usually, they operate on the securities market through the intermediation of a broker or an investment bank. **Institutional investors** are basically banks, insurance companies, mutual and pension funds. They represent the greatest part of the volume

and value of transactions of the financial markets (Guadamillas & Keppler 2001, pg.4-5).

The further participants are responsible for promoting the smooth functioning of the financial markets. Among them, the regulatory authorities (e.g. central banks and securities and exchange commissions) are responsible to develop and oversight the legal procedures that transactions should be carried out. The central banks are in charge of maintaining the national payment system for interbank payments, as well as providing clearing and settlement services for government securities, although the role of settlement has been increasingly given to private depositories.

Broker/Dealers undertake the primary role in intermediating securities market trade, through matching at the stock exchanges surplus units willing to acquire securities to those willing to dispose. **Custodians** are responsible for safekeeping and administrative services related to the holding and transfer of securities on the behalf of their clients. Because individual investors are not deemed to hold an account on the CSD, where securities are kept, custodians which have direct access to the CSD monitor the receipt of dividends, interest payment, corporate actions, apart from payments and delivery of securities in a transaction. **Global custodians** are active in different markets worldwide through establishment of sub-custodian relationships. So, if a customer is willing to invest in several markets, it would be costly and time consuming to achieve expertise in every single jurisdiction, making it very attractive to use custodian services. Because these entities may have a large pool of clients, settlement may occur internally on their books. Global custodians offer further services to their customers, such as: securities lending and foreign exchange transactions (Giovannini Group 2001, pg.9).

Clearinghouse (CH) is a department of an exchange or a separate entity which provides services related to clearing and settlement of transactions and payments. In many cases, CH acts as a **Central Counterparty** (CCP) reducing the credit risk associated with securities transactions. A CCP interposes itself to the both legal parts of the transaction, becoming the buyer and the seller of every security. Additionally, it offers two advantages: the multilateral netting that reduces the costs of cross-border transaction and effective collateral management, which is achieved with the concentration of required collateral in a single entity (Giordano 2002, pg.39).

Central Securities Depository (CSD) holds and administers mobilized or immobilized securities. Under the CSD, there is no physical delivery of shares[12]. Instead, the CSD uses a simple book entry system to keep track of the movement of shares arising from trades. Moreover, it manages the provision of dividends and interest payment services, as well as the settlement process. CSDs are normally private firms and are constituted as a "self regulatory organization" under the oversight of securities market regulators (BIS 2000, pg.21). The word "central" misleads to the understanding that there is only one CSD in a country, although there might be more than a single one. However, there is a trend to centralize all the securities clearance and settlement activities of a country in a single CSD. An **International Central Securities Depository** (ICSD) clears and settles international securities or cross-border transactions through direct access to the local CSD or through indirect access – partnership with a local agent.

In the following, the trading, clearance and settlement steps for domestic securities transactions will be generally explained, although slight differences might occur among different national architectures.

Trade - A transaction starts with an order given by a client to his broker to buy (or sell) a specified number of shares of a company at a specified price. The order is then keyed into the stock exchange's central computers. The order for buying and selling is matched automatically by the system, with prices determined by the market forces of supply and demand through a process of bids and offers. Once matched, confirmation is immediately routed back to the broker and sent further to the clearing agent. There are other trade execution platforms apart from the formal exchange with a trading floor, for example: an electronic trading system, a brokered market, or a matching system where buyers and sellers trade directly. Trading details must be sent from the exchange to the clearing agent on the same trade date "T" (BIS/IOSCO 2001: Recommendations for Securities Settlement Systems, Recommendation 2, pg.9).

Confirmation refers to the terms agreed on the price, quantity, and other details of the securities transaction. Parties must also identify the accounts (usually by a custodian bank) to which the security and payment should be delivered. Brokers send to the clearing house (CCP - if available) or to the central securities depository the trade details and deliver to their customers the terms and confirmation of the counterparty. Confirmation takes place via SWIFT messaging, electronic mail or fax. There is a initiative to standardize communication procedures following the

[12] The dematerialization of securities into data in the book entry system is in line with the 3rd recommendation

international communication standard ISO 15022, in order to reduce costs of cross-border transactions (BIS/IOSCO 2001: Recommendations for Securities Settlement Systems, Recommendation 16, pg.21). Information flows continue until there are no mistakes in trade details, which should be accomplished by T+1.

Clearing of securities transaction involves the calculation of mutual obligations of market participants, and determines what each counterpart should expect to receive. Clearing houses, central securities depositories (CSD) or international central securities depositories (ICSD) are the providers of clearance. Securities and funds must be respectively provided by the custodians or, in some cases, by the brokers, before the settlement time. The securities traded are blocked (cannot be traded) at the depository until settlement date. Meanwhile, the investor authorizes his custodian to receive securities and deliver payment. CSDs clear the instructions of securities and payment transfers either on a gross[13] or net basis[14].

In some markets, large broker-dealers that frequently trade with each other use a central counterparty (CCP) to minimize the risks of failure. A CCP stands between inter-dealer trades, and replaces the original bilateral contractual obligation. The CCP lowers the risks to dealers by offsetting, or "netting", buy and sell trades. In addition, it reduces the number and size of movements on securities and money to be settled. For example, in 2000 Euroclear France reduced the number of transaction to be settled from 135,000,000 pre-netting to 41,000,000 post-netting, which accounts for 69,62%. Monti Titoli, the Italian CSD reduced from 126,395,972 to 8,783,635 by 93%, which is almost as high as the results of the US equity CCP. NSCC reduced number of settlement through netting in 97%, from 1,585,900,000 to 230,271,931 (Lannoo & Levin 2001, box: Operating Income Differentials).

Settlement is regarded to the exchange of a security for its payment. In most developed financial markets, few participants actually hold physical certificates for the publicly traded securities they own. Rather, ownership is tracked electronically through a book-entry system maintained by a CSD. Ownership transfer occurs on the system's records of the depository, while cash side of the transaction is usually affected through a banking payment system. In the example, suggested on the page 13, the custodian of the buyer orders debit the account held at the central bank, while the custodian of the seller make securities traded available for delivery against payment. Criticical is the application of proper control (**delivery versus payment -**

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of the G30 to standardize global clearance and settlement of cross-border securities.

[13] On a gross basis each transaction is cleared individually and the obligations of the seller and the buyer must also be met trade-by-trade on a continuous way.

DVP) to assure that the final transfer of funds only occurs if a final delivery of securities occurs. DVP has three coexistent models[15] to assure both parties that no principal risk may occur during settlement – in other words, that neither the seller nor the buyer may default on the transaction and still hold the asset (monetary or securities) of the counterparty (BIS 1992: DVP Report, pg 12). In most markets settlement ranges from T+1 to T+3, but the commitment period should be as short as possible (BIS/IOSCO 2001: Recommendations for Securities Settlement Systems, Recommendation 3, pg.10). The expanding use of securities lending transactions puts pressure on settlement agents to permit receipt and delivery of securities on the same day.

In addition to the price of the shares bought or sold, the investor have to pay fully negotiated brokerage commission, clearing and settlement fees according to volume and value of trade (payable by both - buyer and seller), and custodian fees.

2.2 Settlement designs

Settlement obligations are calculated after trade is confirmed. It consists of two legs, the obligation of the buyer to pay the funds, and the obligation of the seller to transfer the securities. The calculation of the obligations may occur on a gross, bilateral or multilateral basis. The choice on which basis securities are settled in a system determines its design. On a hybrid design, one of the legs (e.g. transfer of securities) is settled on a gross basis, while the payment occurs through netting of positions, or *vice-versa*.

Gross settlement means that each trade is settled individually. In a real-time gross settlement system, each transaction is settled with finality right after trade is confirmed. Bilateral netting occurs when positions of two participants are combined and off-set in pre-defined intervals of time before final settlement. For example: settlement may happen once in a day after trading hours are closed, or every two hours during the trade period. Finally, multilateral netting means that positions are off-set among all participants before the real transfers of securities and payments take place (BIS 1990: Report on Netting Schemes, pg. 8-9). In order to understand the features of each design, the following comparative exercise was conceived.

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[14] While in a net basis, the instructions occurred in a discrete interval of time are grouped and the obligation of each counterparties is off-set.

[15] DVP 1: Final (unconditional) transfer of securities against payment occurs in a gross basis and at the same time. DVP 2: Final transfer of securities occurs in a gross basis, however payments are netted and irrevocable settlement takes place in cycles. DVP 3: Instructions of delivery of securities and payment are netted with final transfer of the end positions on the end of the settlement cycle (DVP Report, pg.12).

Consider three market participants, who on June 6th, 2003 buy and sell shares of two listed companies (Volkswagen AG – VW and MAN AG). Share price of VW closed at € 40.00 (high 56.91 and low 28.06 in 52 weeks), while MAN closed at € 20.00 (high 25.00 and low 10.00).

Table 2: Hypothetical trades between participants on the June 6th, 2003. Prices in euro.

Buyer / Seller	X sells	Y sells	Z sells
X buys	-	(1) 150 MAN at 15 = 2250 (2) 100 VW at 27 = 2700	(3) 50 VW at 31 = 1550 (4) 50 VW at 29 = 1450
Y buys	(5) 50 VW at 30 = 1500	-	(6) 70 MAN at 14 = 980 (7) 30 VW at 900 = 900
Z buys	(8) 200 MAN at 16 = 3200	(9) 100 MAN at 14 = 1400	-

Table 3: Comparison of gross, bilateral and multilateral netting

	Gross			**Bilateral Netting**			**Multilateral Netting**		
	receives	pays (€)	to	receives	pays (€)	to	receives	pays (€)	to
X	(1) 150 MAN	2250	Y	150 MAN	2250	Y	150 VW		Unknown
	(2) 100 VW	2700	Y	50 VW♥	1200	Y			
	(3) 50 VW	1550	Z	100 VW♣	3000	Z			
	(4) 50VW	1450	Z	Off-set (3)♣					
Y	(5) 50 VW	1500	X	Off-set (2)♥				2970	Unknown
	(6) 70 MAN	980	Z	Off-set (9)♠					
	(7) 30 VW	900	Z	30 VW	900	Z			
Z	(8) 200 MAN	3200	X	200 MAN	3200	X	230 MAN	280	Unknown
	(9) 100 MAN	1400	Y	30 MAN♠	420	Y			
Instruction	9			6			2		
Sec. Leg	520 MAN			380 MAN			230 MAN		
	280 VW			180 VW			150 VW		
Cash leg		15930.			10970.			3250.	

In order to follow the logic of the exercise, please follow the order of trade instructions in the parentheses, e.g. instruction (1), investor X acquires 150 shares of MAN AG for €15 each. €2250 is the amount that X has to deliver to Y. Off-set positions on bilateral netting occur only between similar shares, even if they were traded with different prices. But, money is fungible. Instructions were off-set with another instruction holding the same symbol (♥, ♠, ♣). For example, ♥ corresponds to transactions (2) and (5); X buys 100 VW from Y for €2700 and later Y buys 50 VW from X for € 1500. Both instructions were off-set to: X buys 50 VW from Y for €1200. The Annex 1 demonstrates how multilateral netting was calculated.

The table 3 demonstrates the impact of netting in the reduction of the obligations to deliver securities and pay funds. Multilateral netting is usually employed by clearinghouses acting as central counterparties, because netting reduces the liquidity needed by the system, as well as the volume of transactions and payments. Following the results of this exercise, the settlement instructions are reduced by more than 2/3, from 9 pre-netted to 2 with the use of multilateral netting system. As a consequence to the reduced number of settlements, the number of transferred securities and value of cash payments are also proportionally reduced, which lower the cost of settlement.

The netting system demands less securities and cash available in the account of the participants, given that only the end result is settled. However, it is easy to imagine the risk of such a system, if no control over the availability of funds in the settlement period is undertaken. Strict admission to participation in the system, collateral and shorter netting periods are the most common measures to avoid principal risk. In a more elaborated exercise, Guadamillas & Keppler (2001, pg.11-13) analyze not only the number of settlement operations and the liquidity needed, but also the number and value of transactions affected in case of failure, in order to demonstrate the increasing risks when netting processes are employed.

Securities settlement systems has some peculiarities that distinguish them from payment systems: 1) central banks have a less active role than securities depositories because payments may occur among commercial banks; 2) SSS requires the availability of both idle reserves of funds and securities, which increase the chances of queues in the system; 3) securities, unlike cash, are not fungible[16], so positions can be netted only regarding similar securities (ECB 2000, pg.4-10).

General features of the securities settlement designs are compared in the following cases.

Chart II: Real Time Gross Settlement System (RTGS)

Strengths	**Weaknesses**
low risk – credit, liquidity & systemic no shortage of funds or securities low systemic risk	requires high volume of securities high liquidity needed high volume of fund transfer Gridlocks
Opportunities	**Threats**
Ideal for wholesale transfers – banks intraday liquidity through central bank	demand for high liquidity may be a constrain to participants affect fair competition on the market

[16] Cross-product netting is becoming available in the derivatives field. For derivatives, it is the exposure of an underlying asset which is actually traded, consequently it is not necessary to deliver the underlying asset for the settlement of derivatives. An open position is then settled by a cash payment (ECB 2000, pg.7).

Among the advantages of a real time gross settlement system are the low risk and the absence of possible shortage of funds. Since settlement occurs on a real time basis, the credit risk and liquidity risk are suppressed and settlement is also irrevocable. It is a requirement for the institutions that have access to the RTGS system to maintain an account in the system and to make available securities and funds (liquidity) necessary to settle daily transaction. There are three approaches to handled daily insufficient liquidity: a) Internal queues, if there are not enough funds to settle instruction, the system sends instruction back; b) Centrally located queues system, which keeps the transfer orders in its central processor until covering becomes available, and; c) Availability of intraday credit to its participants. In this case, to avoid risk, the intraday liquidity is provided only against collateral[17].

In the case of commercial bank, lending schemes of cash and securities are fully collaterized[18]. From this perspective, intraday liquidity requirements may lead to concern about the associated costs. Such "liquidity costs" may include direct costs (interest paid or a charges/fees on credit provided), opportunity costs of maintaining funds in accounts (e.g. interest forgone), or opportunity costs of tying up collateral or securities in obtaining credit" (BIS1997: RTGS, pg.11-12). Due to the high volume of liquidity demanded and the low risk, the system is ideal to high volumes transactions or interbank transactions. It is also ideal for the settlement of fixed income instruments which serve as collateral because of the intraday finality. However, the high liquidity demand could also be a barrier for the entrance of smaller institutions that do not fulfill the requisites of technology and liquidity.

Another deficiency of the system is related to the non execution of one transfer instruction impeding a substantial number of instructions of other participants from being performed, the so-called gridlocks (BIS 1997: RTGS, pg.16-17).

Chart III: Netting System

Strengths	**Weaknesses**
low intraday liquidity reduced value of final fund transfer efficiency	higher credit and liquidity risk increase in the systemic risk shortage of funds or securities
Opportunities	**Threats**
Cover for shortages (collateral) Agreement of assurance procedures Novation – CCP	Assurance procedures is costly Difficult to implement

[17] Debt instruments correspond to 98% of eligible collateral in the eurosystem. Since, member-states central banks hold links to TARGET, the eligible collateral can be used cross-border with the central banks acting as custodians (ECB 2000, pg.8).
[18] World Bank presentation: "Requirements for Clearing and Settlement Systems", http://www1.worldbank.org/finance/assets/images/Woltjer_slides.pdf

Netting systems require low intraday liquidity, since transactions are settled after being netted at the end of the period established for clearing of positions. The reduced value of final payment and securities transfers makes the whole system more cost effective, however riskier. It is not possible to avoid shortage of assets from one of the participants if there are no measures to prevent credit risk. If there is no adequate control, replacement cost losses and liquidity pressure arising from a default by a participant could cause systemic problems. A possible solution to reduce risks associated with netting systems is the establishment of a central counterparty between the buyer and the seller.

Chart IV: Hybrid System (Combination of securities gross- and payment net settlement)

Strengths	**Weaknesses**
no need of large intraday liquidity reduced settlement failure medium volume of fund transfer	medium risk requires collateral adequate to risk
Opportunities	**Threats**
tendency for further combination	wrong risk assessment

A hybrid system is the combination of features of both previously described systems. As a result, it places itself between RTGS and netting system in relation to volume of liquidity requirements, risks and cost efficiency. It is important to remember that the system designs available in each country developed in many different directions and it would be hard to categorize them solely under one of the designs demonstrated above. Securities settlements normally have a tendency to adopt hybrid systems, while central bank payment systems adopt RTGS (Guadamillas & Keppler 2001, pg.11).

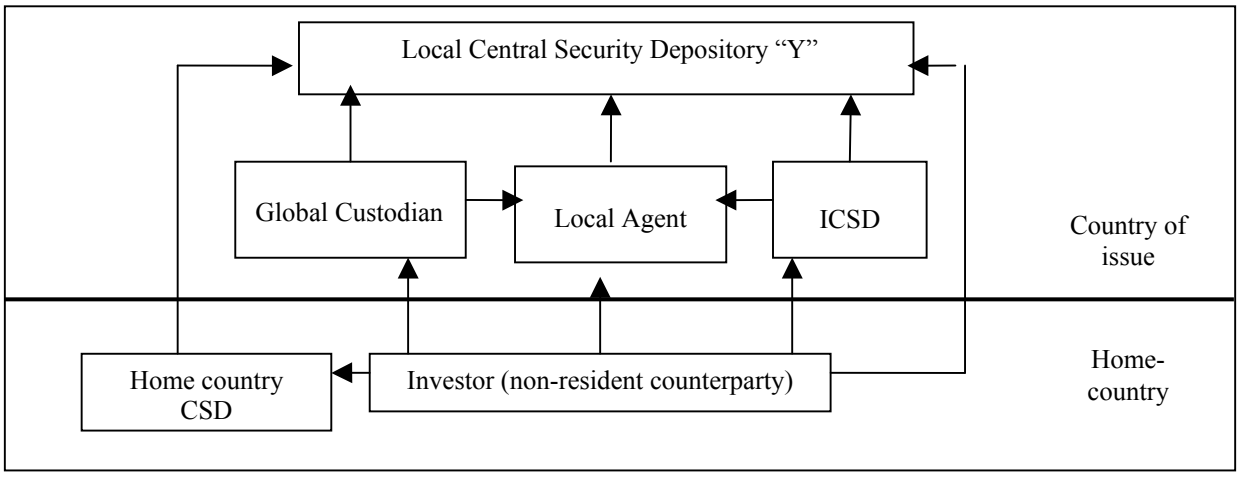
2.3 Cross-boarder securities transaction

First, it is necessary to define the scope of a cross-border trade and settlement in order to avoid confusion to trade of foreign securities within actors of a same country, both with access to the local Central Securities Depository (CSD). According to the glossary of terms[19] issued by the Committee on Payment and Settlement Systems (CPSS) of the Bank of International Settlements (BIS), a cross-border trade is defined as the trade between counterparties (buyer and seller) located in different countries, whereas a cross-border settlement occurs when the security settlement is realized in a distinct country of one or both counterparties.

[19] A glossary of terms used in payments and settlement systems, (E), Revised version March 2003 (First edition January 2001), ISBN 92-9197-133-2. Online version: http://www.bis.org/publ/cpss00b.pdf

An illustration of the most common cross-border trade would be a buyer located in country "X" that wishes to acquire securities issued and held by a seller in country "Y", with trade settled in the country of issue. But, the country of issue of a security may not be necessarily the country where it is mostly traded or even settled. The eurobond market is the classical example. Issuers are located in different countries, however the trade of the eurobonds is heavily concentrated in London and the settlement usually takes place in Belgium through Euroclear.

Chart V: Channels of cross-border settlement



Source: Based on Cross-border Clearing and Settlement Arrangements in the European Union, Giovannini Group, Brussels, November 2001, pg.8

Unlike local securities trade, where securities are traded and settled by participants of the same CSD, cross-border transaction infers complexity due to the increasing number of relationships that the international investor must have to gain access to the settlement system. These relationships enable the interaction of different settlement systems, though these interactions expose the investor to higher risks, as custodian and FX risks, for example. In the following, the different channels to cross-border settlement are presented.

Bilateral links between CSDs have been established in response to the introduction of the euro in order to facilitate the cross-border transfer of securities and to use them for the transfer of collateral for the eurosystem's credit operations. Although this alternative reduces the intermediaries in the settlement process and consequently the risk, it attends only free-of-payment settlements. The hurdles to bilateral links are the unattractive costs and the high concentration of securities turnover in a few market places (Frankfurt Voice, Jan.2003, pg.17).

Global custodians typically have sub-custodians in different countries which hold access to the local CSD. They are most dealing with equities, a market where ICSDs are less active. The clients of custodian banks differ from the ones who seek an ICSD to handle their operations. In general, global custodians concentrate more in institutional investors (e.g. mutual and pension funds) and private banks, while ICSDs attend wholesale financial clients (e.g. investment banks)[20]. The competitive advantage of the global custodians relies on the customization of services attending the clients' needs (Lannoo 2003, pg.8). Global custodians may have a great number of clients enabling settlement of securities to occur in their own book-entry system. BNP Paribas, HSBC and Citibank offer custodian services to 80% of European equities (Euromoney 2003: Time for a Settlement, pg.46).

Local agents used to be the most common option for settlement of equities. International investors used to access to the local CSD using the channels of a local agent, customarily a local bank, even if they had presence in the market. Local agents have competence in the legal and taxation system of the local market, and they offer indirect access to the local settlement system without the burden of attending to requisites of funds, technology and soundness. However, the competition posed by ICSDs, which are increasingly acquiring the local CSD and are also eligible to offer banking services is threatening their position on the financial markets (Global Investors Magazine, March 2003: European Custody, pg. 81).

ICSDs - Euroclear, Clearstream and SIS-Sega - offer a great web of direct and indirect access to CSDs in more than 120 countries. The ICSD specific advantage has been associated with the settlement of eurobond, since it was created specifically for this purpose. Nevertheless, ICSDs have become increasingly active in the settlement of government bonds and equities, as well. Their improved banking service quality and links to local CSDs have contributed to higher growth rates on the volume of settlements than any competitor (Global Investors Magazine, May 2003: The Global Custody Survey, pg.32-40). Nowadays, the lines distinguishing the services of ICSDs and international custodian banks are blurred. As a result, they compete fiercely on the same market offering similar services to their clients - safekeeping of securities, clearing and settlement, securities and cash lending in order to reduce liquidity risk, among others.

Direct access or remote access is in principle possible. In this way, investors can settle remotely on a local CSD across the EU from a single location. In practice,

[20] Global custodians themselves customarily hold an account in ICSDs in order to settle bonds and equities which are not held on their books (Frankfurt Voice, Jan. 2003, Lannoo & Levin, pg.8).

though, some CSDs are concerned about national rules which effectively require them to maintain local presence in order to access directly the settlement system.

The cross-border transaction of bonds and derivatives are much simpler than the transaction of equities. Bonds are settled at ICSDs where the investor has direct access, or at least, his broker has it. The payments do not need to be in the national payment system held by the central bank and may be done by any commercial bank which is correspondent of the ICSD. The Annex II, shows the instruction flows of eurobond, derivatives and equities transactions published by the Giovannini Group.

2.4 Risk management

The "Report on delivery versus payment in securities settlement system" (BIS 1992) was the pioneer in defining and analyzing the types of risks involved with securities settlements. The conclusions achieved were related to the meanings and implications in risk control through the adoption of delivery versus payment mechanism. Without DVP, the most prominent risk associated to securities transactions would be the **principal risk**. It happens when one of the counterparties fails to honor his part – failing to deliver the securities which were already paid, or on the contrary, failing to deliver payment by the receipt of the security. The default could entail full value of the security involved and could be avoided by the implementation of DVP mechanism.

Another potential source of systemic problems which is hard to eliminate is the **replacement cost risk.** This is associated to the risk of an unrealized trade because of default of the counterpart before settlement takes place. If replacement cost risk takes place, the counterparties do not loose the principal (securities or cash) they had, but they loose the possibility of acquiring a desired asset.

A third risk inherent to securities transactions is the **liquidity risk**. Suppose that a counterparty does not settle an obligation when due, but at some unspecified time thereafter. The seller of the security might suffer from liquidity shortfalls if he had counted with the payment for another transaction. To avoid liquidity risks, settlement systems provide lending of funds, however on a limited basis and against collateral. Another procedure to reduce liquidity risk is the so-called net debit caps. They insure that a participant's net debit obligation to the clearing and settlement organization does not exceed the threshold (stipulated maximal value) that the settlement organization's credit exposure is capped. Transactions which are above the stipulated cap (tied to liquid resources) should be prevented.

Finally, we must also account for **operational risk**. This accounts for delayed settlements due to settlement systems breakdown, communication disruptions, and destroyed records. Operational safeguards should be available to minimize disruption on the system. Important features that a settlement system must have at its disposal are disaster automation procedures with back up (redundant) data in another premise, data and physical security, capacity planning, alternative communication network and electricity source. Some other instruments should be additionally used such as audit trail, separation of duties (initiation, verification and execution), and limited access to system through ID-passwords.

Defining participation standards in the settlement system is a way to reduce risk. However there is some trade-off related to the number of participants. A greater number of participants would spread costs, while a limited access to the system minimizes the risk. Direct access is associated with the minimum requirements of capital level, liquidity requirements, and operational (technological) capabilities, as well as to legal status of the institution (licensed banks, custodians and brokers). It is not uncommon to restrict access to national entities. Participation standards may create some inefficiency on the market, since direct participant are free to determine the fees allocated to the indirect access to the settlement system.

Finally, **systemic risk** in a securities settlement systems, as defined by the DVP report, arises with the failure of one institution to deliver a security often causes the institution that had anticipated receipt of the security to fail to meet its obligation to redeliver the security. “Central banks are primarily concerned with potential credit losses or liquidity pressures that are on such a scale that cannot be managed or contained with existing contractual and banking arrangements. Such losses or pressures could threaten the stability of payment systems and financial markets if spillover effects caused widespread difficulties at other firms, in other market segments or in the financial system as a whole” (BIS 1995, p.32).

The following risks are especially associated with cross-border transactions. **Custody risk,** which is the risk related to the loss of security held in custody due to insolvency, operational problems, fraud or negligence. Greater reliance on custodian services is required, if trade is outside the domestic market. Risk could be minimized by the availability of operational links between CSDs. Increased **legal risk** is related to legal uncertainty in the finality (irrevocable state) of the transaction, due to multiple jurisdictions involved in a cross-border transaction and the possible application of an unexpected law in the case of bankruptcy, ownership, and taxes. **Foreign exchange risk** arises from possible movements in FX rates between the

trade and settlement date, and although normally DVP would suffice to liquidate FX risks, because of differences in the hours of operation, DVP is rarely achieved in FX transactions.

Opportunity costs and **liquidity risks** of back-to-back trades arise if settlement systems other than the CSDs are not efficient. Back-to-back trade requires a counterparty to receive and redeliver the security on the same day. "Dealers often finance long and short positions associated with market-making, positioning and hedging of securities and related derivative products through repos and reverse repos respectively. So, dealers seek to settle the repos and reverse repos on the same day on which the related cash positions settle. " (BIS 1995, p.13)

Measures to avoid risks in cross-border securities settlement are related to automation of the systems, and clear and transparent legal provisions. Automation has been promoted by STP (straight through processing). Cross-border transactions involve different CSDs, which still requires manual data processing. With STP, once a transaction is entered in one of the trading chain, its information is delivered to all other segments without requiring further intervention. Moreover, STP technology is now widely practiced, since messaging standardization is increasing and communication costs decreasing (Hallam & Idelson 2003, p.35-36). The most common way of providing STP is integrating trading, clearing and settlement in the so-called vertical silos. This architecture choice is discussed in details with respect to the European example.

Summarizing, there were four objectives in this chapter. The first was to identify the participants and steps involved in the trade, clearing and settlement of securities. For this part, the recommendations of BIS/IOSCO for clearing and settlement systems are of special importance to promote core principles throughout the various existing systems. Then, by analyzing the settlement designs, it was demonstrated with the exercise of fictive trades, that the liquidity demand and the volume of settlement instructions reduces by more than 2/3, when instructions of settlement are netted multilaterally. The trade-off related to cost and risk in utilizing a RTGS or a Netting System is actually not a zero sum game. If certain rules for netting are applied, such as no redelivery of securities before finality of previous transaction and high participation standards, risks can be minimized. The higher costs of RTGS is acceptable for trades which demand same day finality on settlement, which are usually the case of debt securities used as collateral, or repo transactions. Third goal was to assess the channels of trade. The high cost of cross-border trade is related to the increasing number of participants to settle it. ICSDs are especially active in the

settlement of bonds, while equities are most settled in the books of custodian or in the local CSDs. There is a fierce competition between ICSDs and global custodians and agent banks because the line differentiating the services provided by them is blurred. Additionally, ICSDs are increasingly acquiring local CSDs, the trends in the European market is the main topic of the next chapter. Finally, risks involved in the settlement systems were highlighted. Additional to the principal, liquidity, and operational risks that domestic securities transactions face, cross-border transactions infer extra risks – custody, legal and FX risks. Systemic risk was also discussed throughout the chapter.

3. Challenges and perspectives for the European financial integration

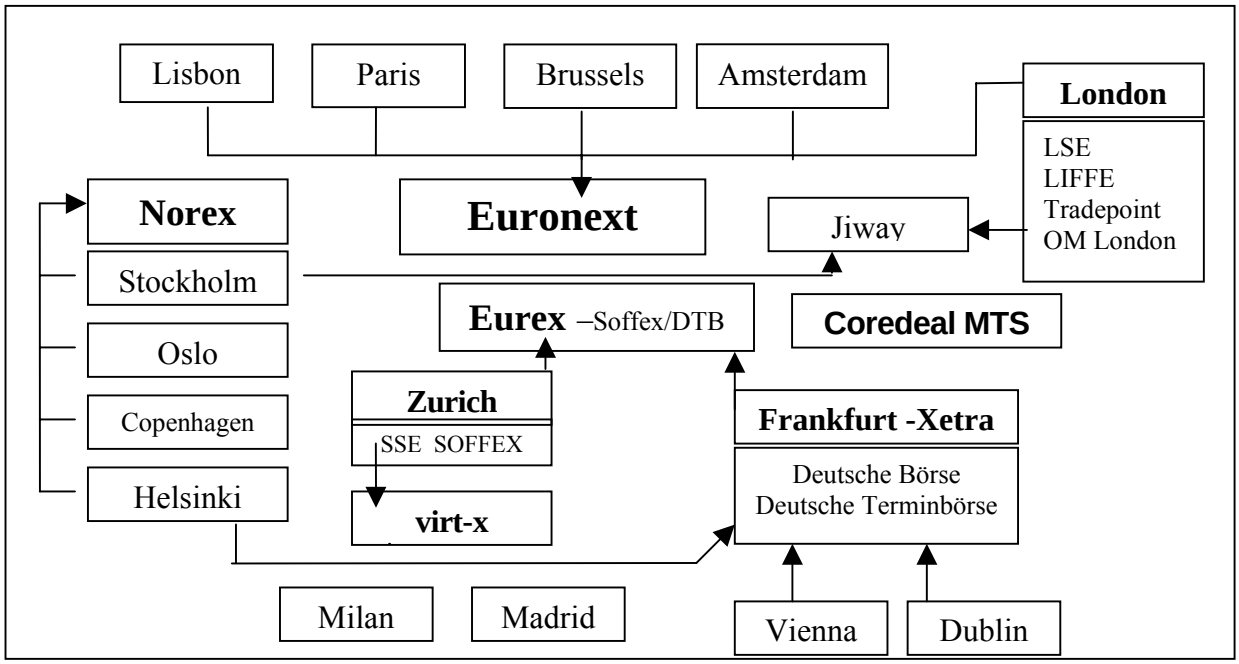
The aim of this chapter is to assess the arrangements between market participants in Europe in the trade, clearing, settlement and custody levels in order to identify the progresses, as well as the barriers to the integration of the financial markets.

3.1 Trade, clearance and settlements landscape in Europe

There are some specific trends regarding the exchange landscape in Europe. The first is related to ownership: exchanges were privatized becoming profit organizations and were listed. The second tendency is regarding the IT developments, which enabled exchanges to use automated systems instead of having an exclusive trading floor. Finally, exchanges have developed alliances and have merged with former competitors (Giordano 2002, p.11-16).

The emergence of an equity culture in Europe and the introduction of the euro are the main driving forces contributing to the consolidation of the stock exchanges. The importance of consolidation is related with the increased liquidity concentrated in fewer exchanges. In this case, high liquidity means the ability to buy and sell an asset in a short period of time without great variation on the acquisition price, assuming no new information is available. If there are few market participants, there is a smaller probability to immediately match offers with demands; consequently price fluctuation can happen (Pagano 1989, p.255-274).

Chart VI: European exchange links and alliances



Source: Based on Reszat 2003, Appendix II.

The pioneer privatization initiative was taken by the Stockholmsbörsen (Giordano 2002, p.13), which subsequently signed a cooperation agreement with Copenhagen Stock Exchange to form NOREX in January 1998. Both exchanges continue independent, but cross-membership is allowed, and there is a single buy-and-sell order book for each security within the system. NOREX has also adopted common trading rules and a uniform trading platform, SAX-2000 - Stockholmsbörsen's trading engine. In 2000, the Iceland Stock Exchange and the Oslo Exchange joined NOREX. Helsinki Exchanges has cross-membership agreement with NOREX, as well as with Euronext since 2001. At a technical level, HEX members will have access to the trading of all cash products of both partner exchanges via unified access architecture through remote membership links. The aim of such agreement is to make it easier for investors and stockbrokers to trade in securities listed on NOREX and Euronext. There is no ownership arrangement included in the agreement.

However, if market capitalization is taken into consideration, a polarized European landscape for trading of securities shall arise[21] (Goldberg et. al 2002, p.3). These poles are not only based on the market capitalization, but also related to the vertical linkages with a clearing and settlement system. The first pole is the United Kingdom.

[21] In August 2003, the London Stock Exchange had the largest market capitalization of European exchanges (€1.828. 696 million), followed by Euronext (€1.562.076 million) and the Deutsche Bourse (€ 764.702 million); the Deutsche Bourse had double the market capitalization of the next largest exchange. Other, smaller systems represented about 35 percent of the total market capitalization of European exchanges. FESE: Market Capitalization August 2003.

Trades realized at the London Stock Exchange are cleared at the London Clearing House (LCH), which also acts as a central counterparty, and settled at Crest (the United Kingdom's securities depository). In 2002, Crest became a whole-owned subsidiary of Euroclear, and in June 2003, LCH (the Clearinghouse for Euronext) was acquired by Clearnet.

The second pole - Euronext was formed out of the consolidation of Paris Bourse, the Amsterdam Exchange, and the Brussels Exchange in March 2000, becoming an integrated European stock exchange. Because of the different Jurisdictions, local licenses of the individual exchanges were maintained. Euronext provides a single operating umbrella for all three exchanges. Trading is centralized, and a uniform trading platform - the Paris Bourse's NSC - is used, allowing a single trade price to be established. Shares are listed at a national level and companies can select their trading venue from among the three exchanges. Trades realized at Euronext are automatically cleared at Clearnet and settled by Euroclear.

The third pole is now centered on Germany's Exchange. In 1999, the German securities depository, Deutsche Bourse Clearing, and the other main international depository, Cedel, merged to become Clearstream. Eurex has recently extended its business acting as a central counterparty for derivatives traded at Xetra and equities traded at Deutsche Bourse. Trades are settled at Clearstream Frankfurt.

In addition to established market centers, electronic start-ups are attempting to evolve into pan-European exchanges. For example, virt-x, a joint-venture of Tradepoint (a London-based electronic market) and the Swiss Stock Exchange established in London, offers trading in all fully listed U.K. common stocks and in continental European blue chip stocks. European government bonds are increasingly traded on a pan-European basis, supported especially by the electronic platform Coredeal MTS. Trades of bonds are cleared at Clearnet and settled in Euroclear or Clearstream. Bonds that are registered only on the domestic depository cannot be used as cross-border collateral. Because of different systems and delivery deadlines, repo markets across borders are not yet fully integrated (FSA & Bank of England: FSAP Guide 2003, p.5).

Few clearinghouses operate as central counterparties in Europe, and a possible reason is that the value-added of netting services increases proportionally with the market size, so small markets find it not beneficial to invest in CCP infrastructure (Lanoo & Levin 2001). There are three main clearinghouses (CHs) in Europe: London Clearing House (LCH), Clearnet and Eurex Clearing. In June 2003, the details of the 1.2

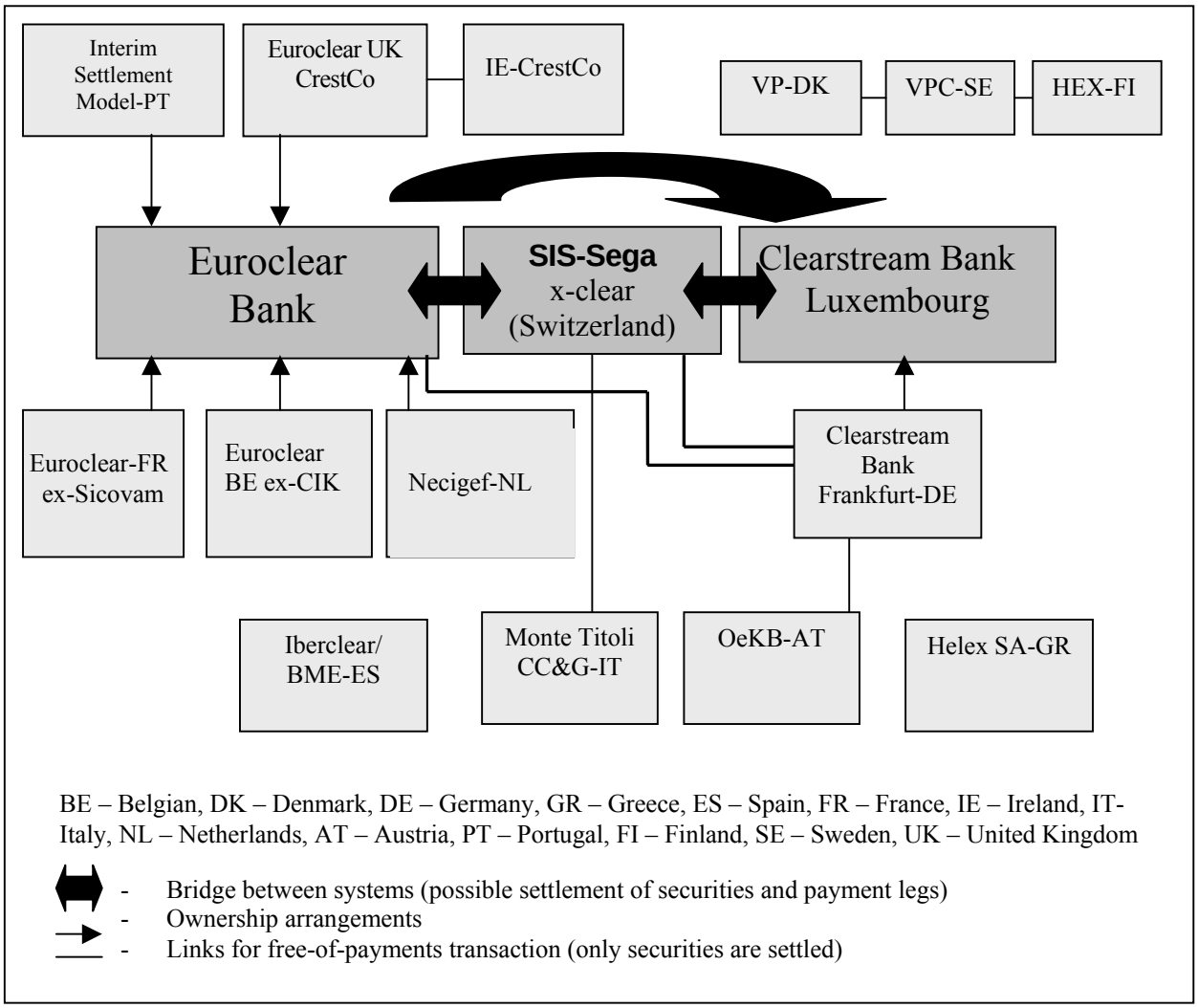
billion euro[22] merger between LCH and Clearnet were announced. The aim of fusion is to cut-back costs and broader the clearing services. Though, market participants speculate on the intention of Clearnet to become the single CCP for Europe (Global Investors Magazine: LCH.Clearnet, July 2003). Eurex Clearing AG is the third biggest CH in Europe, though it offers specific advantages for the clearing of derivatives, repos, bonds and equities. The remote clearing system which was implemented by Eurex in August 2000 enables participants to directly trade, clear and settle the transactions themselves (BIS 2003, p.173). There are some other smaller CHs in Europe, most concentrated in netting positions of derivative markets. This is the case of MEFF in Spain, CC&G in Italy and X-Clear – a central counterparty (CCP) project of the Swiss Financial Service Group and London Clearing House to off-set positions traded at virt-x. The Nasdaq Europe also counted with a CH named Euro CCP, which was a partnership of DTCC (US) and LCH, however Nasdaq Europe closed operations on the 26th of June 2003[23].

Stock exchanges and clearinghouses have changed a lot the scenario in the European market with consolidation, but the major transformations are happening in the settlement arrangements between central securities depositories (CSDs). In 2001, when the first Giovannini Report (p.33-35) was published demonstrating the fragmentation in the post-trading industries, there were 21 Settlement Systems within the 15 countries of the European Union[24]. Nowadays, most CSDs have interfaces/remote access with each other or are following a process of consolidation.

Consolidation has been taking place through the initiatives of ICSDs which are increasingly acquiring domestic CSDs. However, consolidation as an end stage can be regarded only if the institutions belonging to a single group also run the same settlement system. Euroclear System, a Belgian credit institute, is on the way to achieve consolidation. First, Euroclear developed a non-exclusive partnership with Euronext that enabled the 100% acquisition of Sicovan (the French CSD) and Necigef (the Dutch CSD), and part of CIK (the Belgian CSD). In 2002, Euroclear further acquired 100% of the British CSD, CREST Co and the Portuguese CSD. The intention is to reduce costs and boost efficiency through the reduction of market participants executing clearing and settlement within Europe. The acquired CSD continue settling domestic transactions through their own system, however a new single settlement engine is in the phase of implementation and testing (Euroclear:

[22] Financial Times: The Banker (http://www.thebanker.com/news/archivestory.php/aid/388/Route_finally_open_for_LCH-Clearnet_merger.html)
[23] (BBC News, http://news.bbc.co.uk/1/hi/business/3024558.stm)

Chart VII: Settlement links between CSDs and ICSDs



Source: Own chart. Based on the description of BIS 2003.

"Single Settlement Engine 2005 and subsequent Business Models deliverables" June 2003).Since CSDs belonging to Euroclear are still running different IT Systems, do have different settlement processes, and follow different regulations specific to the country of location, consolidation is still a goal to be achieved.

Clearstream International is the parent company of Clearstream Banking Luxembourg (CBL) and Clearstream Banking Frankfurt (CBF) and it operates under Luxembourg law. Clearstream Banking Luxembourg SA was the result of the merger of Cedel International and Deutsche Börse Clearing AG, which took place in 1999. The first key step was to migrate business of CBF business in international securities onto a common platform - Creation - operated by CBL. In July 2002, Deutsche Börse AG acquired Cedel's 50% stake in Clearstream International and advanced in the

[24] See Annex 3 for the "Features of selected settlement systems in Europe" published by the ECB.

strategy to integrate trade, clearing and settlement under the umbrella of a single group. This pattern of consolidation is known under the name of "vertical silos".

Euroclear and Clearstream maintain a bridge that enables the transfer of international and domestic securities, which are eligible in both systems. While most links between CSDs allow only the transfer of free of payment orders, in this case settlement against payment is also admitted. Additionally, settlements between these two ICSDs follow the standards of DVP and settlement finality. ICSDs have developed direct and indirect links to CSDs and are trying to seize the cross-border securities settlement market. Since they also enjoy the status of a CSD and a bank, ICSDs are offering extra banking services to their clients.

Finally, SIS-Sega has developed a very competitive arrangement in the whole chain of securities transactions. There is a vertical integration among the SWS Swiss Exchange trading platform, the SIS SegaInterSettle AG responsible for clearance and settlement, and Swiss Interbank Clearing AG for the payment system. Due to this model of integration, they are able to deliver simultaneous, final and irrevocable DVP, significant reduction in back office costs, open access for direct, as well as for remote participants, competitive transaction costs and high degree of automation. The international business of SIS-SEGA is 90% concentrated in equities, which is very untypical for an ICSD. This competitive advantage was created by the strategy to serve as a global custodian for the Swiss banking industry (Global Investors Magazine: "Clearing and Settlement Roundtable, March 2003, p.20). Common to the CSDs and ICSDs is the utilization of TARGET to execute final payments.

Consolidation is the strategy followed by the main providers of trade and settlement services to improve cost saving and efficiency for the cross-border transactions. In this section, it was demonstrated that the ownership of the whole chain of trade, clearing ad settlement has a tendency to concentrate in the hands of a few competing financial entities. The idea is to increase settlement and banking services in a single entity by either reducing the market participants offering similar services, or creating vertical linkages in the chain of business. Currently a CSD cannot offer securities lending principal and it cannot settle directly the cash leg of a transaction. In turn, ICSDs are enabled to settle securities and cash legs, since they also have the status of a bank. To reduce market participants under the umbrella of ICSDs is an easier strategy to increase efficiency than the alternatives of linking CSDs bilaterally, or enabling remote access.

3.2 Costs of fragmentation in the clearing and settlement arrangements

Major inefficiencies in the European financial markets are related to high cost of cross-border settlements due to the various CSDs, which duplicate instructions and require development of relationships with agent banks. National CSDs were developed to comply with the national central bank, stock exchange and banks demand. In turn, some European domestic systems became as efficient as the American DTCC (Depository Trust & Clearing Corporation), though not appropriate to serve an European integrated financial market (Lannoo & Levin 2001).

Clearstream estimates that the incremental costs of cross-border trading equities is around €4.3 billion a year (Clearstream 2002, White Paper, p.15-16). Of this total, 40% is associated with the "regulatory translations" of 15 different laws, tax system, and rules for corporation actions that can be modified only by the EU Commission. Further 20% is related to intermediaries such as clearinghouses and securities depositories, which requires, as advocated in this chapter, harmonization of market practices and industry consolidation. This requires a specifically market orientated initiative. Finally, the rest 40% is related to the barriers of different languages and cultures, as well as to the home-bias of the investor.

The Giovannini Group has analyzed the costs, which direct participants in the depositories carry in order to have cross-border securities cleared and settled. The costs were divided in direct and indirect costs. Direct costs in the form of cross-border settlement fees charged by operation of a settlement system correspond to only 4% of the whole costs that market participants face. Indirect costs account for the great part of the costs related to settlement: back-office support and system interfaces (60%), and use of a local agent (35%) (Giovannini Group 2001, pg.66).

Further, the fees charged by each clearing and depository system had to be compared. The disappointing result is that, there is no settlement fee applicable for all transactions that could present an overall view of direct cost, even within a single institution. Prices vary whether the transaction is internal or external, according to client, kind of security, volume and method of payment (Deutsche Bank Research: Karel Lannoo 2003, p.9). Apparently, the fees charged by custodian banks for the settlement of cross-border equity transactions were not appraised in Lannoo's work, although custodians are responsible for 80% of cross-border settlement of equities. Additionally, custodians are well-known for the lower price that they charge in comparison to international securities depositories. Such a market analysis, incorporating all the providers of settlement, would be of great

value to understand the investor's behavior in choosing the settlement system, whether investors are more oriented for prices, risks, or services provided by the institutions.

An alternative way to assess costs of securities settlements is suggested by Lannoo & Levin. The data for his analysis is acquired in the annual financial reports (2001) of the CSDs and ICSDs, US settlement system is used as a proxy. As settlement fees vary, Lannoo's proposal is based on the operational income of the various European settlement systems, divided by the number of transactions pre and post-netted, in order to reach an average operating income per transaction which can be compared EU-wide and with the American DTCC.

The results of Lannoo's analysis can be summarized in the following (Lannoo 2001): a) The operating income of the European CSDs is 2.6 times higher (€1,644 million) than the American DTCC (€638 million); 2) Pre-netted instruction in the USA (1,585,900,000) is almost thrice as high as in Europe (531,274,658), but netted instructions in the European system account to 319 million, while in the DTCC 230 million transactions were settled. 3) The operating income of the European securities settlement systems is up to 7 times higher than DTCC, if pre-netted figures are considered (Lannoo 2003, p.13).

Table 4: Operating income per transaction

In euro	Pre-netting	Post-netting
With ICSDs	EU: 3.10 DTCC: 0.40 Ratio: 7.75:1	EU: 5.14 DTCC: 2.77 Ratio: 1.86:1
Without ICSDs	EU: 1.74 DTCC: 0.40 Ratio: 4.35:1	EU: 2.98 DTCC: 2.77 Ration: 1.08:1

Source: Lannoo and Levin, 2001

However, these figures give more an idea of efficiency of systems than costs of securities settlement. The figures give an average cost which does not differentiate cross-border from domestic settlements. The DTCC is the single American settlement system and has a "utility service status", much of its efficiency is related to the multilateral netting system in use. Since European national and international depositories settle more post-netted instructions, but has less pre-netted instructions than the DTCC, the average operating income per transaction of European depositories is 86% higher (a bad sign) than DTCC. This figure can be associated to higher settlement fees charged, but it can also be biased by the ICSDs' revenues of banking services and corporation action.

Clearstream has shown similar inefficiencies, but with a more specific approach. In the "White Paper" (2002, p.5), differences of wholesale and retail investors, as well as domestic and cross-border transactions were appraised. In short, wholesale cross-border transactions cost 30% more than equivalent domestic trades, while retail cross-border transactions increases up to150%.

3.3 Challenges to the EU financial integration

In April 2003, the "Second Report on EU Clearing and Settlement Arrangements", developed by the Giovannini Group, was published. The 15 barriers - grouped as technical, taxation and legal - identified on the first report were generally accepted by the market participants, however solution presented on the second report were not yet commented. It is important to mention that the approach taken by the Giovannini Group does not promote an ideal pattern of consolidation or interoperability. Instead, the group had the task to identify the barriers and to propose solutions to create a level playing field in which the settlement agents in Europe could decide the paths of integration in securities settlement systems (ECSDA 2001).

How to deal with the national barriers? The Giovannini group suggests that efforts should come from market participants, represented by different associations, as well as by regulators. Three years was the aggressively proposed timeline to remove the identified barriers, with some barriers removed in two years. The deadline complies with the deadline for implementation of the Financial Services Action Plan set by the Lisbon European Council. The importance level of the barriers and the relation they bear with other barriers were also identified.

Taxation and legal barriers must be approached by regulators. Market participants can do little to change domestic withholding tax regulation, or different transaction taxes and stamps collected in the securities settlement systems, or to harmonize the different ownership and bankruptcy laws applied in each EU country. Nevertheless, there is a general eagerness from the market side to overcome the technical barriers assessed on the first report, such as: national differences in information technology and interfaces; differences in corporate actions, ownership and custody; remote access impediments to clearing and settlement system; and differences in securities issuance practice. In order to illustrate these barriers, for instance, an international market participant who is not present in Netherlands cannot be a remote member in Necigef, because settlement there is allowed only for non-remote credit institutions. Even in Euroclear, the netting rules are not consistent in every CSD owned by them; for example, netting rules in France diverge from England and Belgium. Although Euroclear is looking for consolidation, it will not

be achieved as long as four different systems are operating and users still need to duplicate arrangements and process to connect to these different systems.

Who are willing to invest in order to overcome the barriers? ICSDs are, but global custodians still play a major role on the settlement of cross-borders equities and are not willing to change the status quo. The three biggest custodians in the European market, BNP Paribas, Citibank and HSBC, represent 80% of European securities settlement volumes.[25] Both are losing market share in the competition with the ICSD; Euroclear is promising to reduce fees in 90%, from €32,80 to only €0,55[26], once the single settlement system starts operating.

In turn, the custodians have grouped themselves under the name of Fair & Clear, an initiative of BNP Paribas and Citibank, claiming that the propaganda of ICSDs do not mention the additional costs of participation in the system and that the applicable fee is limited for account holders. Additionally, they complain that settlement price transparency is removed by vertical consolidation and "through privilege access and reciprocal accounts between CSDs and Euroclear bank (agent banks hold accounts at CSD, but CSD do not have accounts with them), Euroclear is able to take settlement away from the CSDs it owns onto its own books. By doing so, it is not paying for settlements while agent banks would have to…" (Global Investor Magazine: "European Custody: Not so Fair...and Clear" March 2003, p.2). The second argument is related to the user's limitation of choice for CSD. Cross-border settlement would be preconditioned to the "hub" attending the trading platform. Fair & Clear recommends that ICSDs should not be allowed to be banks. Global custodians are making money out of market inefficiencies and definitely are not ready to promote the overcoming of the barriers before they reposition their services and importance in the market (Euromoney Magazine, March 2003, p.49).

Who has got the resources to invest in new systems? Consolidation in cross-border operations has not been stimulated and positively seen by all participants. Another example is related to the poles already existent in the market. Crest, Clearstream and Euroclear are already more or less interconnected with each other. But CSDs in smaller markets, which are efficiently serving the local demand, are not prepared to change their settlement platforms to meet the requirements for participation in these poles. The benefits of opening the market to international investors do not compensate the higher national settlement costs that will be inferred. Moreover, the financial resources to investment in new IT infrastructure are simply not available after 3 years of bear markets.

[25] Euromoney, March 2003, "Time for a Settlement" p.46

[26] Agent banks charge around €13 for cross-border settlement. Euromoney, March 2003, "Time for a Settlement" p.46

Liquidity (the primary goal in inter-linking markets) is also difficult to attract. Rony Vogt, CEO of SIS, revealed that virt-x was created to attract liquidity from outside the local market, but it still has not succeeded (Global Investors Magazine: "Clearing and Settlement Roundtable, March 2003, p.20).

Further challenge is posed by the uncertainty of goals to be achieved, how should the end process look like? With the introduction of the euro, there were unified calls for consolidation of settlement systems. Meanwhile, interoperability of the existing systems is rather the aim of the market service's providers. It is too difficult to assess risk and the return of investing in a new IT platform, if the threat of becoming outdated (because other settlement systems had followed another architecture which is not compatible) is permanently there. It is not only the investment itself, but the readiness of operators and investors to adapt to the new system.

3.4 Perspectives: models of consolidation/integration

Considering the perspectives of the securities settlement industries in Europe, two tendencies are identified. The first is related to further **acquisitions**, and the second concentrates on the development of the most efficient **architecture** for the post-trade industry. Analyzing the **acquisition** patterns of the securities trade and settlement industries, it shall further develop under the two following strategies:

a) Vertical silos are referred to the integration of the whole chain of business related to trade, clearance and settlement of securities. In this model, the securities exchanges are integrated with a clearinghouse, which net traded positions that will be settled and held under custody of a central securities depository that belongs to the same organization. The advantage of a single system is related to the increase of speed and safety, that is achieved through the automation of all interfaces of the transaction process using straight through processing (STP) technology (Deutsche Bank Research: Lannoo 2003, p.4). Trade, clearing and settlement happen within one single entity, consequently legal uncertainty about finality of transaction and ownership is abolished through harmonization of the rules. However, internationally active investors prefer horizontal organized structures instead of vertical silos, because of the free and unbundled choice of services and depository for settlement. Clearstream has followed this pattern and Monte Titoli is on the way to integrate trade with clearing and settlement.

b) Horizontal consolidation occurs when industries offering the same services are acquired in order to achieve economies of scale, reduce competition and improve efficiency reducing redundant infrastructure across the market and back-office costs. This

is the strategy of Euronext and Euroclear. Economies of scale in the depositories activities were assessed by Schmiedel et al. (2002), who calculated the increase of the operating costs of a CSD in the case that settlement instructions would be doubled. The European domestic CSDs, in comparison to the American DTCC, have the greatest potential for cost saving, since by doubling the settlement instructions, the costs in the European CSDs would increase in 69,9%, while in the DTCC it would increase in 94% (Schmiedel et al. 2002, p.26). Smaller settlement systems have even greater saving capabilities (operational costs increase by 56% if settlement orders are doubled), which makes it cost advantageous to mergers and acquisitions.

Concerning to the question of which would be the best solution for the European securities market, whether consolidation (reduction of market participants through acquisition) or interoperability (linking existing systems), there are four competing models to consider. Shortly, agent banks, SIS, and Clearstream believe that the importance lays on the harmonization of technical communication and business practices, and others, like Euroclear, who are skeptic that harmonization can be achieved without putting systems in a "pressure cook"[27], consolidating depositories.

A **"Single Clearing and Settlement System"** is strongly promoted by Don Cruickshank, Chairman of the London Stock Exchanges, in order to attend the securities market in Europe (Cruickshank 2002). This strategy is in line with the centralized clearing and settlement institution in the United States (DTCC), which was created by legislative process of the Securities and Exchange Commission in 1976. It is the most cost-effective settlement system nowadays. With the integration of the 7 CCPs into this monopoly institution, a cost saving of 63% was created (Frankfurt Voice - Jan. 2003, p.12). In Europe it would be much more complicated in the sense that various political and legal considerations have to be addressed. It demands a great regulatory action and supranational power by the European Commission, which it does not possess. Moreover, CSDs in Europe are profit oriented operators, while they were built as utility services in the US.

Francesco Giordano, researcher of the European Capital Markets Institute, speculates on the results of setting up a single CCP for Europe in the form of a C&S monopoly. Benefits are based on a more efficient use of capital, on lower total infrastructure costs (if compared with developing compatibility of platforms used in all European CSDs) and risk sharing among participants. Such environment would also capture the economies of scale associated with clearing and settlement. However, he points out an increase in the potential of systemic risk. An added difficulty is correlated to competition rules, a single

CCP could abuse of its dominant position extracting above normal profits and remain obsolete regarding services and technologies. The creation of a single C&S operator would break up the vertical silos created by Clearstream, whilst LSE would enjoy an advantageous position as a stock exchange with the highest liquidity.

"Hub and Spoke" Architecture was the concept proposed by Euroclear. For a functioning integrated environment, it would be necessary to have a "hub" with local CSDs acting as "spokes". Global institutions realizing cross-border transactions would have direct access and an account at Euroclear, who would act as a "hub", while CSDs would still be responsible in the settlement of domestic transactions. Doubts about the competence of ICSD for the settlement of equities, added to the reduction in the CSDs' importance (number of settlements) contribute to the lack of motivation and supporters. Issues related to governance and price for retail investors acting cross-border contributes to the failure of this proposal.

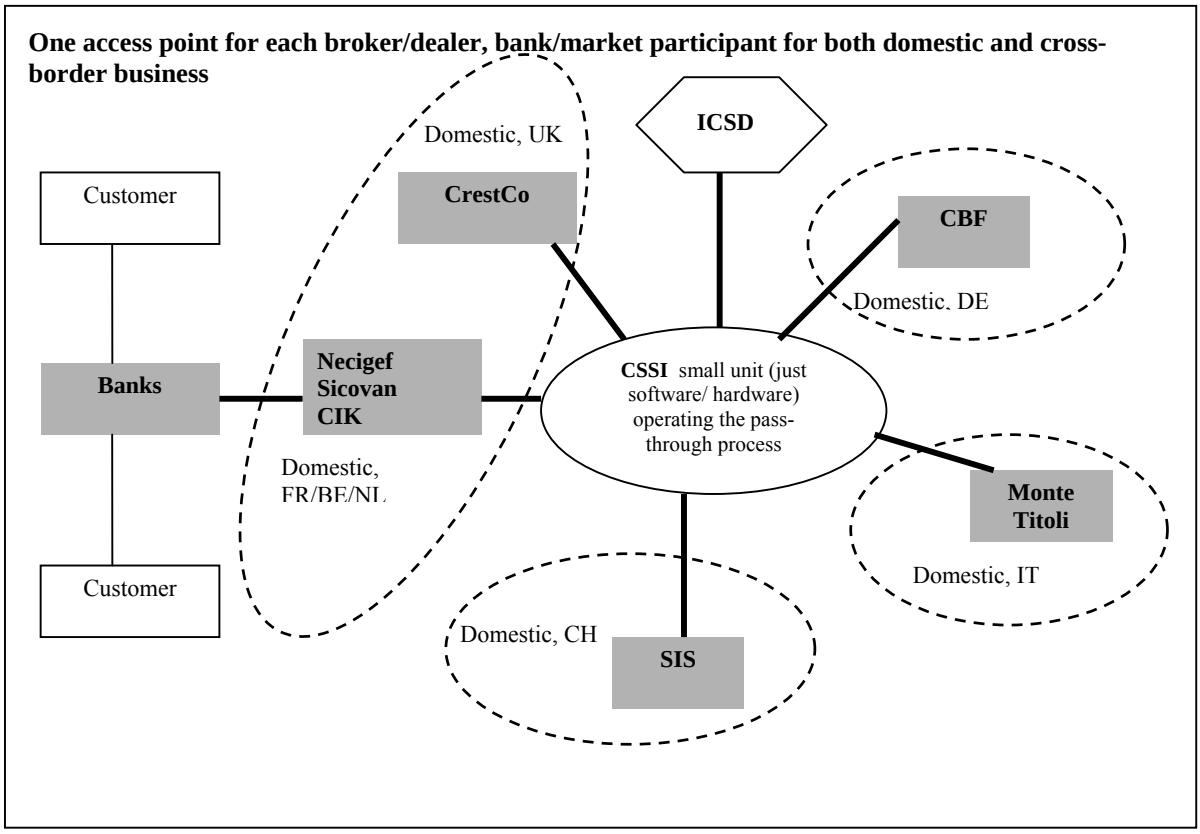
As global custodians have been arguing about the threats that consolidation might impose, the new in vogue pattern is regarded as "**Interoperability of IT Systems"**. This is a network of bilateral connections between CSDs that could "domesticate" cross-border trades. "Already Crest has linked with the Swiss depository SIS to offer sale and receipt of UK, Irish, Swiss and other major European stocks listed on virt-x against payment in sterling, euro or dollar." (Hallam & Idelson 2003, p.33). This is the approach recommended by ECSDA that has taken the initiative to issue a draft proposal for standardization of communication systems to be commented by market participants. However, costs would not be reduced as much as by consolidation since interface between CSDs poses high costs and inefficiencies. There are 15 CSDs registered on the European Central Securities Depositories Association. If each holds interface with all others there would be a total of n*(n-1)/2 or 105 interfaces, as suggested by Levin, 2001.

The most recent proposal is the so called "**Central Securities Settlement Institution (CSSI)"**. This is the initiative of SIS, Crest, Monte Titoli, IberClear and DTCC to develop an existing or preferably a new company, which would only consist of an IT system unit. This system would be governed and owned by market participants, in this case by local and international CSDs. CSSI would deliver access to the local CSDs and would require no change for the participants (banks and investors), since CSDs are the only institutions that need to invest in the access technology. The system does not require write-off of investments made by national settlement, since operations will remain the same on the national level. In addition, CSSI will also contribute in the reduction of the interconnection costs related to link processing, interfaces, synchronization of systems,

[27] Symons, director of Euroclear in Global Investors Magazine: Clearing and Settlement Roundtable, March

data formats, link contracts, liquidity requirements and effective use of collateral. Therefore, the benefits are clear: the need to keep bilateral links ceases to exist, and the architecture poses no threats to the settlement role of CSDs. With this system, the participants will hold one single entry point independently of their location in Europe, and through this entry point the participant will have access to all services throughout Europe.

Chart VIII: Central Securities Settlement Institution (CSSI)



Source: Deutsche Bank Research – "Frankfurt Voice", January 2003, p.24

The C&S steps for cross-border securities traded would be as follow:

1) After trade is matched, the exchange sends instructions directly to the CSD of the securities' issuing country, just as a domestic transaction.
2) There is no need to activate a new local custodian to receive the securities for the investor in the international arena, because the issuing CSD sends the trade instruction to the CSSI, which routes it to the CSD to which the investor has access.
3) Payment is realized simultaneously against delivery of the securities through e.g. TARGET. The traded securities remain in the issuing CSD. The new owner will receive distributions and will be able to sell the acquired securities through his bank, which is linked to the local CSD, which in turn is linked by the CSSI to all CSDs in Europe.

2003, p.21.

This model is technically feasible, though standardization of logical links and messaging must go beyond ISO 15022. Middleware and private network vendors reported that they are currently able to develop software and physical connectivity to execute the pass-through of data to participants in a single unit (Hallam and Idelson 2003, p.34-37). The costs of such an infrastructure would be compensated by revenues flowing from increased volumes of cross-border trades, that would enable the reduction of C&S costs, and the fees charged to investors. Additionally, the system has no preference in the concept of vertical or horizontal consolidation. The choice to further consolidate (takeover) local CSDs remain a choice of the market participants. In short, CSSI would not pose systemic risk since it does not add a new service layer, governance would be able to accommodate competing business approaches and finally, integration is achieved through interoperability of the systems of the different CSDs. Though, such a system requires that all participating systems behave in a very similar way for their business process to be accepted by the CSSI, and this stage of standardization can only be achieved in a long-term.

3.5 Recent initiatives to support harmonization of clearing and settlement systems

Some initiatives have been undertaken in order to harmonize process and procedures in the clearing and settlement of cross-border securities transactions and the legal, fiscal and regulatory environment in Europe.

In May 2003, the International Securities Services Association (ISSA) promoted a regional meeting in Madrid with the presence of representatives of custodian banks and securities depositories. The main topic of the meeting was about the European market infrastructure and competition between ICSDs and Custodians. The results of the forum were communicated to European Securities Forum, Group of Thirty, and Giovannini Group in order to help them to determine future course of actions (http://www.issanet.org/pdf/md03-summary-new.pdf).

Apart from the consultation paper issued in 2002 by the EU Commission[28], for which an evaluation of the responses is expected, some other consultation papers have recently been issued, like the CESR/ESCB "Consultative report on Standards for Securities Clearing and Settlement systems in the European Union". In August , 2003, the Committee of European Securities Regulators (CESR) and the European System of Central Banks (ESCB) have opened the timeframe for the consultation based on the 19 standards (to increase the safety, soundness and efficiency of securities clearing and settlement systems in the European Union) published by IOSCO/BIS under the name

[28] Available at http://europa.eu.int/comm/internal_market/en/finances/mobil/clearing/index.htm

Recommendations for Securities Settlement Systems, 2001. The standards, once finalized, will be used as a regulatory tool by regulators and overseers and will be more binding than the original CPSS-IOSCO recommendations. CESR has announced to open hearings on October 2nd, 2003.

The European Securities Forum (ESF) is a UK incorporated company created in 1998 to represent major international investment banks[29] operating in Europe. ESF has announced that it will play an active role in initiating, coordinating and monitoring actions required to market standardization. ESF has established a series of action plans seeking for cooperation with securities infrastructure organizations, political authorities in the national and international level. The four priorities for the coming few years[30]:

- To standardize communication, such as ISO 15022 as the sole messaging format throughout Europe;
- To harmonize settlement time frames and operating hours, as well as rules related to corporate actions, such as record and dates for all corporate action events and income payments;
- To remove restrictions of open access and free choice, such as the elimination of national settlement and depository requirements in Germany or the registration process in Spain.
- To harmonize the legal environment in Europe, such as the introduction of an EU wide legal definition of transfer of ownership in dematerialized securities, an area in which ESF shall jointly work with the European Financial Market Lawyer Group, chaired by senior legal executives of ECB and the Financial Markets Law Committee, domiciled at the Bank of England.

In this chapter, it was shown that the tendencies of mergers and alliances in the securities clearing and settlements systems are modifying the European landscape. This consolidation trend is happening under a vertical and horizontal strategy. Then, the discussion turned to the consolidation of clearinghouses, LCH and Clearnet in special, which might be seen as an approach to create a CCP for Europe. Furthermore, the costs of fragmentation were discussed. The average operating income in securities depositories in Europe is almost 8 times higher than DTCC. Though if ICSDs are excluded, depositories in Europe have only a 8% higher operating income than DTCC. It is important to remember that CSDs have limited services to settle cross-border transactions, since they cannot settle the cash leg of a cross-border transaction because they do not offer banking services. Although settlement costs are not positive figures for

[29] Among the member: BNP Paribas, Citigroup Inc, Credit Suisse Group, Deutsche Bank AG, HSBC Holdings plc, ABN AMRO Bank NV.
[30] ESF 2003, Action Plans (http://www.eurosf.com/press_releases/press_ release_ 9july 02.htm)

the depositories in Europe, Schmiedel has demonstrated the high potential to create economies of scale in the European depositories by increasing the number of settlements. This is especially true for the depositories serving smaller markets, which might be an attractive acquisition for larger international securities depositories.

Finally, the challenges and perspectives for the development of an efficient architecture for cross-border settlement systems in Europe was discussed; and it became clear that it will not be easy to change the fragmented landscape. Harmonization of standards is a first step that might lead to consolidation. Therefore, the current initiatives engaged with standardization of process involved in the post-trade industry were reviewed.

4 Conclusions

Financial markets integration is an aim of the European Union, which will not only promote economic growth, but also increase competition and consequently enlarge variety and the quality of financial services offered to the consumers (investors). In assessing the developments of the financial markets in Europe after the introduction of the Euro, it became clear that the fragmented post-trade infrastructure in the European markets hinders further progresses towards the creation of a single financial market, especially for the equity markets. The problems of the fragmentation are associated to the high costs incurred to investors to acquire and dispose securities cross-border, even within the EMU.

As discussed on the chapter 1, the high costs for cross-border clearing and settlement are partly associated with the different national laws, taxation systems, as well as with culture and language barriers. In order to minimize the impacts of these varieties, market initiatives cannot do much. The work had to be undertaken by the EU Commission and national governments to harmonize laws and create a level playing field to foster competition among financial services providers - indifferently to the member-state of origin. Further costs arise from the different settlement practices and communication standards which depositories across Europe employ. The standardization of practices and systems should be essentially driven by market participants, in order to reduce risks and costs. As presented in the third chapter, when communication standards are different, the IT system from one depository cannot read the settlement instruction of another, so manual work is required to input the order. Finally, the number of parties involved to settle a transaction has also a direct impact in the costs of a cross-border transaction.

Moreover, chapter 3 accompanied the trend of exchanges, clearinghouses and depositories to merger and increase interoperability, which is dramatically changing the

financial landscape in Europe. As discussed, exchanges, clearinghouses, depositories and custodian banks have complex ownership arrangements among them. These ownership arrangements shall influence on the reshaping of the settlement infrastructure to serve the financial markets. For example, in assessing the recent merger of LCH and Clearnet (Euronext Group), it is evidenced the clear intention to position the new entity as the single CCP for Europe. LCH.Clearnet threats the position of Eurex Clearing (Deutsche Börse) and LSE (London Stock Exchange). In turn, talks about the possibilities to merge Deutsche Börse and LSE restarted (Investment Magazine: LSE to Rethink on Clearnet/LCH Merger, September 14, 2003). Once LSE and DB were discussing about the advantages of a merger, when Euronext intervened and the talks stopped. In short, consolidation follows the strategy of positioning the financial service provider with a competitive advantage, in order to keep or increase its market share. If consolidation is rationally driven, it must bring reduction of costs for investors and increase in the efficiency of cross-border trade, clearing and settlement.

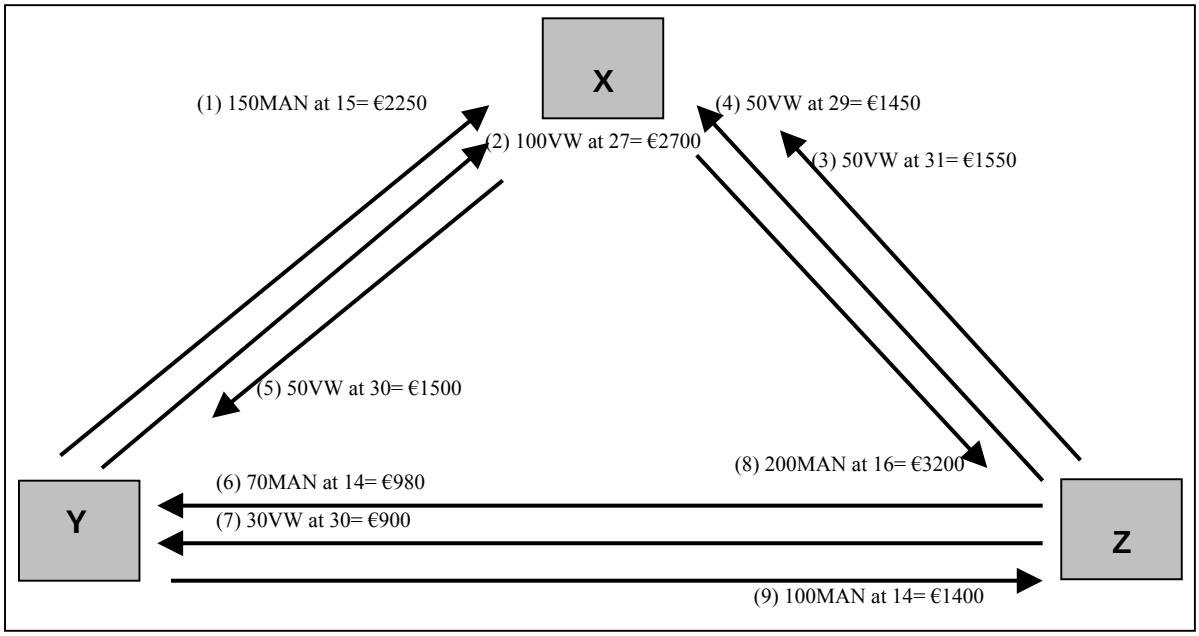
In the securities depositories' level there were two tendencies which were differentiated. First trend was related to the standardization of communication systems and market practices, in order to achieve interconnectivity among different depositories. Interconnectivity or interoperability can be achieved through bilateral links or through the creation of a hub. CSSI would be the most appropriate architecture, as discussed under "models of consolidation/interoperability". The second trend follows the consolidation strategies of exchanges and clearinghouses. Market participants face the dilemma: does interconnectivity suffice to reduce costs, or costs are reduced only if there are fewer market participants? In general, as discussed in the fourth chapter, depositories are aiming to standardize practices, communication systems and participation standards. These are prerequisites to interoperability, which also leave the possibility to further consolidate and reduce market participants. However, Euroclear firmly deems that consolidation is the only way to reduce costs and increase efficiency, therefore Euroclear has acquired the British Crest and the Portuguese depositories. The acquisition of smaller European depositories is of particular interest for ICSDs, since the possibility to create economies of scale are the highest.

Finally, evidences in this paper confirm the hypothesis whether a cross-border securities settlement infrastructure is a prerequisite to a single European financial market. As long as investors loose advantageous cross-border deals, because the prices of settlement and custodian are too high, double taxation is inferred, or higher risks than trading domestically are incurred, there will not have any single market in Europe. Most of these barriers were appraised by market regulators and participants, and initiates are already

bringing results. However, it will not be an easy task to overcome differences and harmonize practices.

Annex 1: Calculating hypothetical trades multilaterally netted

1) Hypothetical trades between three market participants



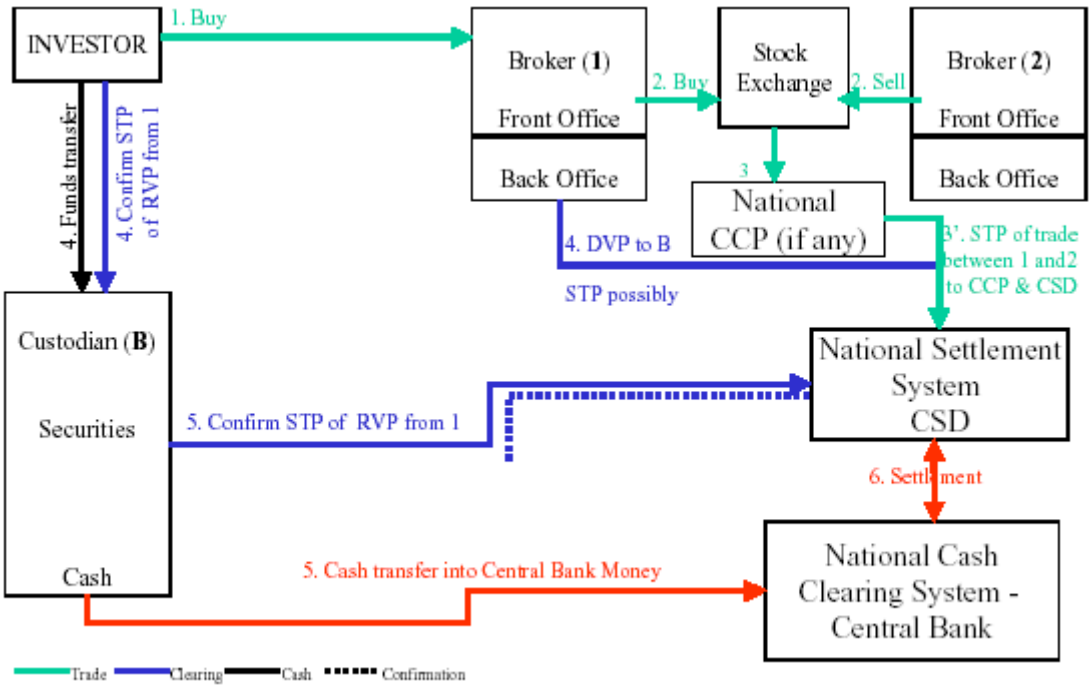
X buys and sells are multilaterally netted with other market participants (Y and Z). Arrows pointing to X mean that equities have been bought by X. Arrows departing from X mean that equities have been sold. The end position of each participant is calculated at the end of trading period, and only netted positions (which are in red on the next table) are indeed settled. For example: X bought 200VW which represent the arrows (2), (3) and (4), and sold 50VW as one can see on arrow (5). Similar securities can be added up even if traded with different prices. The payment leg can be netted independently of the securities, since money is fungible. The figures in red are the end netted positions, which are shown in the page 17.

2) Netting trades multilaterally (one participant in relation to all others)

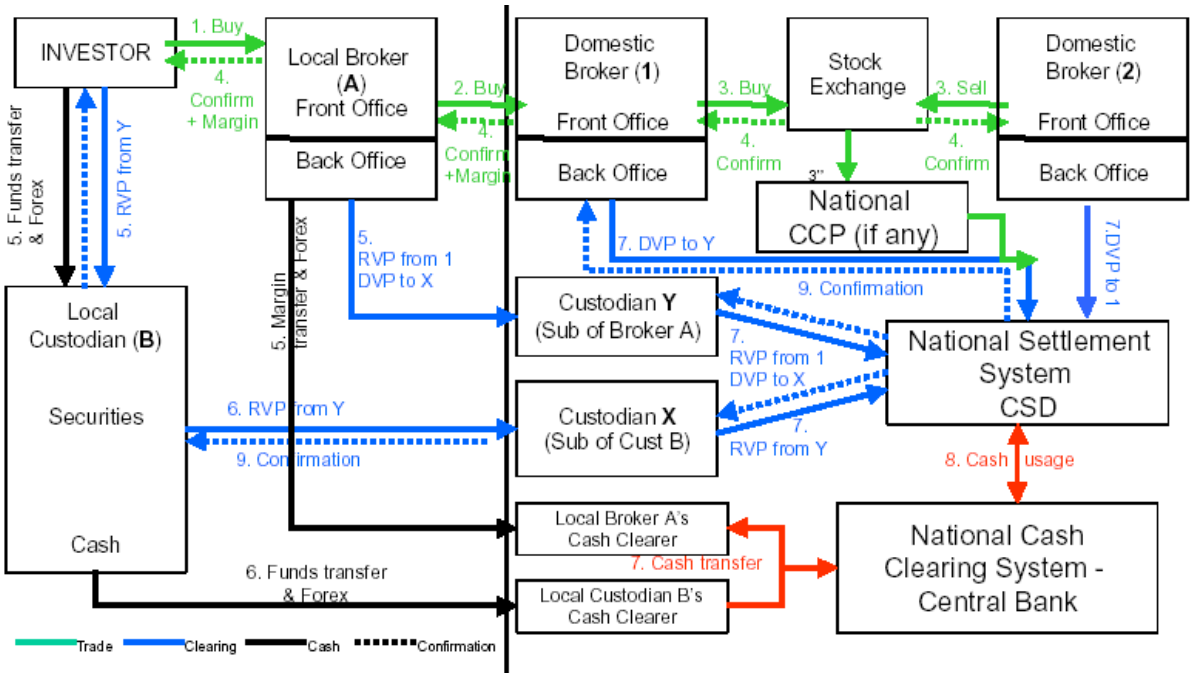
	Buys	Sells	Total Securities Leg		Total Cash Leg (€)	
X	150 MAN=(2250)	200 MAN=3200	(50 MAN)	sold	950	received
	200 VW = (2700+1550+1450=5700)	50 VW=1500	150 VW	bought	4200	paid
		Netted positions =	150 VW	bought	(3250)	paid
Y	70 MAN=(980)	250 MAN = 2250+1400=3650	(180 MAN)	sold	2670	received
	80 VW = (1500+900= 2400)	100 VW=2700	(20 VW)	sold	300	received
		Netted positions =	0	bought	2970	received
Z	300 MAN = (3200+1400=4700)	70 MAN=980	230 MAN	bought	(3720)	paid
		130 VW= 1550+1450+900=3900	(130 VW)	sold	3900	received
		Netted positions =	230 MAN	bought	280	received

Annex 2: Instruction flows of equities, bonds and derivatives transactions

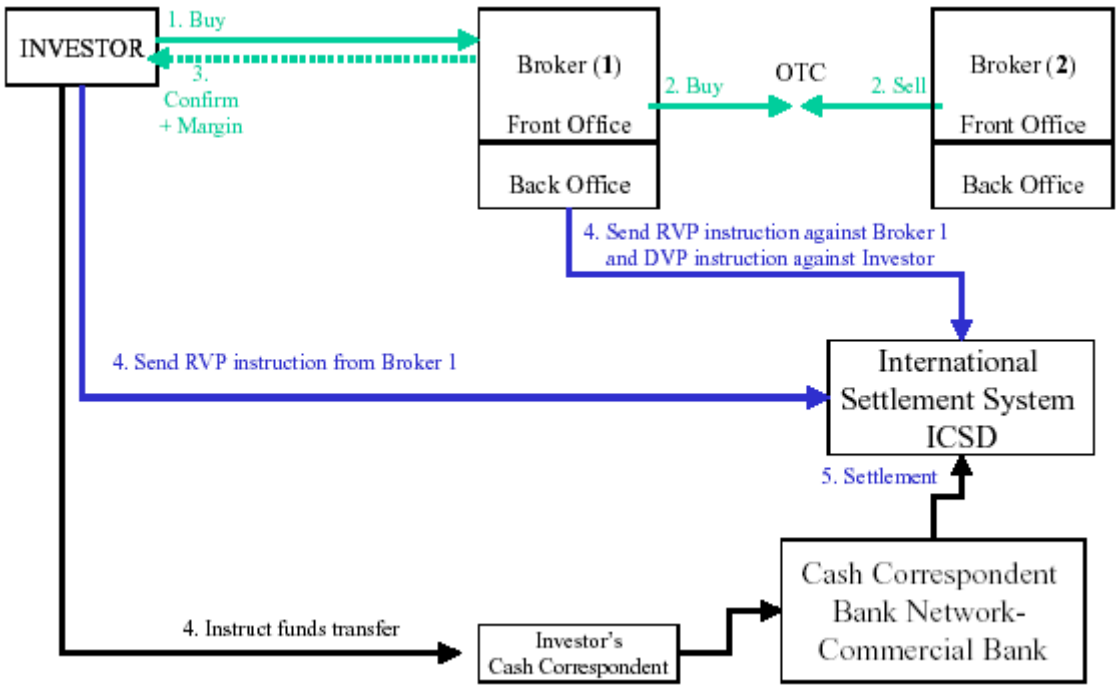
I. Domestic Equities Transaction



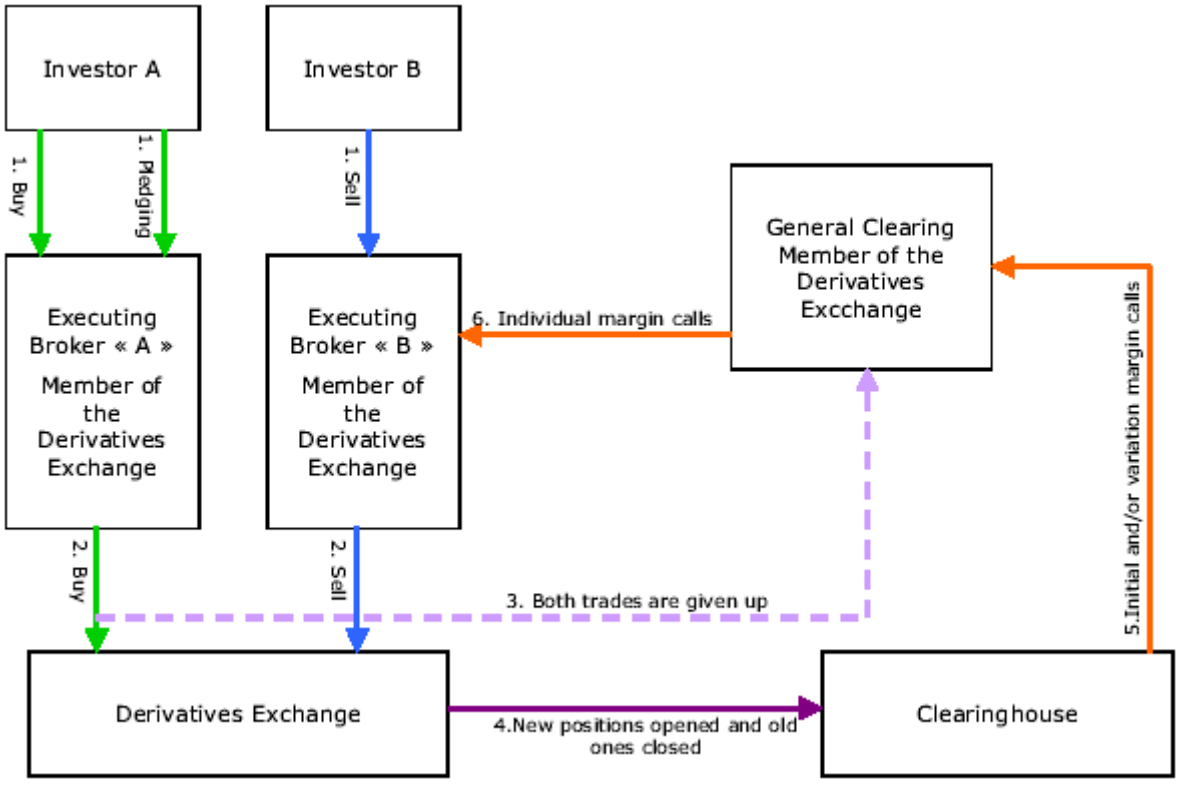
II. Cross-border Equities Transaction



III. Bond Transaction



IV. Foreign Exchange Derivatives Transaction



Source: Giovannini Group, Report on Cross-Border Clearing and Settlements Arrangements in the European Union, pg.11-17.

7 References

Adam K., Jappelli T., Menchini A., Padula M. & Pagano M. (2002), **"Analyze, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union"**, CESF, University of Salermo,
http://europa.eu.int/comm/internal_market/en/update/economicreform/020128_cap_mark_int_en.pdf

Adjaoute K. , Bottazzi L., Danthine J.P., Fischer A., Hamaui R., Portes R. and Wickens M. (2000), **"EMU and Portfolio Adjustments"**, Center for Economic Policy Research, Discussion Paper DP2962, www.cepr.org/pubs/dps/DP2962.asp

Baglioni Angelo, Hamaui Rony (2000), **"The Choice Among Alternative Payment Systems: The European Experience"**, Journal of Banking and Finance, October 2000, Netherlands

Financial Services Authority (FSA) and Bank of England (July 2003), **"The EU Financial Services Action Plan: A Guide"**, http://www.fsa.gov.uk/pubs/other/fsap_guide.pdf

Bank of International Settlements (BIS), Reports prepared by the Committee on Payments and Settlement Systems of the central banks of the Group of Ten countries, Basle:

"Payment and settlement systems in selected countries", April 2003, http://www.bis.org/publ/cpss53.pdf

"Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity", March 2002, http://www.bis.org/publ/rpfx02t.pdf

"The Contributions of Payment System to Financial Stability", September 2000, http://www.bis.org/publ/cpss41.pdf

"Real-time Gross Settlement System", March 1997,http://www.bis.org/publ/cpss22.pdf

"Cross-border Securities Settlement"

"Delivery versus Payment Report in Securities Settlement Systems", September 1992, http://www.bis.org/publ/cpss06.pdf

"Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of ten countries", November 1990, http://www.bis.org/publ/cpss04.pdf

Bank of International Settlements and International Organization of Securities Commissions, BIS/IOSCO: **"Recommendations for Securities Settlement Systems"**, November 2001, Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commission, Basle,
http://www.bis.org/publ/cpss46.pdf

Blanco Roberto (2001), **"The Euro Area Government Securities Market. Recent Developments and Implications for Market Functioning"**, Bank of International Settlements Discussion Papers, Bank of Spain, http://www.bis.org/publ/bppdf/bispap12d.pdf

Canoy, M; van Dijk; Lemmen; Mooij and Weigand (December 2001), **"Competition and stability in banking"**, CBP Document, N. 015, Netherlands Bureau for Economic Analysis.
Clearstream International and Deutsche Börse Group (2002), **"Cross-Border Equity Trading, Clearing and Settlement in Europe"**, White Paper, http://www1.deutsche-boerse.com/INTERNET/EXCHANGE/zpd.nsf/PublikationenID/AKLS-58TMV6/$FILE/White-Paper_online_d.pdf?OpenElement

Cruickshank (2002); Speech of the Chairman of the London Stock Exchanges: **"Clearing and Settling European Securities: Where Competition Works (and Where it Doesn't)"** at European Harmonization of Cross-Border Settlement Conference 21/22 March 2002, available at http://www.londonstockexchange.com/newsroom/speeches/speech15.asp

Deutsche Bank AG, Deutsche Bank Research, Frankfurt am Main:

"The new ISD: better regulation for UE investment service" in EU Monitor, June 2003, http://www.dbresearch.de/PROD/DBR_INTERNET_EN-PROD/PROD0000000000056336.pdf

"Four years of euro: more light than darkness" in EMU Watch, March 2003, N.97, http://www.dbresearch.de/PROD/999/PROD0000000000053292.pdf

"Interoperability and Interlinking: the way forward for the C&S industry" by Karel Lannoo and **"Clearing and Settlement in the EU: Structures and Policy Options"** in Frankfurt Voice, January 2003,

http://www.dbresearch.de/PROD/DBR_INTERNET_EN PROD/PROD0000000000048086.pdf

"Low Euro-land Bond Yield: A New Paradigm" in Frankfurt Voice, February 2002, http://www.dbresearch.de/PROD/DBR_INTERNET_EN-PROD/PROD0000000000041206.pdf

Danthine J., Giavazzi F. and von Thadden E. (2000), **"European Financial Markets After EMU: A First Assessment"**, Center of Economic Policy Research, Discussion Paper No. 2413, United Kingdom, http://papers.nber.org/papers/w8044.pdf

Euroclear Bank S:A/N.V., Brussels

Consultation Paper: **"The Single Settlement Engine (2005) and subsequent Business Models deliverables",** June 2003

Consultation Responses: **"Euroclear Business Model - Update Paper - The Business Model and Harmonization - Edition 1"**, September 2003
http://www.euroclear.com/wps/Euroclear/downloads/MA159_-_UP-BM-200309-1.0.pdf?userId=

European Central Bank (ECB), Frankfurt am Main:

"**Blue Book"**, September 2003, Payment and securities settlement systems in the European Union, Addendum incorporating 2001 figures,
http://www.ecb.int/paym/market/blue/html/index.en.html

"**The Euro Money Market"**, July 2001, http://www.ecb.int/pub/pdf/euromoneymarket.pdf

"TARGET Annual Report 2001", May 2001, http://www.ecb.int/pub/pdf/targetar2000.pdf

"The Euro Area Securities Clearing and Settlement Infrastructure: Recent Changes and Issues for Debate", April 2000, http://www.ecb.int/home/conf/opf/papers/2b.pdf

European Central Securities Depositories Association - ECSDA (September 2002): **"Clearing and Settlement in the European Union – Main Policy Issues and Future Challenges"**, Comments of the ECSDA regarding the Communication from the Commission to the Council and the European Parliament, http://www.ecsda.com/attachments/publications/wgspublications/public_policy/ecsda_comments_to_the_commission.pdf

European Commission, Financial Services, Brussels:

"The euro area in the world economy – developments in the first three years", September 2002, http://europa.eu.int/scadplus/leg/en/lvb/l25063.htm

"Implementation of financial services legislation in the context of the Lamfalussy Report", Speech of Romano Prodi, February 2002, http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=SPEECH/02/44|0|AGED&lg=EN&display=

"Implementing the Framework for Financial Markets: Action Plan", June 2002, http://europa.eu.int/scadplus/leg/en/lvb/l24210.htm

"Final Report of the Committee of Wise Men on the Regulation of European Securities Markets", Lamfalussy Report, January 2001, http://europa.eu.int/comm/internal_market/en/finances/general/lamfalussyen.pdf

Federation of European Securities Exchange - FESE, (2002), **"Share-ownership Structure in Europe"**, Economics and Statistics Sub-committee, http://www.fese.be/statistics/share_ownership/share_ownership.pdf

Equity Markets – the Euroindex: Table 2: "Market Capitalization in August 2003", http://www.fese.be/statistics/monthly_statistics/tables/allmarkets.htm

Financial Times Business: The Banker: **"Route finally open for LCH-Clearnet merger",** http://www.thebanker.com/news/archivestory.php/aid/388/Route_finally_open_for_LCH-Clearnet_merger.html

Giordano Francesco (December 2002), **"Cross-Border Trading In Financial Securities In Europe: The Role Of Central Counterparty"**, European Capital Markets Institute, http://www.ecmi.es/files/giordano.pdf

Giovannini Group:

"Cross-Border Clearing and Settlements Arrangement in the European Union", November 2001, http://europa.eu.int/comm/economy_finance/publications/giovannini/clearing1101_en.pdf

"Second Report on EU Clearing and Settlements Arrangements", April 2003 , http://europa.eu.int/comm/economy_finance/publications/giovannini/clearing_settlement_arrangements140403.pdf

Global Investors Magazine, London:

"Clearing and Settlement Roundtable: Clearing and Settlement, Giovannini and Stelios" by James Rutter, March 2003, p.20-27

"European Custody: Not so fair and clear." By Tim Colyier, March 2003, p.45-50

European Clearing Survey: "The Search for Efficiency" by Jo McGinley and **"Double or Nothing"** by Tim Colyier, July/August 2002 , p.26-43

Goldberg L., Kambhu J., Mahoney J., Radecki L. & Sarkar A. (April 2002), **"Securities Trading and Settlement in Europe: Issues and Outlook"**, Federal Reserve Bank of New York, Current Issues in Economics and Finance, Volume 8, Number 4 http://www.newyorkfed.org/rmaghome/curr_iss/html/civ8n4/civ8n4.html

Guadamillas Mario & Keppler Robert (April 2001), **"Securities Clearance and Settlement Systems: A Guide to Best Practices"**, Western Hemisphere Payments and Securities Clearance and Settlement Initiative (WHI), World Bank, Research Working Paper Series, http://wbln0018.worldbank.org/html/FinancialSectorWeb.nsf/(attachmentweb)/1690_wps2581/$FILE/1690_wps2581.pdf

Hartman P., Maddaloni A. & Manganelli S. (May 2003), **"The Euro Area Financial System: Structure, Integration and Policy Initiatives"**, ECB Working Paper No. 230, http://www.ecb.int/pub/wp/ecbwp230.pdf

International Securities Service Association - ISSA (May 2003), Regional Meeting Europe Summary, Madrid, http://www.issanet.org/pdf/md03-summary-new.pdf

Kauko, Karlo (October 2002), **"Links Between Securities Settlement Systems: an Oligopoly Approach"**, Bank of Finland Discussion Papers 27/2002, Helsinki

Lannoo Karel & Levin, Mattias (2001), **"The Securities Settlement Industries in the EU: Structure, Costs and the Way Forward",** CEPS Research Report, CEPS, Brussels

Leinonen Harry, Soramäki Kimmo (1999), **"Optimizing Liquidity Usage and Settlement Speed in Payment Systems"**, Bank of Finland Discussion Papers 16/99

London Economics (2002), **"Quantification of the macro-economic impact of integration of EU financial markets"**, final report by London Economics in association with PricewaterhouseCoopers and Oxford Economic Forecasting to the European Commission, http://europa.eu.int/comm/internal_market/en/finances/mobil/over view.htm

Euromoney Magazine, **"Time for a Settlement"** by Marshall, Julia, Volume 34, Number 407, Issue: March 2003, p.46-51

McAndrews, James and Stefanadis Chris, **"The Consolidation of European Stock Exchanges",** Current Issues in Economics and Finance, June 2002, Volume 8, Number 6

Monti, Mario (December 2002), Speech: **"The integration of European capital market infrastructures and competition law"**
http://www.fese.be/initiatives/speeches/2002/monti_apcims_speech.pdf

Padoa-Schioppa, Tommaso (December 2001): Speech at the Symposium of the Deutsche Bundesbank: **"Clearing and Settlement of Securities: a European Perspective"**, Frankfurt, http://www.ecb.int/key/01/sp010905.htm

Pagano, M (May 1989), **"Trading Volume and Asset Liquidity"**, Quarterly Journal of Economics, N.104, p. 255-274

Reszat, Beate (2003), **"How has the European Monetary Integration Process Contributed to Regional Financial Market Integration?"**, HWWA Discussion Paper No. 221, http://www.hwwa.de/Publikationen/Discussion_Paper/2003/221.pdf

Rossi Marco (1998), **"Payment Systems in the Financial Market: Real time Gross Settlement Systems and the Provisions of Intraday Liquidity"**, McMillan Press LTD, Great Britain

Schmiedel H., Malkamäki M., and Tarkka J. (October 2002), **"Economies of scale and technological development in securities depository and settlement systems"**, Bank of Finland Discussion Papers 26/2002

White, Lawrence (2002), **"Globalized Securities Markets and Accounting: How Many Standards?"**, Stern School of Business and New York University,

List of Abbreviations

BIS – Bank of International Settlements

CCP – Central Counterparty

C&SS – Clearing and Settlement Systems

CESR – Committee of European Securities Regulators

CPSS – Committee on Payments and Settlement Systems

CSD – Central Securities Depositories

CSSI – Central Securities Settlement Institution

DTCC – Depository Trust & Clearing Corporation (US)

DVP – Delivery versus Payment

ECB – European Central Bank

ECMS – European Capital Markets Institute

ECSDA – European Central Securities Depositories Association

EMU – European Monetary Union

ESCB – European System of Central Banks

ESC – European Securities Committee

EU – European Union

FIBV – Federation Internationale des Bourses de Valeurs

FSAP – Financial Services Action Plan

FX – Foreign Exchange

ICSD – International Central Securities Depository

IOSCO – International organization for governmental securities commissions

ISD – Investment Service Directive

ISSA – International Securities Services Association

LCH – London Clearinghouse

NSCC – National Securities Clearing Corporation (US)

RTGS – Real-Time Gross Settlement System

T – Trading day

TARGET - Trans-European Automated Real-time Gross settlement Express Transfer

SSS – Securities Settlement Systems

STP – Straight Through Processing

SWIFT – Society for Worldwide Interbank Financial Telecommunication

List of Annexes, Charts and Tables