

**The Implementation of the European Central
Bank Project, Target2 Securities, in the European
Settlement System.**

Oxana Tarasiuc

Dissertation as a partial requirement for obtaining the
Master's degree in Information Management, with a
specialization in Risk Analysis and Management

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NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

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Advisor: Dr. Rui Gonçalves

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ABSTRACT

Post-trade market in the European Union continues to be fragmented at the national level, despite the various legislative initiatives, as UCITS 5, CSDR, that brings more harmonization in investments. This issue was taken in the center of focus of the Central Bank and European Commission, that developed a successor for the Target 2 Project, called Target to Securities. With T2S, the settlement of securities between the 17 CSDs will be done uniformized, faster and safer, all the transactions being settled on a single pan-European platform in central bank.

It is one of the largest infrastructure projects launched by the Eurosystem so far and it brings substantial benefits to the European post-trading industry, by revolutionizing the way securities market works. T2S is meant to dismantle the 10 technical barriers identified by the Giovannini Group. The costs of the implementation were shared between the participant CSDs. The future benefits are foreseen to be great costs savings for a unit transaction, and harmonization of the flow of a cross border transaction, like a domestic one.

KEYWORDS

T2S, securities, post-trade, Eurosystem, ECB, financial integration, settlement, clearing, risks.

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LIST OF ABBREVIATIONS AND ACRONYMS

AG	Advisory Group
BCNs	Brokers Crossing Networks
BIC	Bank Identifier Code
BIS	Bank for International Settlements
BME	Group
BOGS	Bank of Greece Securities Settlement System
CA	corporate actions
CASG	Corporate Actions Sub-group
CCP	Central Counterparty Clearing House
CPSS	Committee on Payment and Settlement Systems
CSD	Central Securities Depository
CSDR	Central Securities Depository Regulation
DAC	Dedicated cash account numbering
DVP	Delivery Versus Payment
EBA	European Banking Authority
ECB	European Central Bank
EEA	European Economic Area
EMIR	European Market Infrastructure Regulation
EOD	End of Day
ERC	The European Repo Council
ESAs	European Supervisory Authorities
ESES	Euroclear Settlement of Euronext-zone Securities
ESMA	European Securities and Markets Authority
EUR	EURO
HSG	Harmonisation Steering Group

ICSD International Central Securities Depository

IMF International Monetary Fund

IOC instruction owner CSD

IOSCO Technical Committee of the International Organization of Securities Commissions

ISIN International Securities Identification Number

ISO International Organization for Standardization

KDD Centralna Klirinško Depotna družba Delniška družba

MIFID Markets in Financial Instruments Directive

MIFIR Markets in Financial Investments Regulation MTF Multilateral Trading Facilities

NBB SSS National Bank of Belgium Securities Settlement System

NTS Night-time Settlement

OTC Over the Counter

OTFs Organized Trading Facilities

PFMIs Principles for financial market infrastructures

RTGS Real-time gross settlement systems

SAC Securities accounts numbering

SIs Systemic Internalizers

SOD Start of Day

SSP Single Shared Platform

STP Straight through processing

SWIFT Society for Worldwide Interbank Financial Telecommunication

T2S Target to Securities

TARGET Trans-European Automated Real-time Gross Settlement Express Transfer system

UCITS Undertakings for the Collective Investment in Transferable Securities

1. INTRODUCTION

This thesis studies the implementation and the benefits of the new state-of-art project, Target to Securities (hereinafter T2S), that aims to bring innovations, as cross-border openness, lower the cost of settling transactions, economies of scale, also encouraging greater competition between CSDs, and financial integrity in the European securities settlement industry. T2S is a technical platform, where all trades are settled, designed to support CSDs in providing core, borderless and neutral settlement service. T2S objectives are harmonization, maximizing safety, by reducing the risks, and efficiency in settlement of securities transactions. Overall, it is also EU's financial integration objective where only one single market for settlement services is being built, with a unified, cheaper and less risky, post-trade infrastructure. In this study we will focus particularly on the project implementation in Portuguese Central Securities Depository, Interbolsa.

1.1. RELEVANCY OF THE SUBJECT

Despite the heightened economic significance, very little attention has been given in the debate surrounding the new T2S infrastructure, its risks and benefits. I was inspired to dig into more details on T2S implementation, because of its relevancy for the European financial system integration and the actuality of the project, that up to date, finished its last migration wave on 18 September 2017. Interbolsa was chosen, between the other 17 CSDs participants to the project, because Portugal has already completed the migration at the moment of the research (in March 2016), and because of the access to a broader source of information and interviews, study being held in Portugal.

Robert Schuman (1950) said that Europe will not be made all at once, or according to a single plan; it will be built through concrete achievements. His words were revoked again by Mario Draghi, President of the ECB, at the T2S launch celebration (in Milan, on 2 July 2015): „T2S is a central part of the broader story of the European integration. And the path has indeed been dotted with many of these achievements: TARGET, TARGET 2; but while these were important accomplishments, which resulted in high level of integration on the cash side, the infrastructure supporting capital markets continued to be highly fragmented. Europe had over 30 different systems for settling securities. The overwhelming number of rules and approaches meant that the whole payment system and settlement process remained convoluted and costly.”¹

As shown in the image 1 below, in the Pre-T2S model, settlement and custody are market specific. EU stock market transactions and the cross-border transactions, are marked by an unimaginable growth in the last decades, while the post-trade arena continues to languish in silo fashion, adding unnecessary costs. For instance, the transaction value of debt-based securities platforms (alternative finance market segment) in Europe (excluding the UK) from 2012 to 2015 grew significantly from 0,5 million to 11 million EURO in 2015.²

¹ <https://www.ecb.europa.eu/press/key/date/2015/html/sp150702.en.html>. Opening remarks at the T2S launch celebration

² <https://www.statista.com/statistics/412482/europe-alternative-finance-transaction-value-debt-based-securities/>

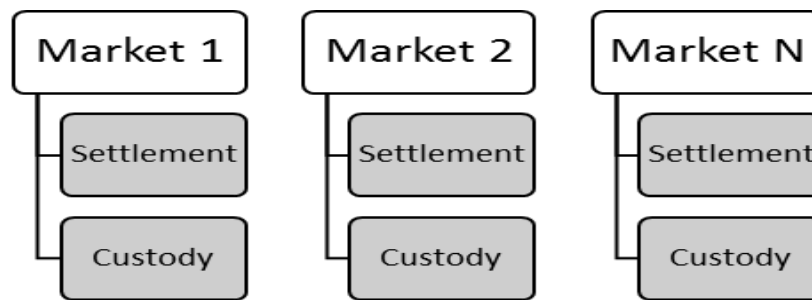


Image 1 Settlement between markets before T2S

The main drivers of the project, as set out by the ECB are:

- To maximize safety and efficiency in settlement of the securities transactions, by using delivery versus payment mechanism.
- To maximize efficiency by settling cash (Target 2 Platform) and securities (Target 2 Securities) on the same IT platform supervised by the same entity ECB.

ECB mentioned that T2S is very much in the centre of its mandate, nevertheless the project doesn't have a political connotation, and it is not a subsidy for a political system. T2S, together with TARGET2, represents the main contribution currently made by the Eurosystem to the integration of the European market infrastructure. This is the reason why, despite the financial crisis, a long-term project like T2S with huge potential for changing European post-trading remains high on the European agenda³. T2S strategy is a winning strategy, because its purpose is making it easier to carry out economic activities, building a system that pulls risks sufficiently. While the Commission recognized its role in legal harmonization, it also continued to see the integration of settlement systems as a private-sector responsibility. Integration should be driven mainly by industry initiative and supported by public action only where this was necessary. Such a distinction between the appropriate roles of public and private actors was in line with the fundamental principles of the European Union about market-based competition, in favour of an open market economy with free competition.

Post T2S model, 2015 onwards, integrates the settlement process on a single technical platform, while the custody remains country specific.

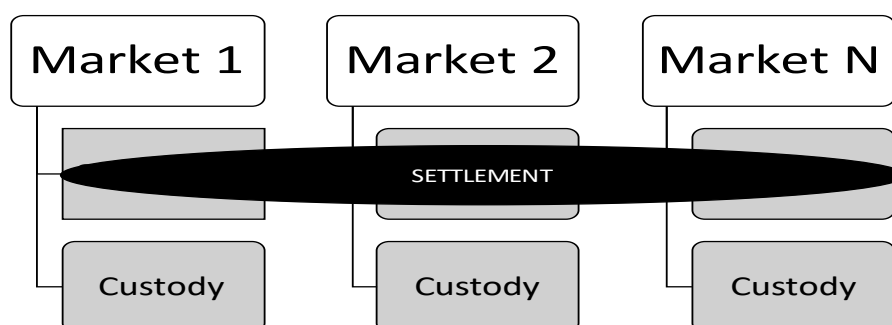


Image 2 Integrated settlement model with T2S

³ <https://www.ecb.europa.eu/paym/t2s/about/multimedia/html/t2s2012.en.html>

The World Bank states that: „T2S represents a unique opportunity to dismantle Giovannini barriers and stimulate European harmonization in post-trading.⁴” It will contribute to the financial development and organizational improvement, which makes markets more complete, increases agents’ options when engaging in financial transactions, improves market transparency, reduces transaction costs and increases competition. T2S is meant to revolutionize the current post-trade landscape.

As any currency area, the euro area needs a financial market infrastructure which enables the safe and efficient flow of payments and financial instruments. Since its creation, Eurosystem, which comprises the European Central Bank and the national central banks of the Member States whose currency is the euro, has one of its primary objective to safeguard financial stability and promote European financial integration. The legal basis for the Eurosystem’s competence in the area of payment and settlement systems is contained in Article 127(2) of the Treaty on the Functioning of the European Union⁵. One of the Eurosystem’s basic tasks is "to promote the smooth operation of payment systems" (Article 3.1 of the Statute of the European System of Central Banks and of the European Central Bank). The first step to financial integration and globalization was the launch of euro that has led to reshaping and harmonization of the infrastructure for euro payments and for the trading, clearing and settlement of financial instruments. After the launch of euro, on 4 January 1999, TARGET, Trans-European Automated Real-time Gross Settlement Express Transfer system, commenced operations. It provided a system enabling the euro area wide real-time settlement of euro payments, by linking together the different RTGS (Real-time gross settlement systems) that existed at the national level. These systems allowed a considerable degree of integration in the large-value payments segment, but in the context of EU enlargement, the system experienced various short comes: new member states were expected to connect to the system, thereby increasing the number of TARGET components, multiplied the local technical components, increasing the maintenance and running costs. On 24 October 2002, the Governing Council of the ECB decided on the principles and structure of the next-generation system: TARGET2, a real-time gross settlement (RTGS) system owned and operated by the Eurosystem. Not like its first decentralized version, the system was replaced by a single technical platform, the “Single Shared Platform” (SSP), provided by 3 Eurosystem central banks: Banca d’Italia, Banque de France and Deutsche Bundesbank. These measures helped the implementation of the single monetary policy, reducing systemic risk, helped banks to manage their euro liquidity at national and cross-border level, lead to progression in terms of reshaping and consolidating the infrastructure in large-value payments.

1.2. OBJECTIVES

During this master thesis, the main objective is to evaluate the T2S impact on the new harmonized European securities market landscape and also to assess its direct contribution to the reduction of settlement costs in Europe. Talking about this objective, we target to understand the benefits T2S brings on the table for the market participants, in particular through the case of Interbolsa Portugal.

4 <http://siteresources.worldbank.org/FINANCIALSECTOR/Resources/282044-1260476242691/T2S.pdf> p 15

5 <http://www.lisbon-treaty.org/wcm/the-lisbon-treaty/treaty-on-the-functioning-of-the-european-union-and-comments/part-3-union-policies-and-internal-actions/title-viii-economic-and-monetary-policy/chapter-2-monetary-policy/395-article-127.html>

Also, this research aims to describe the risks associated with the post-trade activity, the technical inefficiencies among settlement industry in Europe, with different domestic arrangements, that T2S is addressing. This objective relates to identifying the technical, legal and tax barriers in the post-trade environment.

As this is a relatively new project, with no previous analogy, it is of a critical interest to prove that there is a real harmonization of costs between European CSDs, and also that there are cost savings per unit price of a settlement transaction, at the national and cross border level.

2. LITERATURE REVIEW

In the following section, it will be identified the existing literature on the thesis subject, addressing explicitly the problem of securities settlement system integration in EU and T2S initiative, that make a significant contribution to the understanding of the T2S topic. The literature review is divided into several sections. First, it will be identified the studies that focus on the competition and inefficiencies in the trading system in EU, also the major risks in the settlement process. The review was further complemented with the strands in the literature that research the microstructure and organization of securities markets, presenting the coherent framework and performance of the stock exchange and settlement industry and its participants. After that, it will be determined the seemingly previous studies in the global literature concerning the integration and consolidation in payment and securities settlement systems in the euro area.

The studies on the euro area payment and securities settlement systems are a relatively recent area of research in finance. The main body issuing on this subject are: European Central Bank (ECB) and the Bank for International Settlements (BIS). The first measures to address the national settlement barriers were published in April, 2004: „The European Central Securities Depositories Association’s Response to the Giovannini Report”. In April 2012, the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) published the standards report Principles for financial market infrastructures (PFMIs). The new standards replace the three existing sets of international standards set out in the core principles for systemically important payment systems (CPSS, (2001)); the Recommendations for securities settlement systems (CPSS-IOSCO, (2001)); and the Recommendations for central counterparties (CPSS-IOSCO, (2004)). The CPSS and IOSCO have strengthened and harmonized these three sets of standards, by raising minimum requirements, providing more detailed guidance and broadening the scope of the standards to cover new risk management areas.

2.1. RISKS IN THE POST-TRADE MARKET

2.1.1. Cross-Border Transaction Risk

A cross-border securities transaction is much more complicated and risky than a domestic one, it is defined as a settlement that takes place in a country (or currency area) in which one or both parties to the transaction are not located. Normally, it involves a greater number of participants than a domestic transaction, and the use of multiple intermediaries increases transaction costs, and the custody risk to the parties involved. It also increases the possibility of losing securities, because of, for example, insolvency of the custodian. In addition to the risks mentioned, the trade’s international aspects rises the level of operational and credit risk, also legal risk, which contains an unexpected intervention of a foreign law or regulation that makes the contract enforceable. The customer also faces foreign exchange risk, when the trade is done between two currencies. The currencies’ movements can affect the price of the security between trading and settlement dates.

There are some risks specific to the both type of transactions: domestic or not, the settlement risk, counterparty risk, operational risks, credit risks and liquidity risks. The main threats jeopardizing an investor are: securities are delivered but no cash received, or vice versa, because of a default of a

counterparty or intermediary; the possibility that either one of the counterparties may fail to meet their obligations; and the liquidity risk, that either one of the counterparties fails to settle the trade on the due date. Settlement risk is the risk that settlement in a transfer system will not take place as expected, usually owing to a party defaulting on one or more settlement obligations. The settlement failure, or the inability of a participant to meet its settlement obligations in a system can occur when there is a temporary or permanent inability of the settlement agent, the institution across whose books transfers between participants take place (Giovannini, 2003). The risk is limited by ensuring a DVP basis for settlement of securities transactions. It makes settlement of securities conditional on provision of cash, or vice versa. DVP procedures reduce, but do not eliminate this risk, because there can be a risk that the failure of a CSD participant could result in systemic disruptions.

2.1.2. Counterparty risk

All the investors conducting transactions in financial instruments, including derivatives transactions, implement risk mitigation processes and control, in order to reduce the exposure to the counterparty risk. The more counterparties an organization has exposure to, the greater are the risks and so are the costs. According to Giovannini, the presence of CCP marks the great difference between the riskiness of the settlement flow on the Regulated Market and OTC. Thus, from the point of view of market participants, the credit risk of the CCP is substituted for the credit risk of the other participants. A CCP can lower these costs by reducing the number of counterparty business relationships. On the regulated market, while using a CCP, the participants can deal with any counterparty that it knows is eligible to use the CCP without extensive due diligence, as its contractual relationship and risk exposure will only concern the CCP.

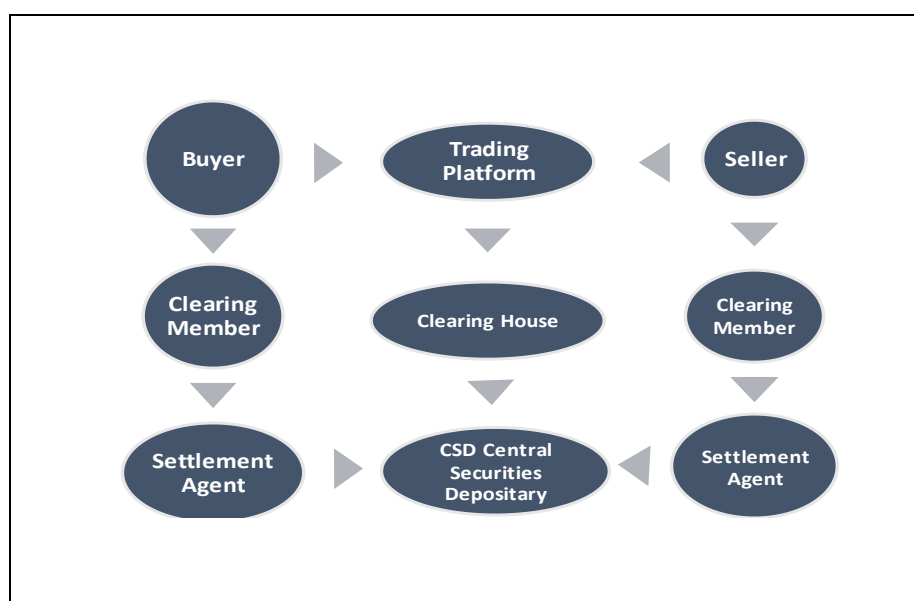


Image 3 Settlement Flow on a Regulated Market

Unlike in exchange transactions, where trades are matched up and guaranteed by the exchange, on the OTC Market, clearing and settlements of trades, are still left to the buyer and seller, on a non-standardized basis and continue to require a considerable degree of manual intervention. In OTC markets, participants trade directly with each other, typically through telephone or computer links.

Post-trading infrastructures for OTC derivatives have therefore struggled to cope with the growing volume and complexity of OTC derivatives trades in recent years. The dealers in an OTC security can withdraw from market making at any time, which can cause liquidity to dry up, disrupting the ability of market participants to buy or sell (IMF,2017)⁶. The inherent opacity of OTC derivatives markets, lack of market discipline and ineffective management, creates a large risk exposure for the financial institutions.

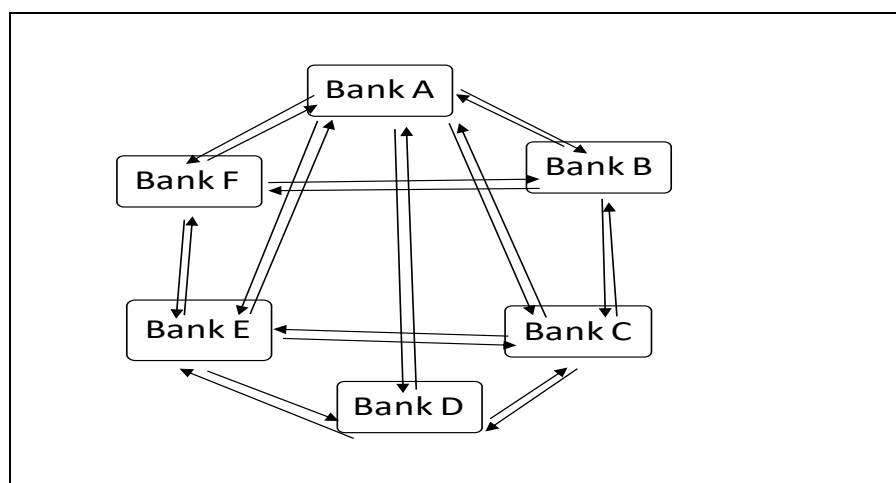


Image 4 Settlement Flow on OTC Market

The IMF says that counterparty risk on OTC market could be substantially minimized if bilateral contracts were cleared through a central counterparty mechanism, which essentially acts as counterparty to all counterparties, through the enforcement of the robust risk management standards, the sharing of losses of members of CCPs, and multilateral netting⁷.

2.1.3. Operational risk

In order for a transaction to be settled, it should be first confirmed and matched, operations usually performed by the back offices of the direct market participants, indirect market participants and custodians. They need to prepare settlement instructions, which should be matched prior to the settlement date⁸. Speedy, accurate verification of trades and matching settlement instructions is an essential precondition for avoiding settlement failures, especially when the settlement cycle is relatively short. Many markets have introduced the automation of trade confirmation and settlement matching systems. According to Committee of European Securities Regulators, STP allows the automatic, interoperable, comparison of trades between direct market participants. At its most sophisticated, automation allows manual intervention to be eliminated from post-trade processing. STP allows trade data to be entered only once, and then those same data are used for all post-trade requirements related to settlement.⁹ The implementation of STP requires CSDs, market operators, custodians, brokers, dealers and investment firms, one precondition: the adoption of universal

⁶ <http://www.imf.org/external/pubs/ft/fandd/basics/markets.htm>

⁷ <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Counterparty-Risk-in-the-Over-The-Counter-Derivatives-Market-22447>

⁸ This only applies to settlement cycles that extend beyond T+0, and only for transactions where matching is required.

⁹ https://www.esma.europa.eu/sites/default/files/library/2015/11/10_610.pdf

messaging standards and communication protocols in order to have timely access to accurate data for trade information enrichment, mainly with regard to clearing and settlement details. The longer the period from trade execution to settlement, the greater the risk that one of the parties may become insolvent or default on the trade; the larger the number of open trades prior to settlement; and the greater the opportunity for the prices of the securities to move away from the contract prices, increasing the risk that non-defaulting parties will incur a loss when replacing the unsettled contracts. The timing of settlement finality, or the time at which the deliveries of securities or cash become both irrevocable and enforceable, it should be clearly defined by the rules of the system, or national legislation, and should apply to all participants. Intraday finality can be provided through real-time settlement ¹⁰procedures or multiple batches processing during the settlement day.

2.1.4. Legal Risk

The rules and contractual arrangements related to the operations of the securities settlement systems and the entitlement to securities should be valid and enforceable, even in the event of the insolvency of a system participant. The operators should identify the relevant jurisdictions for each aspect of the clearing and settlement process, and should address any conflict of law issues for cross-border systems. All eligible CSDs governed by the law of an EEA Member State should apply to have their securities settlement systems designated under the European Directive 98/26/EC on settlement finality in payment and securities settlement systems. The relevant authorities should actually designate the systems that meet the criteria of the Settlement Finality Directive. The rules governing the system should clearly indicate the law that should apply to each aspect of the settlement process. The operators of cross-border systems must address conflict of law issues when there is a difference in the substantive laws of the jurisdictions that have a potential interest in the system.

2.2. SECURITIES TRADING AND SETTLEMENT

An important strand in the financial literature focuses on the analysis of the efficiency of settlement process and different form of financial integration. According to Ian Domowitz and Ruben Lee (The Legal Basis for Stock Exchanges: The Classification and Regulation of Automated Trading Systems, 1998),¹⁰ at the most general level, a market may be thought of as a forum for executing a trade. In an equity market, the standard trade cycle is composed of many different activities, including consideration of pre- and post-trade information, order routing, order execution, matching, clearing, settlement and custody. A trading system is defined here to be a mechanism which delivers three of these functions - trade execution, order routing, and data dissemination. Also, they debate some international issues. Despite the fact, that it is now technologically relatively easy to construct cross-border automated securities trading systems, only a few have been developed. Of these, only a small number have actually been successful. One reason why so few cross-border systems have been built is that many of the regulatory problems associated with their operation have not been adequately addressed. These questions are, however, not easy to answer. They are often complex, controversial, politically charged, and not given the highest priority for attention by domestic regulators and legislators. Furthermore, apart from the various institutions of the EU, there is no institutional framework for enforcing any agreed international policy.

¹⁰ Real-time gross settlement (RTGS) is the continuous settlement of securities transfers individually on an order-by-order basis.

Thomas Gehrig (Cities and the Geography of Financial Centres, 1998) emphasised that „financial activities based on straightforward, generally available information tend to be centralized. For example, limit orders and market orders consist of a high degree of simple and standardized information. The processing of such standardized financial activities is therefore a technical matter and does not rely on complex local or issuer-specific information.

The investment cycle starts with the formation of the investment decision. In the pre-trade phase, the investors meet the fund managers or asset managers to conclude their investment strategy, according to their objectives and risk appetite. Trading represents the buying and selling of the securities or commodities, between two brokers on a short-term basis.

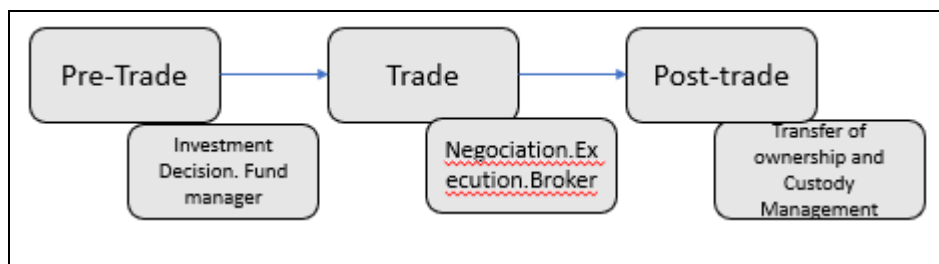


Image 5 Settlement Chain

The post-trade phase represents the transfer of the ownership and custody management of the securities. The post-trade services represent the safe and smooth conclusion of a security transaction, involving the securities clearing and settlement. Clearing and settlement institutions guarantees that these transactions are performed safely and efficiently. Custody management includes the safekeeping and administration of securities on behalf of others. The post-trade phase involves 4 main activities: confirmation, clearance, delivery and payment, and each activity is crucial for the completing of the trade. Delivery of securities and payment of funds may occur simultaneously, and only when both delivery and payment have been finalized, the settlement of the securities transaction is achieved. The process of clearing and settlement begins when a securities trade has been executed. The first step is to ensure that the buyer and the seller agree on the terms of the transaction, referred to as trade confirmation. The trade confirmation or affirmation should preferably occur without delay after trade execution, but no later than T+1. This measure will help to avoid errors in recording trades, inaccurate books and records, also will reduce mismanaged market risk and credit risk. Delivery requires the transfer of the securities from the seller to the buyer. The most common type is delivery versus payment (DVP), a way of controlling the risk to which securities market participants are exposed. In such a settlement, there is a link between a securities transfer system and a fund transfer system ensuring that delivery of securities is done simultaneously with payment, assuring that neither the buyer nor the seller is exposed to settlement risk. Often, when a CSD does not itself provide cash accounts for settlements, the underlying securities are first blocked in the account of the seller or at the seller's custodian. The CSD then requests the transfer of funds from the buyer to the seller in the cash settlement agent. The securities are delivered to the buyer or the buyer's custodian only if the CSD receives confirmation of settlement of the cash leg from the settlement agent. A financial institution that deals with global markets ought to build a network of cash correspondents and sub-custodians, these intermediaries (banks) will give to their customer's access to the market of the country they are residents. This network is sophisticated and the links between the participants are created at every step of the investment cycle. Heiko Schmiedel in „Performance of international securities markets (Bank of Finland Studies E: 28 2004), describes the

3 types of organizations providing clearing and settlement services: CSDs, ICSDs, and custodians. Historically, ICSDs' main function was to settle Eurobond trades. They are now active in clearing and settlements across different international markets and currency areas. The custodian holds a securities account on behalf of its client, and saves the results of all its transactions for the purchase and sale. It is an entity, usually a bank, that safe keeps and administers securities providing various services as clearance, settlement, cash management, foreign exchange and securities lending.

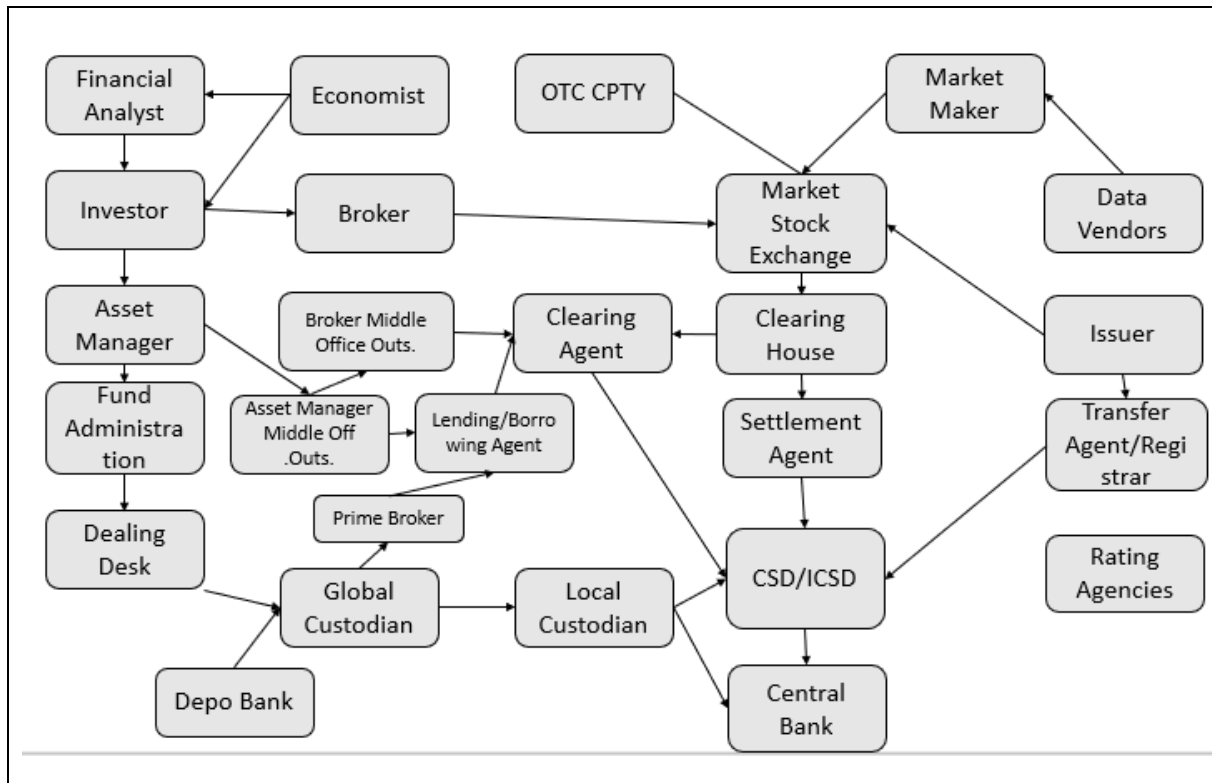


Image 6 Market Participants

A custodian provides to an investor a place to store assets with little risk, because it reduces the risk of the client losing the assets or having them stolen. While the correspondent maintains a cash account on behalf of its client, used to pay and receive currency. Correspondents and custodians are the way to go directly to a local market. The local custodians, provides custody services for securities traded and settled in the country in which the custodian is located. It is considered a good partner for a successful post-trade processing, as it is in the local market and has deep understanding of local practices and rules, can digest and communicate fast the operational and strategic challenges introduced by the new market regulation. The following financial institutions are the 6 largest custodians by assets under custody¹¹: The Bank of New York Mellon Corporation from USA, Euroclear located in Belgium, J.P. Morgan from USA, State Street Corporation and Citi from USA, BNP Paribas Securities Services from France. The drawback of using a local custodian is that for every new currency, each new securities market, the investors need to find a new supplier. Usually, the

¹¹ The Bank of New York Mellon Corporation from USA (24,266,267 USD millions), Euroclear located in Belgium (19,407,827 USD millions), J.P. Morgan also from USA (16,032,933 USD millions), State Street Corporation from USA (15,794,657 USD millions), Citi from USA (12,600,000 USD millions), BNP Paribas Securities Services from France (6,205,000 USD millions). Web source: <http://financialmarkets.theasianbanker.com/custodians-by-assets-under-custody>

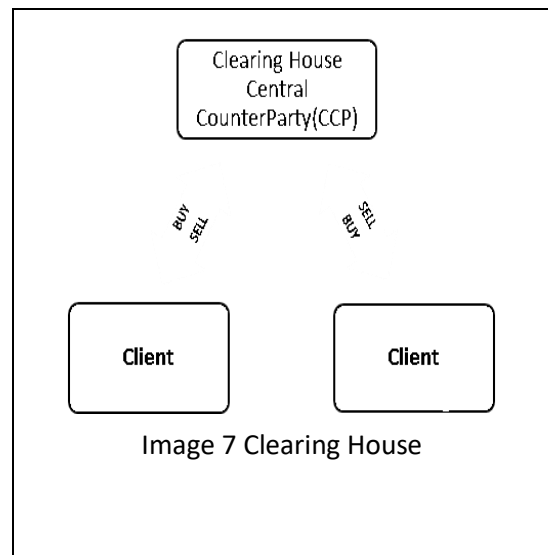
institutional investors and large companies involved in financial markets delegate their securities and cash assets to the global custodians. The global custodian provides custody services for securities traded and settled not only in the country, where the custodian is located, but it serves as a single-entry point for worldwide operations, through a net of cross-border experts, providing the possibility to hold a single account (in multicurrency) opened for all markets, single contractual relationship to be signed for all markets, and the management of FOREX. To do this, the global custodian is in contact with a network of sub-custodians located in domestic markets, which give them the access to the markets where the customers trade, and the CSD of the country of residence of the client. These global custodians are typically members of many national CSDs, or have access to membership via local custodian. The transactions itself are settled via a settlement agent, an institution appointed by the client and authorized to instruct and settle transactions with a CSD/ICSD. Its responsibilities are: check the validity of the trades, repair the trades whenever necessary; control the stock and cash positions; release the instructions and settle the instructions. CSD is the institution associated with the national market, that holds the securities and they can never leave its CSD, because the exchange of asset ownership can only take place within a domestic market. As an example, each country has its own CSD, which houses all the shares from that country. Those shares never cross the border, regardless of the nationality of the investors who buy or sell them: an Italian share, no matter who it belongs to, will remain in Monte Titoli, when a German one will remain in Clearstream Frankfurt. It is a centralized organization, the official holder of all the national securities on a market, where securities can be available for clearing and settlement. It guarantees to its clients the relay and the processing of all financial information to its members' participants. The 3 main services provided by a CSD are: issuance or first entry point for newly created securities, the settlement of the securities and safekeeping. Not like a CSD, that deals only within the perimeter of the national borders, the ICSD (International Central Securities Depository) offer a set of services in area of the issuance and asset management of international securities, as Clearstream International, Euroclear Bank, SIX SIS. Beside these participants in the post-trade process, the Central Bank plays an important role, meaning that, if the securities accounts are held by the CSDs, the cash accounts are held by the Central Bank. The Central Bank is in charge to issue and control the money supply for a specific currency.

Kauko (Interlinking securities settlement systems: A strategic commitment? 2007) explores a different dimension of the industrial organization of central securities depositories. In his model, it is recognized that CSDs operate simultaneously in two different markets. These are the primary market for securities (where it was issued), and the secondary market for settlement, where the transfer of legal ownership occurs. As Kauko demonstrates, for profit, CSD is faced with a commitment problem. Once securities are issued then a profit maximizing CSD will seek to maximize net revenues from secondary market settlements. But this in turn will raise the costs of secondary trading, reduce volumes and liquidity in secondary markets, and hence reduces the value to both investors and issuers of primary market issuance. The CSD will achieve higher profits and investors will achieve higher utility, if the CSD can pre-commit to maintaining relatively low secondary market pricing. Kauko's specific objective is to analyse the potential role of "links" between CSDs. He noted that many national CSDs have established communication links, which allow other national CSDs to provide indirect access to their securities accounts.

Giddy, Saunders, and Walter (1996) in “Alternative Models for Clearance and Settlement: The Case of the Single European Capital Market”, emphasize the fact that most CSDs are properly viewed as multiproduct organizations, which adds to the complexity of assessing the level and structure of total costs of clearance and settlement systems and their efficiency. This complexity derives from the fact that clearance and settlement costs can be viewed as a subset of the transaction costs facing an investor in effecting a trade. The key feature of the clearance and settlement value chain is that it involves a sequence of related services, of which actual securities clearance and settlement is but one element. CSDs rarely handle a single class of securities, or provide a single type of service, but offer a range of services that create potential economies of scope and scale.

Clearing provides a smoother and more efficient market. According to BIS (in Capital requirements for bank exposures to central counterparties, 2012), the Clearing House is a financial institution through which participants agree to exchange instructions for funds, securities or other instruments. It interposes itself between the counterparties to a trade, becoming the buyer to every seller and the seller to every buyer. It plays a critical role in the stability and efficiency of financial markets, taking on significant financial risks by:

- Guaranteeing anonymity of transactions counterparties through the post-trade process.
- Eliminating bilateral counterparty risk until settlement, as CCP becomes the counterparty to both parties, and if one party fails to meet its obligations, the CCP will ensure the other party is not affected and will fulfil the obligations with the remaining counterparty.
- Managing risk through collateral, a CCP evaluates the counterparty exposure to outstanding obligations, and it requires the market players to deposit collateral, in the form of cash or securities.



The clearing agent is a local bank that settles trades in the market and delivers on to the custodian, he receives shares to sell them or buy shares to deliver them.

Lamfalussy Group, (The Committee of Wise Men, governed by Chairman Alexandre Lamfalussy) in the Final Report of the Committee of Wise Men on the Regulation of European Securities Markets (Brussels, 2001), has underlined the role of efficient clearing and settlement arrangements in delivering the economic benefits from the broader process of EU financial integration. The Committee argues that further restructuring of EU clearing and settlement arrangements is necessary, stressing that "the process of consolidation should largely be in the hands of the private sector". The Committee reaffirms its view that there are significant gains from building an integrated financial market in the European Union. An integrated European financial market will enable, subject to proper prudential safeguards and investor protection, capital and financial services to flow freely throughout the European Union. The barriers - unnecessary bureaucracy, lack of trust, and sometimes downright protectionism - will become things of the past. European businesses, large and small, will be able to tap deep, liquid, innovative European capital pools, centred around the euro for

the financing they require to develop their business activities. However, the Committee also highlights the public policy interest in having the most cost-efficient, competitive and prudentially sound arrangements possible.”

Holthausen and Tapking (Raising Rival’s Costs in the Securities Settlement Industry, July 2004) analysed the competition between a central securities depository and a custodian bank in the Stackelberg model. The CSD sets its prices first, the custodian bank follows. There are many investor banks, each of which has to decide whether to use the service of the CSD, or of the custodian bank. This decision depends on the prices and the investor banks preferences for the inhomogeneous services of the two service providers. Since the custodian bank uses services provided by the CSD as input, the CSD can raise its rivals’ costs. However, due to network externalities, the CSDs equilibrium market share is not necessarily higher than socially optimal. Their model explores a trade-off between client preferences, between the two settlement providers (the CSD and the agent bank) and a network effect, the additional cost of cross-firm settlement between an investor accounts on the CSD and investor accounts at the agent bank. The limitations of their study are that in the real world the competition between agent banks and CSDs for settlement volume, on which they focus, is not of great relevance. The agent banks key function is to provide technical connectivity to CSDs for those brokers who do not wish to bear the operational costs of interacting with CSDs, costs such as maintaining IT connections, monitoring and tracking account balances, and dealing with processing exceptions. Bilateral link between CSDs, is the most recently available, but probably the least used option by non-residents. Links between CSDs offer advantages by reducing the number of entities involved in the settlement process and by allowing investors to more easily and cheaply meet any collateral requirements. To conclude, the settlement system of a cross-border transaction can be achieved by using one of these types of access:

- Direct access to a national CSD in the country where the security is issued. Direct access implies participation/membership in the national CSD, which involves signing legal agreements, complying with membership requirements, investing in technological interfaces and access to a payment mechanism.
- Services of a local agent, which is normally a financial institution with membership in the national CSD, in the country where the security is issued. This is the most common option used for cross-border settlement of equities transactions. The local agent offers the non-resident a full range of settlement, banking and custody services, as well as services for tax purposes, processing of corporate actions.
- ICSDs, that operate mainly in the settlement of internationally-traded fixed income instruments, but offer a single access point to national markets via links to many national CSDs.
- Global custodian, which also provides customers with a single access point to national CSDs in various countries, via a network of sub-custodians.

Tapking and Yang (Horizontal and Vertical Integration in Securities Trading and Settlement, 2006) analyse the welfare effects of different forms of consolidation amongst trading and settlement institutions. They find that full technical horizontal integration of settlement systems is better than vertical integration of exchanges and settlement systems. These findings have clear policy implications with regards to the highly fragmented European securities infrastructure. Their model supports three principal conclusions. First, they show that vertical integration (integration of trading

infrastructure with clearing and settlement infrastructure) leads to a welfare improvement, when compared with competitive separation. Clearing and settlement are inputs to the total trading service of executing, clearing, and settling a securities trade. Trade execution without subsequent clearing and settlement is incomplete and hence of no value to the investor. The three services - trade execution, clearing, and settlement are therefore different elements of a composite good. Suppose, therefore, that total trading demand is given by $V(p)$, where total execution price p is the sum of the price of trading p_t and the price of clearing and settlement p_s (for simplicity clearing and settlement will be treated as a single service, but the argument is only strengthened when these are recognized as distinct services): $p=p_t+p_s$. Consider first separation of the trading platform and the settlement infrastructure. Simplifying by assuming operating costs are zero, the profit of the trading platform is then given by $p_t V$, with the first order condition for profit maximization:

$$V + p_t \frac{dV(p_t + p_s)}{dp_t} = 0$$

Implying that the price of trade execution equals the inverse of the price elasticity of trading demand: $p_t = V/dV(p_t + p_s)/dp_t = 1/\eta$. Similarly $p_s = V/dV(p_t + p_s)/dp_s = 1/\eta$, so the total price of trading is given by $p=p_t+p_s=2/\eta$. With vertical integration, we instead have $p = 1/\eta$, so prices are considerably closer to the socially efficient level of $p=0$ under vertical integration than with separation. Further, Tapking and Yang show that horizontal legal integration at the lower (CSD) level can facilitate competition between exchanges and improve welfare, while technical integration, removing costs of linking between the CSDs, is always better for social welfare, than purely legal integration.

$$\ln TC(P, Q, D, T, YR) = \alpha_0 + (\frac{\alpha_1}{r}) \ln Q_1 + (\alpha_2/r) \ln Q_2 + \sum_i (y_i/r) \ln P_i + \lambda_1 D_1 + \tau_1 T + \sum_i \delta_1 YR_1$$

2.3. T2S PROJECT IMPLEMENTATION

Aiming to develop its own unique settlement business model, in July 2008, the Euro System of Central Banks launched T2S. The T2S project main goal is to diminish the risks and costs during the settlement process. Deutsche Bundesbank, Banco de Espana, Banque de France and Banca d'Italia have been mandated to build the system and operate it live. One of the key objectives of T2S project is to assure safety by using DVP mechanism, while efficiency is achieved via settling cash (T2 Platform) and securities (T2S) on the same IT platform, supervised by the same entity, ECB. T2S uses CCP netting which is usually the most effective way for settlement when the securities are held on omnibus accounts. Due to its complexity, the project was divided in 5 waves. TS2 was initially planned to go live in Q2 2013, but due to the multitude of players, it was postponed several times and the first CSDs migrated in June 2015.

Wave 1 22 Jun 2015 - 31 Aug 2015	Wave 2 29 Mar 2016	Wave 3 12 Sep 2016	Wave 4 6 Feb 2017	Final wave 18 Sep 2017
Bank of Greece Securities Settlement System (BOGS)	INTERBOLSA (Portugal)	Euroclear Belgium	Centrálny depozitár cenných papierov	Baltic CSDs
Depozitarul Central (Romania)	National Bank of Belgium	Euroclear France	SR (CDCP) (Slovakia)	(Estonia, Latvia, Lithuania)
Malta Stock Exchange	Securities Settlement Systems (NBB-SSS)	Euroclear Nederland	Clearstream Banking (Germany)	Iberclear (Spain)
Monte Titoli (Italy)		VP Lux (Luxembourg)	KDD - Centralna klirinško depotna družba (Slovenia)	
SIX SIS (Switzerland)		VP Securities (Denmark)	KELER (Hungary)	
			LuxCSD (Luxembourg)	
			OeKB CSD (Austria)	

Table 1 T2S Implementation waves

There are 23 central securities depositories in the European region that moved to T2S. Migrations took place in waves, with the first wave accomplished on 22 June 2015, and the final - September 2017. The migration took place over several weekends in order not to impact the production. The objective of the migration phase is to enable a smooth and successful transition to the usage of T2S services for the CSDs, central banks and their communities. On the Monday morning following these migration weekends CSDs will be operationally settling in T2S. 4th wave was the largest T2S migration wave, in terms of both the number of CSDs and the increase in settlement volumes, the volume of securities transactions being settled on the platform has almost doubled, with 18 CSDs, representing 16 markets.

2.3.1. T2S Principles

According to ECB, the project was aligned to 19 principles¹²:

1. The Eurosystem shall take on the responsibility of developing and operating T2S by assuming full ownership
2. T2S shall be based on the TARGET2 platform and hence provides the same levels of availability, resilience, recovery time and security as TARGET2
3. T2S shall not involve the setting-up and operation of a CSD

¹²

4. T2S shall support the participating CSDs in complying with oversight, regulatory and supervisory requirements
5. The respective CSD customers' securities accounts shall remain legally attributed to the CSD and the respective central bank customers' cash accounts shall remain legally attributed to the central bank.
6. T2S shall settle exclusively in central bank money
7. The T2S settlement service allows CSDs to offer their customers at least the same level of settlement functionality and coverage of assets in a harmonized way
8. Securities account balances shall only be changed in T2S

As stated above, T2S is a service for enhancing the efficiency of securities settlement across Europe, while at the same time keeping central banks' cash account management.

9. The primary objective banks. Its scope is therefore limited exclusively to central bank money and does not extend to the settlement of commercial bank money. of T2S is to provide efficient settlement services in euro
10. T2S shall be technically capable of settling currencies other than the euro
11. T2S shall allow users to have direct connectivity
12. CSDs' participation in T2S shall not be mandatory. CSDs' participation in T2S is a business decision on the part of the CSDs and their local market community. When deciding whether or not to join T2S, CSDs are expected to follow the interests of their shareholders and customers.
13. All CSDs settling in central bank money and fulfilling the access criteria shall be eligible to participate in T2S
14. All CSDs participating in T2S shall have equal access conditions
15. All CSDs participating in T2S shall do so under a harmonized contractual arrangement
16. All CSDs participating in T2S shall have a calendar of opening days with harmonized opening and closing times for settlement business
17. T2S settlement rules and procedures shall be common to all participating CSDs
18. T2S shall operate on a full cost-recovery and not-for-profit basis. The Eurosystem prices the development and operation of T2S on a full cost-recovery and not-for profit basis. While delivering a very high level of service in terms of quality, security and availability, T2S also seeks to be as cost-efficient as possible.
19. T2S services shall be compatible with the principles of the European Code of Conduct for Clearing and Settlement T2S shall be compatible with the principles of the European Code of Conduct for Clearing and Settlement with regard to price transparency, the unbundling of services and accounting separation.

2.3.2. T2S Harmonization Activities

In order to ensure the efficient harmonization towards the post trade environment, there were implemented 24 activities. They were divided in priority 1 and priority 2 activities, managed by the T2S team at the ECB, under the guidance of the Harmonisation Steering Group (HSG) and the endorsement of the T2S Advisory Group. Priority 1 activities are necessary to ensure efficient and safe cross-CSD settlement in T2S. The HSG and the T2S team should focus on these activities as first priorities for resolution and implementation prior to the launch of T2S.

1. T2S introduces new ISO 20022 messages

The T2S users will communicate with the technical platform using ISO 20022, an ISO standard for electronic data interchange between financial institutions. ISO 20022 compliant messages is the successor to ISO 15022. It describes a metadata repository containing a set of 130 messages, customized to the specific needs of T2S, business processes, and a maintenance process for the repository content. SWIFT Standards Consulting Services has been supporting the T2S project since 2008. T2S instruction types are as follows: Settlement Instructions - settlement of securities and cash leg of transactions; Settlement Restrictions - blocking, reserving and earmarking of securities and cash positions on T2S accounts; Maintenance Instructions- cancel, hold/release and amendment instructions; Liquidity Transfers-liquidity transfers between DCAs and DCA-T2 transfers.

2. T2S mandatory matching fields

With the implementation of T2S there are new matching criteria with mandatory, additional and optional matching fields. T2S actors are required to use mandatory and non-mandatory T2S matching fields. Mandatory matching fields are those fields that must be present in the instruction and which values should be the same in both settlement instructions: for example, payment type, securities movement type, ISIN Code, trade date, settlement amount, intended settlement date, delivering party, receiving party, CSD of the Delivering Party, CSD of the Receiving Party, currency. Non-mandatory matching fields can be additional or optional: additional matching fields are initially not mandatory but their values have to match when one of the counterparties provides a value for them in its instruction (Opt-out ISO transaction condition indicator, CUM/EX indicator). In case of optional matching fields, a filled-in field may match with a field with no value, but when both parties provide a value, the values have to match (common trade reference, client of delivering CSD participant, client of receiving CSD participant). T2S also offers the possibility to prioritize the settlement instructions: from high to low. Reserved priority is assigned only by a CSD or NCB. Top priority is assigned automatically to trading venues and CCP transactions. High and normal priority can be assigned by T2S actors to their settlement instructions.

3. Interaction with T2S (tax info requirements)

To avoid complexity and confidentiality issues, for intra-CSD or cross-CSD transactions, no tax-related information should be included in T2S settlement messages. Some of these taxes related information is tax status of transaction, tax status or tax id of end investor, tax exempt identification number, alien registration number, passport number, corporate identification, driver license number, foreign investment identity number, BIC, proprietary id, name and address of investor. As ISO messages also provide fields that can be used to pass information about a particular transaction tax type (withholding tax, payment levy tax, local tax, stock exchange tax, transfer tax, value added tax, consumption tax) specifying amount, debit/ credit indicator, currency and other details, such fields should not be used to pass on any kind of tax related information.

4. T2S schedule of the settlement day and calendar

One of the key harmonization agreements in the T2S context is the use of a single schedule for the T2S settlement day and a single calendar per currency, and CSDs should be fully compliant with it.

Time	T2S periods	High level description
6.45 p.m. -7.30 p.m.	SOD: Start of Day	Change of business date in T2S and preparation for night-time settlement.
7.30 p.m.-3.00 a.m.	NTS: Night-time Settlement	Settlement with multiple cycles (proposed 2 cycles) in night-time settlement period • First night-time cycle with reporting and static data update • Last night-time cycle (with partial settlement) with reporting and static data update.
3.00 a.m. -6.00 p.m.	RTS: Real-time Settlement (with a maintenance window)	Real-time settlement followed by settlement with partial settlement periods and real-time settlement closure period
6.00 p.m. -6.45 p.m.	EOD: End of Day	Close of the current T2S business day

Table 2 T2S Day Schedule

5. T2S corporate actions standards

Asset services offered by CSDs, such as corporate actions (CA), play an increasingly important role in the competition framework of the securities post-trade industry. Considering the fact that they will all use the same, T2S platform for settlement related to processing of corporate actions, there is an urgent need for harmonization. For example, in a cross-border scenario, where securities holdings are recorded in multiple CSDs, persistence of divergent practices of markets in T2S would result in unnecessary costs and high rates of matching fails during the processing of corporate actions in the cross-border environment. In September 2009, the T2S Advisory Group (AG) approved the T2S CA standards for processing corporate actions on flows, which had been prepared by the T2S Corporate Actions Sub-group CASG, a group composed of experts on CA processing from CSDs, central counterparties (CCPs), and their participants.

The corporate actions on flow, or transaction management, include market claims, transformations and buyer protection, and they occur only on matched instructions in T2S. The challenges for CA transaction management in the cross-CSD environment of T2S stem from the fact that more than one CSD may be involved. Therefore, for the purposes of the T2S CA standards, a new concept has been introduced: the instruction owner CSD (IOC), the CSD that provides the securities accounts on which the participant has sent a settlement instruction. Thus, the IOC is the same CSD for both instructions if the transaction is between two of its participants. However, there will always be two IOCs in a cross-CSD transaction in T2S.

In the case of corporate actions on “stock” (cash distribution, securities distribution, distribution with options, mandatory reorganization with options, voluntary reorganization), minimal change is expected in T2S in relation to the current practice of cascading delivery of proceeds (both in the form

of securities and cash), via the chain of investment intermediaries to the end investors, as described in the European CA market standards.

6. Settlement Finality I. Moment of entry of transfer order into the system.

The aim of this T2S harmonization activity is to agree on a common T2S rule regarding the moment of entry of a transfer order into the system and to ensure compliance by all T2S markets. The irrevocability of transfer orders in T2S is protected through the rule prohibiting the unilateral cancellation of instructions after matched status is achieved in T2S. According to T2S Framework Agreement, contracting CSDs shall make all necessary arrangements in order to adopt a harmonized definition of the irrevocability of transfer orders, in order to eliminate the risk of transfer order revocation in a T2S cross-border environment.

7. Settlement Finality II. Irrevocability of transfer order.

According to Article 21/para.4 of the T2S Framework Agreement, in order to facilitate legally sound, seamless cross-border DVP settlement, the regulatory/legal environments of the CSDs participating in T2S have to recognize account entries in T2S as unconditional, irrevocable and enforceable.

8. Outsourcing IT services

T2S represents, firstly, a technical IT platform and it is important to ensure that all participating CSDs obtain regulatory approval before outsourcing settlement services to T2S. The CSD Regulation is expected to harmonize the legal framework for IT outsourcing to bodies.

9. Settlement discipline regime

T2S introduces for the fragmented EU post-trade arena, a harmonized settlement discipline regime, in order to avoid the risk of multiple inconsistent or incompatible regimes that would create operational complexity. It will also ensure a level playing field to avoid the risk of so called "regulatory arbitrage", and to reduce fails. The New CSD Regulation is expected to harmonize settlement discipline regime in the EU.

10. Settlement cycles

On October 6, 2014, most T2S markets have migrated to T+2 settlement cycle. It can be considered one of the most crucial harmonization activities, allowing T2S participants to rationalize the technical infrastructures in back-office activities, as well as in managing cross-border corporate actions.

11. Availability of omnibus accounts T2S standard

CSDs offer different types of segregations, omnibus, segregated or a hybrid option, a combination of the both. This reflects the local market constraints, law or market participant preferences, in terms of investor protection and issuer transparency. Even if CSD provides all of them, in T2S, in cross-border scenarios, for CSDs participating, individual client or end investor account segregation typically does not apply. CSD links operate on the basis of omnibus accounts in order to avoid complex and inefficient procedures for cross-border settlement. This is a crucial requirement for delivering the T2S benefits of cross-CSD settlement in the EU. Issuer CSDs in T2S must offer omnibus accounts to their foreign participants to ensure interoperability and cross-CSD settlement.

12. Restrictions on omnibus accounts

To make full interoperability, issuer CSDs in T2S should ensure foreign participants the possibility of opening omnibus accounts, and must provide appropriate services on omnibus accounts to foreign participants, as required by participants. These omnibus accounts should also include, as an option, holdings of domicile and non-domicile investors.

13. Securities accounts numbering (SAC)

In T2S, CSDs open a SAC on behalf of their participants, and each SAC must be linked to one or more DCA (only one should be set as a default cash account). Every SAC is univocally identified at CSD level, even if the participant can open an unlimited number of those securities accounts. As mentioned above, T2S does not allow distinguishing of securities account between proprietary and third-party account; it remains under the CSD responsibility. In securities account numbering, CSDs must use BIC 4 digits to identify parties of CSDs plus 31 digits of free text.

14. Dedicated cash account numbering (DAC)

Central Bank opens a DCA on behalf of their participants, although a T2S participant may have its own securities account with DCA of a different payment bank. Each DCA must be linked with a RTGS account and at the end of each T2S day, the cash liquidity present in the DCA will move in to the RTGS account, in form of an outbound liquidity transfer. The DCA account numbering standard includes 34 characters (1 to designate the cash account, 2 for the country, 3 for the currency code, 11 for the BIC and 17 characters of free text for the account holder).

The priority 2 activities are not essential, but they are key for enhancing the competitive environment and the efficiency of T2S.

Location of securities account. Conflicts of law - The location of securities accounts must be clearly determined, harmonized and compatible with the set-up of T2S, so as to mitigate legal risk for CSD links in T2S. The location of the account is linked to the place of business of the CSD, where the securities are or used to be physically located. European Commission, in its Discussion Paper of 1 February 2010 (MARKT.G.2/ (2010)57731), states that it is applicable the law of the country where the branch is located, where the account was opened and where the commercial relationship is handled.

Corporate Actions Market standards - The problem of heterogeneous national market practices with regard to corporate actions was identified by Giovannini (2001 report), as one of the barriers to efficient cross-border settlement in the EU. The Corporate Actions Joint Working Group (CAJWG), an industry working group formed by issuers, market infrastructures and market participants, created the "Market Standards for Corporate Actions Processing". The aim was to streamline corporate actions processing so as to reduce costs and operational risks for market participants. These market standards provide the basis for the T2S corporate actions standards, in key areas, as information flows, sequence of key dates, and operational processing, mandatory for every market and CSD. According to the market CA standards, it is the issuer who should inform the issuer CSD of the details of a CA as soon as it has been publicly announced. The information must then reach the end investor through the chain of CSDs and relevant investment intermediaries. The CA market standards is following the path of information on the top -down approach, also known as the Christmas tree

model, the information is passed from the issuer down the chain of investment intermediaries to the end investors.

Securities amount data - In line with the current standard market practice in the EU, T2S markets should define securities amount data by using nominal value for debt instruments and units for non-debt instruments (debt instruments in FAMT and equities in UNIT). The objective of this activity is to ensure that all T2S markets are aligned with the EU's standard practice for defining securities amount data in the trading, clearing and settlement chain. Some more practical changes introduced on the settlement flow are the new market cash tolerance and the cancellation of instructions. Before T2S, cash tolerance level was 25 EUR, and in T2S, it is of 2 EUR for counter values less than or equal to 100000 EUR, and 25 EUR for counter values of over 100000 EUR. In T2S the cancellation of matched instructions is done bilaterally (unilateral is not possible as Pre-T2S). The unmatched instructions will continue to be cancelled unilaterally.

2.4. T2S AND THE NEW EU REGULATION

T2S Project has grown in a period when European Union together with all the other countries was passing through the severe consequences of the financial crises. The near-collapse of Bear Sterns in March 2008, the default of Lehman Brothers on 15 September 2008, and the bail-out of AIG the following day, highlighted the shortcomings in the functioning of the financial market and has proven that the downside in US market impacts immediately each market. On 23 September 2009, the Commission adopted proposals for three regulations establishing the European System of Financial Supervision, including the creation of three European Supervisory Authorities (ESAs). The ESAs comprise the European Banking Authority (EBA), established by Regulation (EU) No 1093/2010 of the European Parliament and of the Council (4), the European Insurance and Occupational Pensions Authority (EIOPA), established by Regulation (EU) No 1094/2010, and the European Securities and Markets Authority (ESMA), established by Regulation (EU) No 1095/2010. The ESAs have a crucial role to play in safeguarding the stability of the financial sector. The T2S project will be a catalyst for further harmonization of post-trade practices and regulations across Europe. T2S, together with an ambitious regulatory agenda, including MIFID 2, MIFIR, EMIR, CSDR and UCITS V, will reshape the structure of the complete value chain, from trade execution to post-trade functions.

2.4.1. The Regulation on settlement and Central Securities Depositories (CSDR)

It was adopted by the European Parliament, on 15 April 2014, and it has the scope to uniform requirements for the settlement of financial instruments in the Union, and rules on the organization and conduct of CSDs, to promote safe, efficient and smooth settlement. The CSDR applies to European CSDs and any entities being participants in that CSDs. It introduces:

- Minimal harmonized rules governing securities settlement and settlement discipline
- Together with the Regulation on OTC derivatives (EMIR) and the Markets in Financial Instruments Directive (MIFID), it will form a framework in which systemically important securities infrastructures (trading venues, central counterparties, trade repositories and central securities depositories) are subject to common rules and settlement discipline measures on a European level. The new development of the Regulation is: the obligation of dematerialization for most securities, harmonized settlement periods for most transactions.
- Rules on the authorization, supervision and passporting of CSDs

Issuers will be able to issue securities in any EU domiciled CSD of their choice. Any buyer or seller of securities safe kept within an EU CSD, as well CSD participants, will be subject to the settlement provisions, including a settlement cycle of 2 days (already in force). CSDs will be subject to minimum requirements and will benefit from a harmonized authorization, supervision and governance regime, allowing them to passport activities throughout the EU.

In order to reduce settlement risks due to the insolvency of the settlement agent, a CSD should settle the cash leg of the securities transaction through accounts opened with a central bank, otherwise, a CSD should be able to settle through accounts opened with a credit institution.

CSDs should be subject to strict record-keeping requirements, they should maintain for at least 10 years all the records and data on all the services that they may provide, including transaction data on collateral management services that involve the processing of securities repurchase or lending agreements.

- Conditions under which CSDs may provide banking services

According to Directive 2013/36/EU, CSDs, like other credit institutions, as they provide banking services ancillary to settlement, should also be subject to enhanced credit and liquidity risk mitigation requirements, including a risk-based capital surcharge for intra-day credit and liquidity risks. CSDs should have in place recovery plans to ensure continuity of their critical operations. Without prejudice to Directive 2014/59/EU of the European Parliament and of the Council (11), the competent authorities should ensure that an adequate resolution plan is established and maintained for each CSD in accordance with the relevant national law. CSDs should be authorized to provide services ancillary to their core services that contribute to enhancing the safety, efficiency and transparency of the securities markets and that do not create undue risks to their core services. Namely, such entities must hold a fully-fledged banking license but may provide only limited services.

- Cash penalties. All players will be submitted to settlement discipline with harmonization of mandatory buy-in rules and penalties based on failed settlements. Another set of rules are addressing settlement fails and introduce uniform rules concerning penalties and certain aspects of the buy-in transaction for all transferable securities, money-market instruments, units in collective investment undertakings and emission allowances, such as timing and pricing.
- CSDs will be subject to common requirements and uniform conditions for links and access between CSDs. The development of links agreements between CSDs, in the absence of common prudential rules, CSDs were importing the risks encountered by CSDs from other member states. CSD links introduce significant risks for settlement, and they should be subject to authorization and increased supervision by the relevant competent authorities.

The CSDR dismantles the significant obstacles in the functioning of the internal market, to avoid distortions of competition by introducing some crucial changes in the functioning of CSDs in T2S. It introduces an open internal market in securities settlement that should allow any investor in the Union to invest in all Union securities with the same ease as in domestic securities. This will enable the competition between CSDs and should provide the market participants with a greater choice of providers and reduce reliance on any one infrastructure provider. Any authorized CSDs should enjoy the freedom to provide services within the territory of the Union, including through setting up a branch in a host member state, the access should be granted on fair, reasonable and non-discriminatory terms, and could be refused only where it threatens or causes systemic risk.

2.4.2. EMIR

The crisis highlighted that the level of counterparty credit risk related to OTC derivatives is very high. The OTC derivatives are privately negotiated contracts and any information concerning any one of them is usually only available to the contracting parties. In order to decrease the level of risk on OTC derivatives market, on 4 July 2012, the Regulation on OTC Derivatives, Central Counterparties and Trade Repositories was adopted, known as "EMIR"-European Market Infrastructure Regulation. EMIR introduces:

- Mandatory clearing and reporting for OTC derivative contracts, implementation of strong measures to improve transparency and regulatory oversight of OTC derivative. Information on the risks inherent in derivatives markets will be centrally stored and easily accessible to ESMA, the relevant competent authorities, the European Systemic Risk Board (ESRB) and the relevant central banks of the ESCB, and will give policy makers and supervisors a clear overview of what is going on in the markets.
- Standard derivative contracts to be cleared through Central Counterparties (CCPs), as well as margins for uncleared trades and establishes stringent organizational, business conduct and prudential requirements for these CCPs. G20 leaders agreed that all standardized OTC derivative contracts should be cleared through a central counterparty (CCP) by the end of 2012.

2.5. THE GIOVANNINI BARRIERS

Several researchers analysed the roots of the inefficiencies in the cross-border settlement in EU. The most significant contribution to this subject is the report issued by the Giovannini Group, that identifies 15 barriers to an efficient pan-European market infrastructure and makes recommendations for removing them. Overall, North American exchanges are the most cost and revenue efficient, followed by European exchanges, while the ones in South American and Asia-Pacific regions appear to be lagging behind. Giovannini (2002) demonstrated that the presence of different systems and standards generated communication and synchronization problems, impeding efficiency and safety for cross-border transactions, that compared to the streamlined domestic systems was substantially more expensive, less efficient and less safe. As soon as cross-border settlement gets a little bit complicated, transactions could take up to 5-6 days, and can require the use of eleven intermediaries at its highest, while a domestic transaction requires only five. As a consequence of the barriers the cost of settlement of cross-border securities transactions was about 11 times higher. This referred essentially to the costs of settling in the two major International CSDs (ICSD), Euroclear Bank and Clearstream Banking, situated in Brussels and Luxembourg. The fragmented system could be compared to an old age when countries couldn't agree on the width of the rail track, and the goods should be unload at the borders, bringing new costs. The custody landscape of Europe, with different technical systems, opening hours, settlement cycles, and operated under different legislative frameworks, according to the Commission was not "a level playing field". The removal of these inefficiencies is a necessary condition for the development of a large and efficient financial infrastructure in Europe. Without it the entire process of financial market integration will be suboptimal. The report was generated by analysing a questionnaire of a total of 38 responses, received from institutions involved in all stages of the clearing and security settlement process and operating from various Member States. The bulk of respondents came from the banking

sector, 13 commercial banks and 12 investment banks, also from 6 national, CSDs, both of the ICSDs, 4 stock exchanges and an association of investment managers.

Barrier 1: National differences in information technology and interfaces

This is the most frequently cited barrier, by 30 of 38 respondents. National clearing and settlement systems operate on a variety of unstandardized platforms. These implied differences in information technology and interfaces add to the cost of cross-border clearing and settlement by requiring a higher level of manual input. Additional cost arises because institutions must invest in understanding the technologies concerned and in multiple back-office interfaces to communicate with all necessary systems, with a need for additional staff to understand and support the various arrangements.

Barrier 2: National clearing and settlement restrictions that require the use of multiple systems.

National restrictions on the location of clearing and settlement typically require investors to use the national system. This requires investors, who engage in cross-border securities transactions on multiple stock exchanges, to use multiple post-trading systems. National restrictions on the location of clearing and settlement prevent cross-border investors from centralizing their activities. These restrictions seem outdated in the context of efforts to integrate the EU financial system, and their removal, together with the creation of bridges between national systems.

Barrier 3: Differences in national rules relating to corporate actions (the offering of share options, rights issues), beneficial ownership and custody. As corporate actions often require a response from the securities owner, national differences in how they are managed may require specialized local knowledge and the lodgement of physical documents locally, and so inhibit the centralization of securities settlement and custody.

Barrier 4: Absence of intra-day settlement finality. Intra-day settlement finality is needed to ensure that pan-EU clearing and settlement can be delivered efficiently, while minimizing systemic risk. Before T2S, intra-day settlement finality cannot be guaranteed for all cross-border transactions within the EU. Settlement cycle timing differences between platforms tend to impede same-day transfer between systems. If same-day transfer or finality cannot be achieved, there is a requirement for the counterparties to provide extra collateral or incur funding costs.

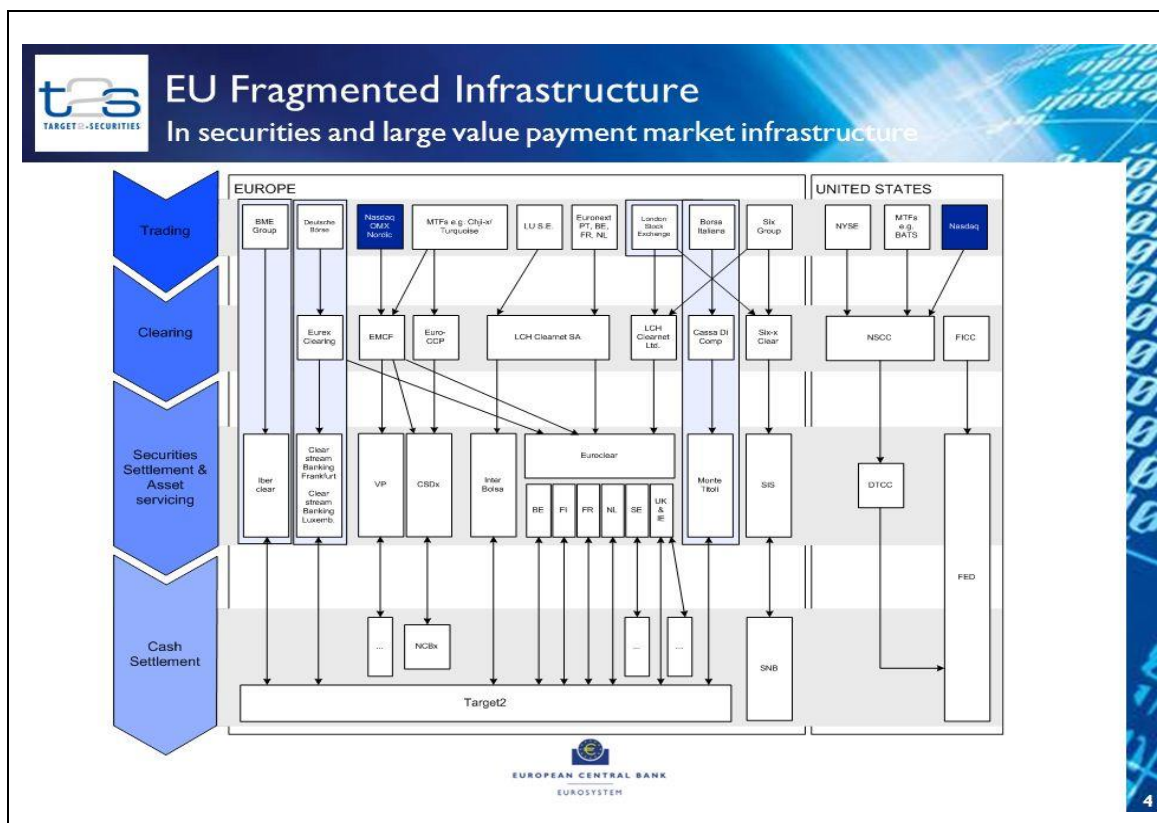


Image 8 EU Fragmented Market Infrastructure. Source: ECB

Barrier 5: Practical impediments to remote access to national clearing and settlement systems

As market participants are required to interface with multiple post-trading systems in the context of cross-border transactions, there is a resultant duplication of costs. Remote access, the possibility for an institution to become a member of a system located in another Member State, is both legally and technically possible. However, practical impediments often remove it as an option.

Barrier 6: National differences in settlement periods. Cross-border clearing and settlement is complicated by national differences in settlement periods and the need to make adjustments as settlement periods change. Europe is marked by numerous differences in settlement periods¹³. The international consensus favours a short settlement period to limit credit risk. In order to a harmonized settlement period for the EU as a whole, CSDR mandates the adoption of T+2 for all transactions in “transferable securities”¹⁴. On 15 May 2014, debt managers of all 28 EU Member States agreed to the implementation of T+2 as the standard settlement period for OTC secondary market transactions in EU Member State government securities, effective as of 6 October 2014.

Barrier 7: National differences in operating hours/settlement deadlines

Differences in the operating hours of national systems complicates cross-border settlement, if at least one of the systems concerned does not operate real-time settlement or frequent batches.

¹³ See annex

¹⁴ including exchange traded funds and warrants) that are executed on trading venues (exchanges, Multilateral Trading Facilities (MTFs) or Organized Trading Facilities (OTFs)) and that are settled in the international or domestic CSDs.

Settlement periods should be harmonized across the EU, so as to reduce the need for costly funding arrangements in cross system transactions. The differences in operating hours can result in the incompatibility of deadlines for matching and delivery in the different systems. In addition, inconsistency between the deadlines/opening hours of payment systems and deadlines/opening hours of securities settlement systems can cause problems in the use of CSDs links.

Barrier 8: National differences in securities issuance practice. The clearing and settlement of cross-border securities trades is hampered by national differences in issuance, and uneven capability across the securities markets in Europe to allocate ISIN¹⁵ numbers to securities issues in real-time.

Barrier 9: National restrictions on the location of securities. The national restrictions often apply to the location of securities. Such restrictions can limit the choices for issuers when placing their securities. There are two types of restrictions, first, that listed securities must be deposited exclusively in the local settlement system, second, there may be a connection between listing on the regulated market and registration with a local registrar. This can constrain the choice of settlement location available to users because the selection of a foreign settlement system will be less attractive.

Barrier 10: National restrictions on the activity of primary dealers and market makers

Restrictions on the activity of primary dealers and market-makers often require the setting-up of local securities operations and the settlement of primary-market transactions in the local settlement systems. Such restrictions prevent primary dealers and market-makers whose activities span several markets from centralizing their settlements in fewer systems. The inability to centralize cross-border settlements raises the cost of their operations.

Barrier 11: Domestic withholding tax regulations serving to disadvantage foreign intermediaries

Withholding tax relief can be granted in two ways: relief may be provided at source, with a reduced rate or exemption applied directly to the tax payment made. Relief may also be granted by refunding the excess withholding tax on the basis of a reclaim by the investor. The clear preference of investors is for at-source relief, which is offered by the withholding agent (normally a bank or other financial institution). The majority of Member States restricts withholding responsibilities to entities established within their own jurisdiction and thereby disadvantages foreign intermediaries in their capacity to offer at-source relief. Even in those Member States, which allow foreign entities to assume withholding tax collection obligations, a local fiscal representative must be appointed to discharge the foreign entity's withholding obligations. The need to use a local agent or to appoint a local representative in the discharge of withholding obligations represents a significant extra cost for foreign intermediaries relative to local providers.

Barrier 12: Transaction taxes collected through functionality integrated into a local settlement system. The national tax authorities are not always focused on the needs of foreign investors. Tax

¹⁵ The ISIN standard is used worldwide to identify specific securities such as bonds, stocks (common and preferred), futures, warrant, rights, trusts, commercial paper and options. ISINs are assigned to securities to facilitate unambiguous clearing and settlement procedures. They are composed of a 12-digit alphanumeric code and act to unify different ticker symbols "which can vary by exchange and currency" for the same security. (<https://www.isin.org/isin/>)

procedures can be complex and raise interpretation questions. Taxation of securities transactions can be a barrier to efficient cross-border clearing and settlement. In these circumstances, the foreign investor's choice of provider for securities settlement is reduced, because it is necessary to link up with the local settlement system that operates the tax collection functionality. Often, language problems and a lack of orientation to the needs of the foreign-based taxpayer complicate communication between foreign intermediaries and the domestic tax authorities. A fundamental difficulty in the granting of tax relief to the investor is the absence of a standard legal definition of beneficial owner for specific transaction types.

Besides the taxation barriers, the Giovannini Report identifies 3 legal barriers that relate to cross-border clearing and settlement. "The law has yet to catch up, it fails to keep pace with developments in market practice."

Barrier 13: The absence of an EU-wide framework for the treatment of interests in securities

According to the current practices, it co-locates securities with the systems through which they are settled. EU Member States have different concepts of property and ownership, often disguised by the use of expressions such as 'proprietary rights' and 'rights in rem'. The absence of an EU-wide framework for the treatment of interests in securities (including procedures for the creation, perfection and enforcement of security) has been identified as the most important source of legal risk in cross-border transactions.

Barrier 14: National differences in the legal treatment of bilateral netting for financial transactions

Barrier 15: Uneven application of national conflict of law rules. Since almost all transactions involve some cross-border elements, and therefore it should be examined the laws of more than one jurisdiction in order to identify the relevant one, and the extent to which each legal system recognizes the validity of the laws of the other. Some EU legal systems treat as different the ownership of a security outright and an entitlement (against a settlement system or intermediary) to own such a security. The market-led convergence in technical requirements and market practice for clearing and settlement could deliver considerable benefits within a significantly shorter timeframe than that required for full system mergers. In order to achieve technical convergence could be used user agreements and market conventions. Whereas, the national authorities should concentrate on removing the other barriers in the fields of taxation and legal certainty.

2.5.1. The UCITS V Directive

Adopted on 21st of March 2016, it revises the depositary regime as regards depositary eligibility, duties, responsibilities and liabilities, and defines the conditions in which safekeeping duties can be delegated. It focuses heavily on increasing investor protection for UCITS investment funds, given that these are sold to the general public. UCITS or "undertakings for the collective investment in transferable securities" are investment funds regulated at European Union level. They account for around 75% of all collective investments by small investors in Europe. UCITS can be set up as a single fund or as an umbrella fund consisting of multiple compartments, each with a different investment policy. Key changes compared to UCITS IV are: the introduction of stricter criteria for entities allowed acting as a depositary (now restricted to credit institutions, national central banks and other legal entities authorized under the laws of EU Member States to carry out depositaries activities and

subject to harmonized additional conditions under UCITS V). Under its scope are asset managers of UCITS funds, UCITS depositaries. UCITS V will also create a strict depositary liability regime, in case UCITS' assets held in custody are lost, investors have the rights of action against the depositaries, allowing them to sue depositaries. UCITS V puts in place remuneration policies and procedures designed to prevent conflicts of interest and discourage risk-taking inconsistent with the risk profile of the managed UCITS. Also, it introduces rules governing remuneration policies of UCITS managers and put in force the minimum administrative sanctions regime across member states. Such coordination facilitates the removal of the restrictions on the free movement of units of UCITS in the Community, and the actual National laws governing collective investment undertakings should be coordinated with the conditions of competition between those undertakings at Community level. Luxembourg has successfully positioned itself as the global leader for cross-border distribution of investment funds, with the result that today more than 65% of UCITS funds distributed internationally are based in Luxembourg. For the funds industry to adopt T2S as a preferred channel for settlement means a lot of benefits in terms of infrastructure issues.

Single Entry Point	The introduction of T2S should create the ability to settle all EUR denominated cross - border fund transactions placed via any CSD's in Europe from one settlement account
Access	To a CSD and an account at the central bank to settle via T2S, and should not be overly restrictive whether directly possible or via an intermediary agent. Without adequate choice, the cost of doing so may well outweigh the benefits
Transparency of holdings	Cross-border distribution is based on open architecture with Distributors sales networks selling Promoters funds in exchange for remuneration in the form of fee rebates. It is essential that Distributors positions in shares are clearly identifiable.
Issuer CSD	Industry best practice for eligible securities is to keep the totality of an issue within the so-called Issuer CSD. Cross - border funds must have the option to maintain the whole of the shares in issue with the Funds Transfer Agent
CSD Data Exchange	a legal framework or equivalent facility is required to allow the exchange of data between CSD's and the Funds agents to allow the identification of holders to the level of the contracting party (Distributor) for the calculation of rebates
CSD reporting-interfaces	Reporting tools will be needed to allow the exchange of data between the various CSD's and the Funds agent. This is required for the identification of Distributors and organizations purchasing funds via CSD's for AML\KYC purposes and for the calculation of fees based on holdings.
Global Distribution	The share of assets held by investors domiciled outside of Europe is growing and approaching 50%. Therefore, T2S should facilitate Distributors domiciled outside of the EEA to settle in T2S.
Alternative Funds	The trading and settlement methods on T2S should be developed to accommodate alternative fund types that do not follow a standard equity model of trading and settlement.

Table 3 T2S Impact for Fund Industry

2.5.2. MIFID

Markets in Financial Instruments Directive (Directive 2004/39/EC) aims to improve the competitiveness of EU financial markets, by creating a single market for investment services and activities, and ensuring a high degree of harmonized investor protection. Following MIFID1 (2004), MIFID2 (2014) was dramatically widened in scope. It creates greater market transparency, and strengthens the protection of investors. They include harmonized rules on the authorization and supervision of investment firms, an EU-passport regime for investments firms, rules on the conduct of business, on investor protection, and the functioning of the trading platforms. The new trading obligations for equities and derivatives are intended to restrict the OTC trading, which will impact price formation and market liquidity. BCNs (Brokers Crossing Networks) and other OTC dark pools will have to convert to MTFs (Multilateral Trading Facilities), OTFs (Organized Trading Facilities) or SIs (Systemic Internalizers). The scope of reportable transactions to national authorities is significantly extended also including derivatives. Also, MIFID2 brings new regulation for algorithm or automated trades, it will be required to continuously post executable quotes during the trading day, and they will need to become authorized to ensure that excessive orders cannot seize up markets or increase volatility; this means the delivery of an annual description of trading strategies to competent authorities, regulators on at least an annual basis about how their strategies work.

3. METHODOLOGY

For the realisation of this thesis, considering the complexity of the subject, several research methods were applied. The main incentives for choosing the methodology were: the actuality of the subject, the limited sources of veritable information related to the project, and the absence of the previous research background on this matter. Considering this, the method of research was divided into the following main steps: documentation with the subject, the project implementation plan, through the ECB website and other official references. In the second phase, the main effort was focused on gathering the information through different sources, regarding the impact and benefits of itself, surveys performed by other companies or other scientific researches. On the next stage of the work, a more practical approach was applied. It was performed a calculation exercise, with data from European CSDs, to prove or not the existence of a cost benefit. Following this, a field visit was done to INTERBOLSA headquarter in Porto, where planned interviews were performed.

The detailed description of the performed steps will be documented in the below section.

The methodology for documenting about the T2S project plan, its phases and technical specifications consists of the analysis of the official documents, discussions, user guides available on the European Central Bank official website¹⁶. They were consulted regularly during all the project duration, in order to stay up-to-date with the novelty of the last implementations, and to follow the waves of migrations of all the participants countries. This information is delivered in the Literature Review section, about: settlement chain, market participants, risks in the settlement chain, also about T2S implementation, project 5 waves, T2S innovations and migration activities and 19 principles of it.

Also, in this work stage, the T2S Regulatory Framework was presented. The main European Legislations guiding this initiative and influencing the modern financial environment are CSDR, EMIR, MiFID and UCITS V. All the documentation regarding them was consulted on European Commission website¹⁷ in the Securities Markets and Post-Trade services section.

Another source of information is the Giovannini Group Reports. This represents the base documentation regarding the European settlement barriers and the different domestic trading arrangements. Those arguments represented the trigger for the European Commission to initiate the T2S Program, in order to dismantle the barriers exposed in the reports, and to harmonise the post-trade infrastructure. The Giovannini Group was a group of financial market experts, formed in 1996 to advise the European Commission on financial market issues. In particular, the work of the Giovannini group focused on identifying inefficiencies in EU financial markets and proposing practical solutions to improve market integration.

In the following part, in order to outline the overall benefits of T2S for different market participants, the following surveys were consulted: the official European Central Bank reports on the T2S benefits, delivered in the Special Series: “T2S benefits, much more than fee reduction”; “T2S Economic Impact Analysis” by The International Capital Market Association ICMA, Sponsored by The European Repo Council (ERC), another survey conducted by BNP Paribas in May 2016: “T2S Industry Survey – you might be surprised”, and Accenture survey on international banks, held in April 2016: “Evolution or

¹⁶ <https://www.ecb.europa.eu/paym/t2s/html/index.en.html>

¹⁷ <https://ec.europa.eu/info>

overhaul? How banks are adapting to TARGET2-Securities in Europe”. It was performed a comprehensive analysis of them, and afterwards, it was highlighted the 6 main benefits concluded between all the respondents of the surveys.

In the successive part, it was conducted a cost benefits analysis of settlement fees, before and after T2S implementation, using the calculation model presented in Giovannini Group Report (2002) OXERA study (2011), and a more recent calculation performed during this dissertation (2011-2015).

As a reference model, it will be used the Giovannini Model (First Giovannini Report (2002)). His paper stresses on the importance of the removal of cost inefficiencies in clearing and settlement, as a necessary condition for the development of an efficient financial infrastructure in Europe. He developed 2 methods for estimating the additional cost of settling a cross-border transaction. First, he chose the comparison of settlement fees, an obvious approach in assessing the relative cost of cross-border and domestic transactions. But he identified several limitations of this approach, apart from the problem of data availability: there is neither a “typical” fee, nor a “typical” service in processing a domestic or cross-border securities transaction. According to Giovannini: “the fee structure of providers tends to be highly complex, with the fee actually paid by clients dependent on a wide range of factors. These factors include the type of securities to be processed, the type of client, the volume of business of that client, the client’s method of payment, relationship with the provider (e.g. share in ownership of the CSD). Meanwhile, the settlement service provided varies with the provider. Some CSDs provide only the narrow settlement functionality, while others offer a range of ancillary services, such as intra-day credit and securities lending. A simple comparison of the fee schedules for settling a domestic and cross-border transaction is, therefore, likely to yield a misleading view of the relative costs.”

An alternative approach focuses on the operating income per transaction settled. This approach for estimating the cost of settlement services is more indirect and sophisticated. Giovannini used the data on the operating income obtained from the financial statements of the relevant service providers, as well as ICSDs. The approach followed is much centred to standardize the implicit costs of settlement across CSDs, in this manner, the formula for operating income per transaction settled is reduced, and such components as interest income, items of depreciation and amortization and exceptional costs have been removed.

The second study, we refer to, is the Oxera Study, a price monitoring study commissioned by DG Internal Market and Services of the European Commission, that examines the impact of recent changes in the industry on the costs of trading and post-trading services. It provides an analysis of a new large set of data collected by Oxera from intermediaries (40 fund managers, 40 brokerage firms and 60 custodians), and infrastructure providers (trading platforms, CCP, CSDs) operating in the trading and post-trading value chain in 18 financial European centres. Commission classified them in 3 types of financial centre: major (France, Germany, Italy, Spain, Switzerland and UK), secondary (Belgium, Luxembourg, the Netherlands, Norway, Poland, Sweden), and other (Austria, Czech Republic, Denmark, Greece, Ireland and Portugal). The study measured the effect of market integration on prices of trading and post-trading services over the period 2006-2009, capturing the development of MIFID.

Limits of the study as mentioned by Oxera:

-other types of costs are not included, as access and membership fees, or interest that broker may receive on cash margins when using CCP.

-there is no standard definition of the core services provided by the intermediaries or infrastructure providers.

-the main issue when analysing these data is the non-disclosure agreement and restrictions on data availability. The results are presented aggregated and in absolute terms across the financial centres. Usually the brokers and CSDs are global firms, pressured by competition factor, and it is difficult to break their data. This study can be undertaken only if the firms provide sufficient data on their use of channels and the cost of trading and post-trading services on a consistent basis.

In my study, it was applied the same approach as OXERA and Giovannini, for identification of the average differences between the settlement costs of cross border and domestic transactions, over a more recent period, 2011-2015. Rather than comparing the pricing schedule, this study, as the Giovannini study, applies the method of measuring the actual unit cost of the trading and post-trading services on the basis of the revenues (divided by the number or value of transaction). It provides the comparison of the prices of transactions, between domestics and cross border ones, over the mentioned above period. The data processed in this study was collected from annual reports of the settlement institutions, issues of the European Central Bank, and information from the settlement institutions and statistic databases. The methodology for analysing the economic impact of T2S presented in this note proposes some indicators for evaluating the potential benefits of T2S for market participants and the European economy. One of the indicators is the total average fee per settlement instruction. The aim of this indicator is to focus on a direct comparison between the cost per settlement instruction with T2S, and the current market structure without T2S. The data processed belongs to 2 ICSDs (Euroclear Bank, Clearstream Banking Luxembourg), and 13 national CSDs, between them ECSD Eesti Väärtpaberikeskus, Clearstream Banking AG, Bank of Greece Securities Settlement System (BOGS), Iberclear - BME Group, Monte Titoli S.p.A., Latvijas Centrālais depozitārijs, Lietuvos centrinis vertybinių popierių depozitoriumas, VipLux, Malta Stock Exchange, OeKB CSD GmbH, Interbolsa, KDD, Centrálný depozitár cenných papierov SR, Euroclear Finland, SC Depozitarul Central SA, VP Securities A/S, Euroclear France, Euroclear Netherlands, Euroclear Belgium. The same as mentioned by Oxera study, the major limitation of the referred study is the unavailability of recent data, and some CSDs were excluded, because of data unavailability for the mentioned period.

The next step was the field visit to INTERBOLSA Portugal, organised after several discussions with the board of INTERBOLSA from Porto. It was held on 21 of August 2017.

INTERBOLSA - Sociedade Gestora de Sistemas de Liquidação e de Sistemas Centralizados de Valores Mobiliários, S.A. (hereinafter INTERBOLSA) is a limited liability company, which purpose is the management of securities settlement systems and central securities depository systems. During this visit, the planned interviews were done with the management team, in order to get the required information about the T2S benefits for INTERBOLSA, and about its functioning since the migration to the new settlement platform in March 2016 (the questions discussed in the interview presented in annex). The answers to be revealed in the results part.

4. RESULTS

After analysing the surveys, several benefits for the industry participants were identified, showing the viability and cost efficiency of the T2S project. Per International Capital Market Association ICMA, 62% of respondent banks see T2S as a way to reduce cash accounts and funding complexity; respondents felt that T2S will have most significant impact regarding: collateral pooling, increased liquidity, and a decrease in the number of agent banks.

In March and April 2016, Accenture undertook a survey between 20 international banks regarding T2S, focusing on their strategy and readiness and understanding of benefits brought by T2S. A large majority (90 percent) of respondents have a T2S readiness strategy in place and began working on its implementation. The top areas most positively affected by T2S are: liquidity management, settlement processing and collateral management. The third survey on this topic was conducted by BNP Paribas between 50 leaders (May, 2016). When asked, what will be the greatest benefit with T2S fully implemented, the answers were divided between: collateral and liquidity management - 25%, cost savings - 15%, new functionalities - 21%, harmonization- 39%.

Competition and business benefits

The T2S implementation and the new European legislation on CSDs, will introduce important changes for the European settlement landscape. The CSDs operate in a largely monopolistic national environment. T2S, together with the new legislation, will push them for competition, as it will help remove many of the technical and market practice restrictions. The market participants will benefit from a much greater freedom of choice regarding where they trade, clear and settle. Also, issuers will have the choice of which CSD of issuance to use to settle securities issued in another CSD, legally. They will have access to deeper markets to raise funds, and will no need to consider issuance in multiple countries. T2S represents the European single railway tracks of settlement industry. This will stimulate the CSDs to move up the value chain, also to compete for the customers that have now more freedom of choice and possibilities.

Collateral and liquidity savings

T2S is creating nowadays a single gateway to collateral management. This is one of the most important benefits for the banks and other sell-side institution. Before T2S, in the post financial crises environment, due to increased regulation the collateral requirements raised high in quality and quantity. In a fragmented infrastructure, investors with a diversified portfolio have to hold their securities through custodians with different national CSDs. This creates inefficiencies for collateral and liquidity management, because of the need to keep multiple cash accounts as collateral and pledged in multiple NCBs. They need to keep sufficient buffers of collateral for every market they operate in. This is because the liquidity for those securities lies within those CSDs. That makes cross-CSD settlement, involving an investor holding his securities with a single CSD, which then acts as an “investor CSD” in other markets, inefficient and costly. Secondly, the access to ECB money is performed via each NCB, meaning connection needed to many domestic markets. Also, the fragmentation of collateral inventory creates operational overheads securities among international CSDs and global custodians, the amounts are limited and settlement can only take place in commercial bank money, not central bank money. As a result, banks usually need to hold significant

excess collateral, because they cannot reuse surplus collateral and liquidity if they have a long position in a settlement system. At the same time, they need to maintain a precautionary buffer of collateral and liquidity for days when they will be short in this market. T2S brings significant changes for collateral management. It will make it possible for banks to have a single buffer for the entirety of their European business, a single pool of assets and liquidity that will automatically generate significant collateral savings. Banks and intermediaries will be able to manage their collateral much more efficiently, optimize their funding costs and avoid failed deliveries. Before T2S, the cross-border management of collateral was always associated with additional costs, due to the additional time lag in moving collateral from one securities account to another, but also the differences in time schedules and operating hours among CSDs. These delays significantly impede the quick cross-border movement of collateral, resulting in collateral being left unused. T2S creates a borderless settlement scheme and CSDs will use a common settlement time schedule and optimization mechanisms, ensuring easier collateral mobilization, real-time cross-border settlement and the immediate re-use of collateral on a cross-border basis.

Possibility to Auto Collateralization

Auto-collateralization is a new key feature for many T2S participants' markets. It is a way to obtain liquidity in order to support securities settlement. This pooling of cash and collateral will lead to major liquidity savings. It is a credit operation that is triggered automatically during settlement, in case a buyer doesn't have sufficient funds to settle a securities transaction as to improve its cash position; he can use the very same securities that are being bought, as collateral, to obtain the central bank intraday credit needed to pay for the purchased securities (called auto collateralization on flow), or the securities that are already being held by the buyer (auto collateralization on stock). This auto-collateralization feature in T2S will significantly reduce the need for pre-funding of cash accounts, both for daytime settlement and, in particular, for night-time settlement. Value of collateral savings generated by T2S, so far, exceed 50 EUR million per year. In conclusion, T2S will overcome market fragmentation by creating a single collateral and liquidity pool. T2S Users will be able to centralize liquidity in a single central bank cash account, and manage collateral optimizing their funding costs, as T2S eliminates the need to hold excess collateral in different European national markets. Additionally, T2S will reduce collateral settlement needs by having a single engine and extend auto-collateralization to all CSDs.

Operational efficiency benefits

One of the key sources of efficiency for custodians, is the reduction in back office costs and the reduction of operational risk. 71% of operations staff see positive sides in T2S, meaning expectations of a simplification of work, reduction in fails and accounts, less post-settlement date chasings. Before T2S, custodians had to maintain separate back offices, adapting to the various local settlement procedures, to interact with each CSD, or even employ a local sub-custodian to carry out the task on their behalf. The T2S technical platform brings a high degree of harmonization in the securities settlement process. It will make it much easier for custodians to consolidate these separate back offices into a central back office and achieve a very high degree of automation. The T2S information security will comply with the highest industry standards. It will have an extremely robust business continuity solution, with the operational standards that are already applied in the TARGET2 system.

The financial impact of T2S will result in annual back office cost savings of 48 EUR million per year (per ECB's Economic Impact Assessment, published in 2008).

Safety benefits

As T2S was developed in a financial crisis circumstances, it was modelled to bring safety benefits for the European financial market. T2S will reduce counterparty risk and risk on the settlement agent, because it will only settle in central bank money - the safest settlement asset. Settlement in commercial bank money is always subject to the risk that the settlement agent may fail. On a macro level, T2S will reduce systemic risk by having a highly efficient settlement engine, with gross real-time settlement finality in central bank money even for cross-border transactions. Before the majority of cross-border transactions were settled in commercial bank money and were exposed to safety concerns. T2S will improve the efficiency of cross-border transaction, by offering direct connectivity to banks, diminishing the number of possible "weak links" in the chain. Nevertheless, T2S allows settlement for participants outside T2S markets, but only in commercial bank money.

Following these surveys, it is noticeable that the expectations and benefits are perceived differently for each segment of players of the financial market. T2S will transform fundamentally the traditional post-trade landscape, and will diminish the traditional distinctive lines between banks, local and global custodians, CSDs. Market players will need to adapt to enter new terrain down the value chain to gain competitive advantage. T2S users net benefits are: collateral savings, optimization of their funding costs and less failed deliveries, benefits from increased competition between CSDs, ICSDs, agent banks, benefits from accelerated process of harmonization and standardization. Generally, the respondents are very optimistic regarding T2S and 48% of them see clear improvement on post-trade in Europe. In terms of pricing, overall the respondents are expecting the prices charged for settlement to decrease quite significantly, while prices charged for asset servicing and connectivity are expected to rise. T2S will have significant implications for the sub-custodians. Smaller regional players that normally act as sub-custodians for global custodians must rethink their business models. T2S will put pressure on revenues from settlement services, as it will assume much of the Eurozone's settlement activity. Thus, CSDs must develop new services and possibly tap into the services traditionally offered by local custodians. For CSDs, T2S offers the possibility to reshape their existing settlement infrastructure into a more optimal model. This reshaping will allow cost savings relative to their current investment, as CSDs will be able to recover these costs (including their profit margin) from their users, by charging T2S fees.

The interview to INTERBOLSA originated the following answers, that present the official INTERBOLSA point of view about T2S. A great achievement of T2S is the harmonization in what concerns matching rules, settlement cycles and corporate actions processing, and all the functionalities and optimizations of T2S had a positive impact increasing settlement efficiency. T2S and CSD Regulation (CSDR) brought big changes in the post trade industry. Per INTERBOLSA, the main challenges were huge technical adaptations for the connection to T2S platform and the conversion of debt instruments from quantity to face amount with pool factor. INTERBOLSA participants were very interested on the benefits that T2S would bring on cross border transactions. It provides both direct and indirect connectivity to T2S. If a participant uses the indirect connectivity he can choose between ISO15022 messages via SWIFT and the proprietary interface provided by INTERBOLSA. All 3 options are being used by participants. INTERBOLSA intends to establish direct links with ESES CSDs, NBB SSS,

Clearstream, Iberclear and Monte Titoli. Regarding costs, INTERBOLSA stated that there were no savings but adaptation costs, as it had in place a settlement system before joining T2S. Nevertheless, the initial period for cost recovery defined by ECB in 2010 was 8,75 years. If we look just for the settlement we can say that the cost decreased, but if the total cost is considered, it is higher due to the communication costs. Also, INTERBOLSA sees no problem in separating the platform that provides settlement services (T2S) from the custody and other services that will remain to be provided by the CSDs.

The results of the analysis of the cost benefit of T2S are presented in the following part. The report of Giovannini and Oxera prove that the cross-border transactions are more expensive than the domestic one. The analysis conducted in this study come to the same results. According to Giovannini, the settlement fees of the ICSDs are considerably more expensive than those of the national CSDs. For example, the settlement fee of an equity transaction of the Danish CSD is between 0,11-0,28 EUR, while the average fee of Euroclear for settling an international equity transaction is much higher, up to 32,47 EUR.

National CSDs	Equity	Bonds
Denmark	0,11-2,28	
Germany	0,25-0,40	0,125-5,00
France	0,30-1,13	0,30-1,13
Italy	0,72	
UK	0,32-0,90	
Switzerland	0,26	

Table 4 Settlement fees of a sample of national CSDs, in euro

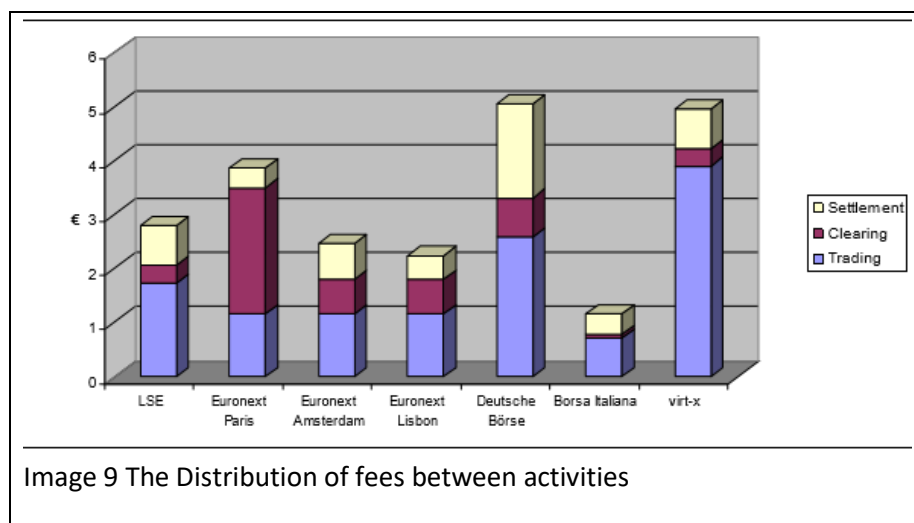
CSD	Internal				External			
	International securities		Domestic securities		International securities		Domestic securities	
	Equity	Bond	Equity	Bond	Equity	Bond	Equity	Bond
Clearstream LU	2.00	1.35	2.00	1.35	--	--	--	--
Euroclear Bank					2.71	1.35	2.71	1.35
SIS			--	--	32.47	32.47	27.60-48.70	21.65-27.06
DE			2.16	2.16	32.47	32.47	21.65	21.65
FR			--	--	32.47	32.47	13.53-27.06	13.53-27.06
UK			--	--	32.47	32.47	10.82	10.82
US			--	--	32.47	32.47	5.41	10.82

Table 5 Settlement fees of Clearstream for selected markets, in euro

CSD	Internal				External			
	International securities		Domestic securities		International securities		Domestic securities	
	Equity	Bond	Equity	Bond	Equity	Bond	Equity	Bond
Clearstream LU			--	--	1.03-2.71	1.03-2.71	--	--
Euroclear Bank	0.49-2.16	0.49-2.16	--	--	--	--	--	--
SIS			0.60-2.71	0.60-2.71			9.74-16.23	5.94-10.80
DE			0.32-1.73	0.32-1.73			4.33-8.66	1.52-6.49
FR			0.60-2.71	0.60-2.71	--	--	23.81-32.47	7.58-21.65
UK			0.54-2.16	0.54-2.16	--	--	6.49-10.82	9.74-16.23
US			0.54-2.16	0.54-2.16	--	--	4.33-8.66	6.49-10.82

Table 6 Settlement fees of Euroclear for selected markets, in euro

The comparability of the data is limited by the absence of a typical settlement fee and a typical settlement service. The average value of a transaction, measured in terms of costs, is composed by: 78% of trading and post-trading costs that relate to infrastructure, trading platforms, 19% by CCPs and 4% to CSDs clearing and settlement cost. It is not an easy task to give a precise formula of clearing and settlement, as it is composed of many elements and the contribution of each to the total varies from CSD to CSD. This also makes it difficult to lead out an objective analysis of the causes of high all-in costs for trading and to distinguish settlement from custody fees. The distribution of fees between the different activities (trading, clearing, settlement) varies considerably, by trader and by exchange in function of a series of factors, the individual user's trading profile: wholesale or retail trades, as shown in the image 9.



Clearing and settlement represents only one part of the full cost to the broker or investor. Besides the fixed fees, it contains other components as back-office costs such as those for connection and communication, monitoring, reconciliation, collateral, fiscal, legal, billing, relationship management etc. Also, the total all-in cost trade is impacted by the user profile at a given exchange, certain profiles incur significantly higher unit costs than others.

Giovannini alternative approach focuses on the operating income per transaction settled. It reveals a big difference between the ICSDs operating income per transaction comparing to the national CSDs, while the Euroclear bank manage to get 32.78 EUR per transaction, the Danish CSD is getting 3.99 EUR.

	Organization	Operating income (EUR)	Transactions	OPINC/trans action
ICSD	Euroclear Bank	360,590,000	11,000,000	32.78
ICSD	Clearstream Luxembourg	401,175,000	12,000,000	33.43
DK	VP	27,122,013	6,800,000	3.99
DE	Clearstream Frankfurt	268,746,000	125,000,000	2.15
ES	SCLV	45,758,000	11,000,000	4.16
GR	CSD	47,805,161	21,973,933	2.18
FR	Euroclear France	144,968,647	135,000,000	1.07
IT	Monte Titoli	22,175,332	126,395,972	0.18
PT	INTERBOLSA	14,205,395	8,654,761	1.64
SE	VPC	43,125,089	14,633,242	2.95
UK	CREST	143,446,634	58,816,750	2.44
EU	EU	1,644,565,272	531,874,658	2.86
	EU (excl. ICSDs)	882,800,272	508,874,658	1.49
ICSD	SIS	103,231,065	17,745,900	5.82

Table 7 Operating income per transaction (in euro)

The Oxera study provides the comparison of the prices between domestics and cross border transactions, over the period 2006-2009. In this period the number of trades has doubled, reaching 904,150,671, also the average trade size of a transaction in equities fell from 35036 EUR in 2006 to 10522 EUR in 2009.

	Trades	Equities Turnover (€m)	Average size of transaction	Trades	Fixed income Turnover (€m)	Average size of transaction
2006 total	477,959,619	16,745,939	35,036	8,617,311	9,721,109	1,128,091
2009 total	904,150,671	9,513,038	10,522	8,208,711	13,624,271	1,659,733
of which: exchanges	661,986,147	8,155,163	12,319	—	—	—
MTFs	242,164,524	1,357,875	5,607	—	—	—

Table 8 Evolution of volumes of trades between 2006-2009. Source Oxera Analysis

This reduction is due to the increased competition between financial centres, entering of new players, and an increase in the scale of transactions. CSDs reported also a reduction in their core services prices. The cost of service is composed by asset servicing cost and clearing and settlement cost. Table 9 shows a reduction of 9% over 2006-09 for account provision and asset servicing for equities, from 0.19 EUR to 0.17 EUR. While the clearing and settlement cost per transaction was reduced from 0.62 EUR to 0.46 EUR over the same period.

	Account provision and asset servicing (costs per value of securities held, bp)			Clearing and settlement (€ per transaction)		
	Equities	Fixed income securities	Total ¹	Equities	Fixed income securities	Total ¹
2006	0.19	0.18	0.18	0.48	0.53	0.62
2008	0.21	0.18	0.19	0.41	0.35	0.46
2009	0.17	0.17	0.16	0.36	0.34	0.46
2006–09 % change	–9	–7	–11	–25	–35	–26

Table 9 Cost of services provided by CSDs, equities and fixed income securities

The same as the Giovannini report, the Oxera study shows that cross border transactions tend to be more expensive than domestic ones, for both safekeeping and settlement. The fixed income and equities cost changes will be presented separately in the following part. The prices for clearing and settlement for equities transactions have come down in most cases, the differences between the costs of domestic and cross border transactions is significant. The ratio got smaller over the period, from 480 % in 2006 to 330% in 2009. In absolute terms, the changes in relative costs of cross border and clearing settlement services for equities dropped from 1.83 EUR comparing to 0.39 EUR in 2006, and 0.9 to 0.27 EUR in 2009 (table 10).

	Domestic cost (€ per transaction)	Cross-border cost (€ per transaction)	Ratio of cross-border: domestic costs (%)
2006	0.39	1.83	480
2008	0.31	1.01	330
2009	0.27	0.90	330
2006–09 % change	–30	–51	

Table 10 Changes in the relative costs of clearing and settlement services-equities

The fixed income cost changes are illustrated in table 11, it shows a big difference between cross border transaction (4 EUR), comparing to 0.42 for a domestic one in 2006, to 1.68 EUR for cross border and 0.30 for a domestic transaction in 2009.

	Domestic cost (€ per transaction)	Cross-border cost (€ per transaction)	Ratio of cross-border: domestic costs (%)
2006	0.42	4.00	950
2008	0.30	2.66	900
2009	0.30	1.68	560
2006–09 % change	–29	–58	

Table 11 Changes in the relative costs of clearing and settlement services-fixed income securities

Total changes for securities are calculated as an average between the equities and fixed income (table 12). In 2006, the cost per cross border transaction was 2.34, while a domestic one was 0.57 EUR. In 2009, the cost per cross border transaction diminished by 44 % to 0.96 EUR, the domestic transactions reduced by 32% to 0.36 EUR.

	Domestic cost (€ per transaction)	Cross-border cost (€ per transaction)	Ratio of cross-border: domestic costs (%)
2006	0.57	2.34	410
2008	0.46	1.34	290
2009	0.36	0.96	260
2006–09 % change	–32	–44	

Table 12 Changes in the relative costs of cross border clearing and settlement services- total securities.

After analysing the OXERA report, it can be concluded that the general trend is the decrease in unit cost per transaction, either for equity or fixed income transactions across all financial centres. While the differences between the domestic and cross-border transactions remain a problem, in most cases the prices for clearing and settlement have come down, while the difference between the costs for domestic and cross-border transaction have increased. In 2009 the crossborder transaction represents 260% of the national one (table 12).

Post-trading service	Ratio of cross-border to domestic costs (%)		
	Total	Equities	Fixed income
Account provision and asset servicing			
2006 (bp)	430	340	500
2008 (bp)	390	260	470
2009 (bp)	380	310	470
2006–09 % change	–12	–7	–4
Clearing and settlement			
2006 (€/transaction)	410	480	950
2008 (€/transaction)	290	330	900
2009 (€/transaction)	260	330	560
2006–09 % change	–36	–30	–41

Table 13 Comparison between costs of cross border and domestic CSDs services, total securities.

The same calculation model was applied for the period 2011-2015 on a sample of CSDs participants at T2S, and it revealed significant differences in the volumes of transactions, number of participants in the European CSDs analysed, and the operating income.

The ICSDs mark a significant growth in the value of securities held on accounts, Euroclear Bank leading with 11240151 million EUR, average value of securities held on accounts.

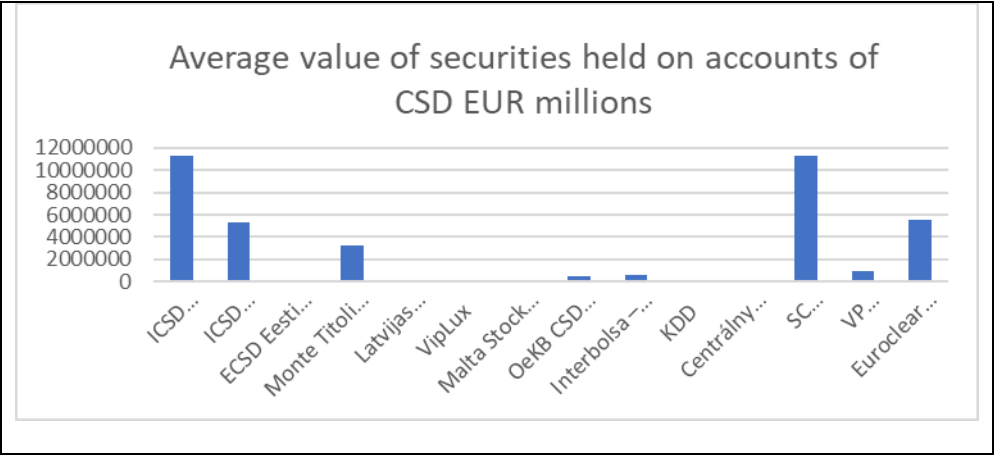


Figure 1 Average value of securities held on accounts with central securities depositories (EUR millions)

As in the previous 2 studies, we notice an increase in the number of participants, at the ICSDs, Euroclear in 2015, riches 1602, Clearstream Banking Luxembourg with 1421, while the maximum between the national CSDs is represented by Germany with 288, considerably less participants than the ICSDs.

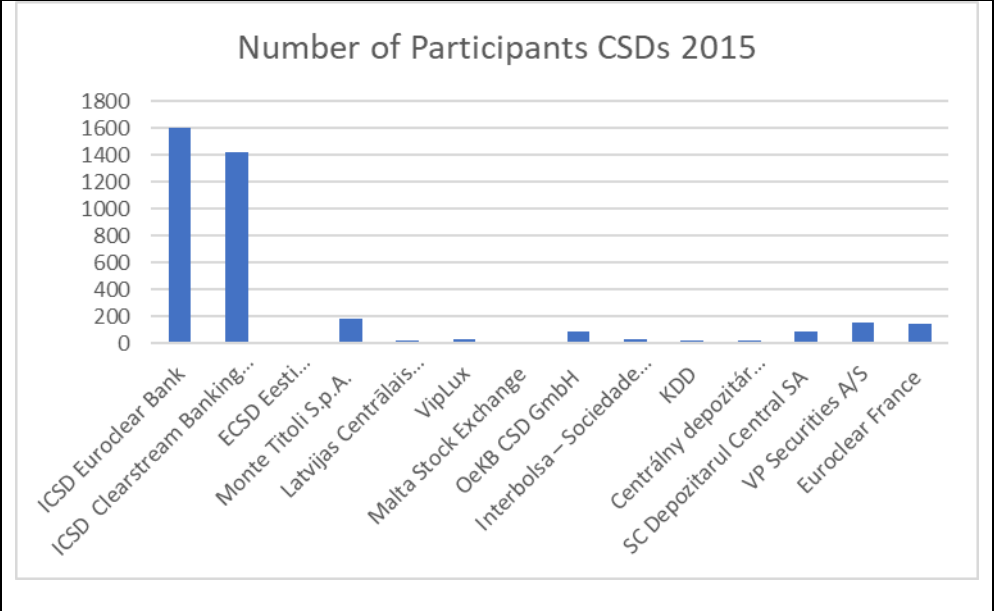


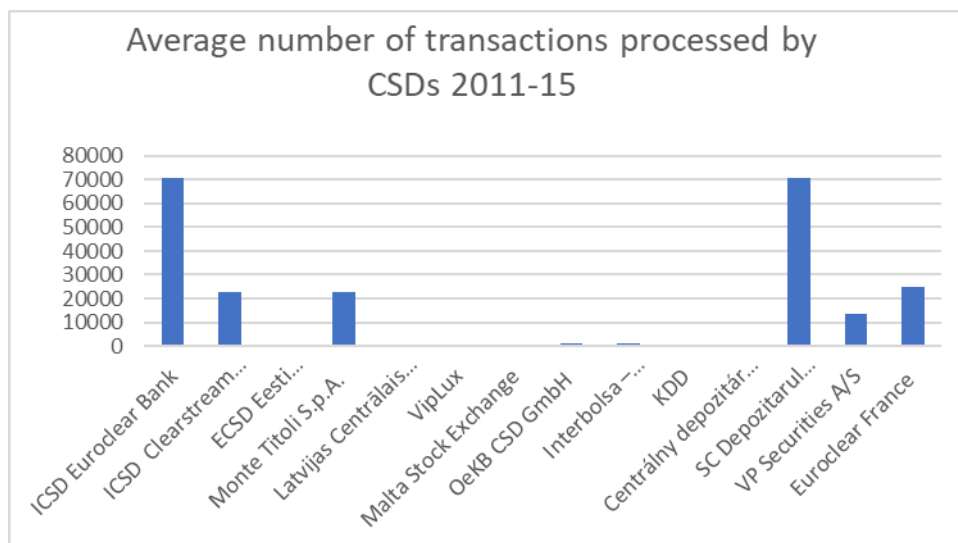
Figure 2 The Average Number of Participants in CSDs 2015

The same tren is noticed regaurding the average number of transactions. The chart below illustrates the discrepancies between the ICSDs and the national ones (Euroclear and Clearstream, both leading

with 70860.8 and 22744.8 thousands transactions processed). While several CSDs do not pass 100 thousands transactions, as Malta with 250000, Latvia-41000.

The comparability of data was limited by the absence of data from several CSDs, following several attempts to obtain information directly from their offices via emails. Also, it was jeopardized by the different interpretation of data for CSDs, for example the number of transactions can be presented with netting and no netting, when a sell-buy transaction is considered as 1, or 2 separate transactions. Also it was influenced by the exchange rate, as some CSDs present their operating income in the annual financial report in the local currency.

Figure 3 The average number of transactions processed 2011-2015



5. CONCLUSION

Objective 1: the main objective is to evaluate the T2S impact on the new harmonized European securities market landscape and also to assess its direct contribution to the reduction of settlement costs in Europe. we target to understand the benefits T2S brings on the table for the market participants, in particular through the case of Interbolsa Portugal.

It was concluded that T2S brings a range of benefits for the market participants, though it was finished recently, in September 2017. The main benefits are competition and business benefits, collateral and liquidity savings, possibility to auto collateralization, operational efficiency benefits, safety benefits. Through the case of Portuguese CDS, INTERBOLSA, it was concluded that all the functionalities and optimizations of T2S had a positive impact increasing settlement efficiency, diminishing the settlement risks and operational risk.

Objective 2: this research aims to describe the risks associated with the post-trade activity, the technical inefficiencies among settlement industry in Europe, with different domestic arrangements, that T2S is addressing. This objective relates to identifying the technical, legal and tax barriers in the post-trade environment.

During this master thesis, it was identified that the main risks jeopardizing an investor are: the settlement risk, counterparty risk, operational risks, credit risks and liquidity risks. The main threats for an investor are: that securities are delivered but no cash received, or vice versa, because of a default of a counterparty or intermediary; the possibility that either one of the counterparties may fail to meet their obligations. It was concluded that the cross border transactions are more complicated and risky, than the domestic ones. In addition to the risks mentioned, the trade's international aspects rises the level of operational and credit risk, also legal risk, which contains an unexpected intervention of a foreign law, or regulation, that makes the contract enforceable. The customer also faces foreign exchange risk, when the trade is done between two currencies.

T2S has a significant impact on the creation of a new harmonized European securities market landscape, contributing to reduction of the number of intermediaries involved in a cross border transaction. Also, it eliminates the technical barriers described by Giovannini in the First Report, and make the settlement flow smoother and faster.

Objective 3: to prove that there is existent a real harmonization of costs between European CSDs, and also that there are cost savings per unit price of a settlement transaction, at the national and cross border level.

As we see in the previous chapter, T2S brings many welfare implications for the participants, indeed the cost reduction is an important achievement, conceived as a driver for the further financial harmonization. After the analysing the 3 numerical cases, it was concluded that T2S has a direct contribution to the reduction of settlement costs in Europe. INTERBOLSA Portugal stated that if we look just for the settlement we can say that the cost decreased, but if the total cost is considered it is higher due to the communication costs. The transaction cost savings is represented by the difference between the average fee charged by settlement service providers (CSDs or custodian banks) for core settlement services today and the total average fee per settlement instruction with T2S. The new T2S

pricing shows the tariffs established by the ECB for the post-trading settlement across all European CSDs. The standard DVP instruction fee is 0.15 EUR, compared to a rough European average of 0.40-0.50 EUR with CSDs before T2S.

Tariff items	Price	Explanation
Delivery versus payment	15 cents	per instruction
Free of payment/payment free of delivery	9 cents	per instruction
Internal T2S liquidity transfer	9 cents	per transfer
Account allocation	3 cents	per instruction
Matching	3 cents	per instruction
Intra-position/intra-balance movement	6 cents	per transaction
Auto-collateralization service with payment bank	15 cents	for issue and return, charged to collateral provider
Intended settlement day failed transaction	15 cents	surcharge per business day failed per instruction
Daytime settlement process	3 cents	additional surcharge per instruction
Daytime-last two hours, 2pm-4pm	Free	per transaction, charged to the collateral provider
Auto-collateralization service with national central bank	Free	surcharge per instruction
Instruction marked with “top/high priority”	Free	per instruction
Cancellation	Free	per instruction
Settlement modification	Free	
Information services		
A2A reports	0.4 cent	per business item in a report
A2A queries	0.7 cent	per queried business item
U2A queries	10 cents	per executed query
Message bundled into a file	0.4 cent	per message in each file containing bundled messages
Transmissions	1.2 cent	per transmission
Account management services		
Securities account	Free	
Fee per cash account	Free	Monthly

Table 14 T2S ECB Pricelist

The T2S invoicing circuit functions as following: the CSD is charged by T2S (T2S fees), the CSD will charge the custodian (T2S fees +CSD mark-up fee); the direct connectivity participant is also charged by the network provider. The final client will be charged by the custodian fees (T2S+CSD+ connectivity + Custodian fee). This price is fixed for the period from 22 June 2015, if the following conditions are fulfilled:

- non-euro currencies add at least 20% to the euro settlement volume
- the securities settlement volume in the EU is not more than 10% lower than the volumes projected by the T2S Programme Office, which in turn are based on market advice
- tax authorities confirm that the Eurosystem will not be charged VAT for T2S services (approved)

T2S Programme Board, after several assessments on costs and pricing, spent 256.4 EUR million for the development of T2S, and 50.7 EUR million on average per year during the running phase on the side of the four central banks which will develop the T2S business application and operate T2S (Deutsche Bundesbank, Banco de España, Banque de France, and Banca d'Italia - jointly referred to as the "4CB"). The costs on the side of the ECB, which supports the T2S Programme Board and coordinates the relations with internal and external stakeholders, are expected to amount to 90.2 EUR million over the development phase and 9.3 EUR million on average per year during the running phase. In addition, the T2S Programme Board currently calculates interest costs for the financing of T2S of 67.5 EUR million and a contingency provision of 36 EUR million to cover costs related to the maintenance of the system, minor changes, and potential liability claims. The cost-benefit analysis conducted together with market participants in 2008 revealed that less than half of the expected annual T2S benefits would be generated from savings on CSD settlement fees, with the rest arising from the streamlining of back-office functions and collateral savings at the user level.

In my opinion, the reduction in settlement cost is an important achievement for European Financial Market, nevertheless as mentioned by INTERBOLSA, the additional communication costs make the total fees higher. Also, this standard DVP fee is non- guaranteed in case any of the conditions above aren't fulfilled. This project is affected by a series of political and other external factors, that could impact the future evolution of the project, it's financing and the overall cost. As an example, Great Britain, the largest single securities market in Europe, opt OUT of this ambitious project. Its non-involvement in T2S made it more expensive to implement. On the other side, UK potentially loses out on the benefit of any future reductions in settlement costs. This topic could be a reference for the future studies related to the relationship between the EU political organization and the financial market and T2S. At the end it's all about investing in joining!

6. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORKS

During this master thesis there were identified several limitations. The availability of CSDs data from annual reports was a problem, as several CSDs don't present it on their website, and refused to disclose it after being directly contacted. This led to dismissing some CSDs from the research and may impact the numerical case study. Many CSDs consider the financial information, settlement prices, costs, a strictly confidential information, as it is able to influence competition and the market.

This study was performed during the T2S project implementation, this means that many of the results/benefits/ expectations are perceived by the market participants on a considerably short period of time, the final phase of the project ended recently, in September 2017.

This can be a recommendation for the future study, to test the T2S project impact, benefits and other effects, in a larger timeframe, at least after 5 year of implementation, when the project will reach "its maturity". Also the cost benefits analysis should be reviewed annually, as the maintenance costs and running costs of the project can vary, depending on several factors, including the structure and number of participants.

In my opinion, this is a major project for the financial infrastructure of the European Union, and it will bring many effects on the settlement process and the whole market functioning, and they will be more obvious in a larger timeframe.

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8. ANNEX

INTERBOLSA questionnaire on T2S migration

One of the biggest benefits of the T2S is the possibility to pool liquidity for settlement in the T2S zone via a single central bank money cash account, what other benefits are perceived as major for the CSDs, from the INTERBOLSA perspective?

Do you agree that CSDs migration to T2S is the start of post trade transformation? Which were the main challenges for INTERBOLSA to adapt this transformation, both in terms of technical and organizational changes?

T2S aims at increasing efficiency and reduce risks by facilitating centralized securities settlement at a European scale. After INTERBOLSA migration to T2S, did you perceive any major reductions of risks and liability risk?

T2S will have several functionalities and improvements not available in the Portuguese market, as prioritization, partial settlement, auto collateralization, linked instructions, securities blocking, reservation, earmarking. What is the importance of such a development for INTERBOLSA?

One of the T2S objectives is to facilitate cross border settlement. To accomplish this goal there must be interoperability between CSDs. Which are the main CSDs INTERBOLSA should have interoperability with: Euroclear, Clearstream, Iberclear? Which other mutual links INTERBOLSA is planning to establish?

Which is the type of connectivity to T2S direct or indirect provided by the INTERBOLSA interface to its clients?

What are the incentives/disincentives for INTERBOLSA to join T2S?

What is the amortization period of the settlement platform currently used by CSD?

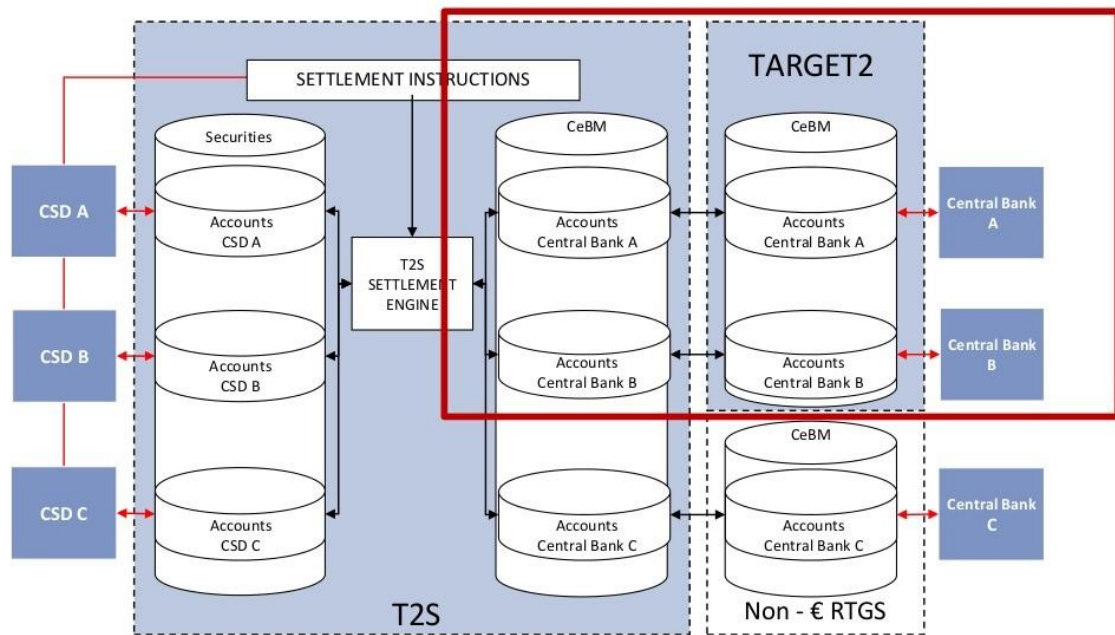
How should T2S affect the links among CSDs of the EURO area? And outside euro area?

Do you see any problem in separating the platform that provides settlement services (T2S) from the custody and other services that will remain to be provided by the CSDs?

What would be the cost savings for INTERBOLSA in joining T2S and not having to develop a settlement platform itself?

In terms of INTERBOLSA Pricelist, how does T2S impacted the settlement costs?

Provision of central bank money in T2S



CeBM = central bank money