Aalto University
School of Economics

Restructuring the European post-trading industry - A quest for efficient financial markets

International Business

Master's thesis

Jenni Laininen

2011

Department of Management and International Business
Aalto University
School of Economics

Aalto University
School of Economics

RESTRUCTURING THE EUROPEAN POST-TRADING INDUSTRY

A quest for efficient financial markets

Master´s Thesis
Jenni Laininen
10.06.2011
International Business

Approved by the head of the Department of Marketing and Management __.__.20__ and awarded the grade _____

Preface

I would like to thank Professor Rose (Aalto University School of Economics) and Professor Deloof (Université Catholique de Louvain) for acting as supervisors for this thesis.

I would also like to thank Madame Honkajuuri-Kokkonen from Euroclear Finland Ltd. and Madame Taipale from the Ministry of Finance, Finland for their valuable contribution to the completion of my thesis.

Abstract

One of the main obstacles of establishing a fully efficient European financial market is the post-trading infrastructure, which creates excess costs and increased risks due to its suboptimal efficiency especially in cross-border trading. A restructuring of the whole post-trading industry can be expected to bring many advantages to the European economy. The solution preferred by this thesis is a regulated monopoly. This model allows for the reaping of economies of scale and scope and a significant decrease in indirect costs. In order to gain the full benefits associated with this solution new regulation on risk control and pricing would be needed.

Yksi merkittävimmistä esteistä tehokkaiden eurooppalaisten rahoitusmarkkinoiden luomiselle on selvitystoiminta, joka aiheuttaa ylimääräisiä kuluja ja suurempia riskejä johtuen etenkin rajat ylittävän selvitystoiminnan tehottomuudesta. Koko selvitystoiminnan uudelleenjärjestämisen voidaan olettaa tuovan monia etuja Euroopan kansantaloudelle. Tämä tutkielma suosittelee selvitystoiminnan järjestämistä säännellyksi monopoliksi. Tämän mallin avulla pystyttäisin hyödyntämään tehokkaasti skaalaetuja ja vähentämään merkittävästi epäsuoria kuluja. Jotta näihin tuloksiin päästäisiin, tulisi luoda uutta riskinhallintaa ja hinnoittelua koskevaa sääntelyä.

Table of Contents

Table of Figures and Tables

Table of abbreviations

CCP	Central Counterparty
CSD	Central Securities Depository
DvP	Delivery versus payment
FoP	Free of payment
EMCF	European Multilateral Clearing Facility N.V.
EU	European Union
GDP	Gross domestic product
ICSD	International Central Security Depository
M&A	Mergers and acquisitions
MiFID	Markets in Financial Instruments Directive
NYSE	New York Stock Exchange
OTC	Over-the-counter
SSS	Security settlement system

1. Introduction

Achieving a single market within the European Union by means of free movement of people, goods, services and capital has been one of the objectives of the Union and its predecessors from the very beginning. While many steps have been taken to boost integration, a single market without borders is not yet a reality.[1] This is true especially in the sector of financial post-trading services, where national frontiers keep fragmenting the market.

While domestic, internal financial markets might function efficiently, a fragmented and inefficient cross-border post-trading network acts as a barrier to European-wide efficient financial markets. Infrequent and complicated cross-border transactions demand excess back-office resources, increasing the costs of such transactions. Investors find cross-border investing unattractive due to high costs and diversify their portfolios inside national borders, thus suffering from a suboptimal risk/reward ratio. It has been estimated that about 30 to 60 per cent of all equity trading is still domestic, and by offering more efficient cross-border post-trading services this percentage could be increased.[2]

Further integration is needed to get rid of expensive inefficiencies in the European financial markets. A reorganisation of the European post-trading network can be expected to have a huge impact on the efficiency of the whole financial industry. Currently the fragmented European post-trading network fails to exploit the advantages of mass production; neither does it take advantage of competition between players in the market (SERIFSOY & WEISS, 2007, p. 3052). In short, the current organisation of the European post-trading network seems to be inefficient and to damage the European financial markets.

---

[1] Also the EU has recognised this. See the webpage of the European Commission. European Commission, http://ec.europa.eu/internal_market/top_layer/index_3_en.htm. Consulted on 27.04.2011.

[2] CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002, p. 7) have estimated the figure to be 60 per cent, while a study by OXERA (2009, p. 53) suggests that 30 to 60 per cent of equity investments in major financial centres are allocated to domestic securities. The home bias for retail investments is much stronger, resulting to 70 to 90 per cent of trading of retail brokerage firms being domestic (OXERA, 2009, p.53). The home bias is generally stronger in major financial centres than in smaller financial centres (OXERA, 2009, p. 53).

This study examines how the European post-trading network could be organised in order to create a truly efficient single financial market. The EU internal financial markets have a great potential if exploited correctly, but on the other hand all costs due to a malfunctioning system will eventually be borne by EU citizens. Restructuring the European post-trading industry to allow for efficient financial markets is one of the most current issues in the EU, and the problem needs careful analysis where theoretical and practical realities are taken into account.

The study is organised in the following way.

First this study will argue why the current European post-trading structure should be reorganised by demonstrating the advantages of financial integration and by estimating how much excess costs are created by the current inefficient system. Then different models for structuring the European post-trading industry are examined and analysed.

After the examination of different models for post-trading the special characteristics of the post-trading industry are studied, those including economies of scale and scope and the inefficiency of vertical silos. These characteristics will be taken into account when deciding which model to recommend as the European post-trading structure. The case of Finland will be introduced to demonstrate the importance of sufficient competition and regulation for the external efficiency of a post-trading industry.

Finally, a proposition of the most suitable structure is made based on the evidence collected.

2. Methodology

This study is conducted using a case study method. A case study is "an empirical enquiry that investigates a contemporary phenomenon within its real life context (...)" (YIN, 2003, p. 13).

This study has a research design which consists of *research questions*, *research propositions*, a *definition of units of analysis* and *criteria for interpreting the research findings*.[3]

Based on the objective of ultimately deciding which structure to choose for the European post-trading, and following the logical progress of the study, the research questions are formulated as follows:

1) Should the European post-trading industry be reorganised, and if yes, why?

2) Which characteristics should be taken into account when choosing the most suitable European post-trading model?

3) What is the best way to organise the European post-trading network in order to create a truly efficient single market for financial services?

The study proposes, based on the academic studies conducted on the area[4] that:

The existing EU cross-border post-trading infrastructure is inefficient and stands in the way of a truly efficient, single financial market. The European post-trading infrastructure needs to be completely restructured in order to allow for more integrated, safe and efficient European financial markets. One of the models suggested by the academic literature will serve as an efficient model based on which the European post-trading industry will be structured.

This study will have one main unit of analysis and one embedded unit of analysis (see Figure 1). The main unit of analysis is **the European post-trading network**. **Case Finland** will be

[3] See YIN (2003) for a more detailed description of research design elements.
[4] See chapter 4 for further introduction.

studied as an embedded unit of analysis. In other words, the study is structured as an embedded single-case method (see Figure 1).

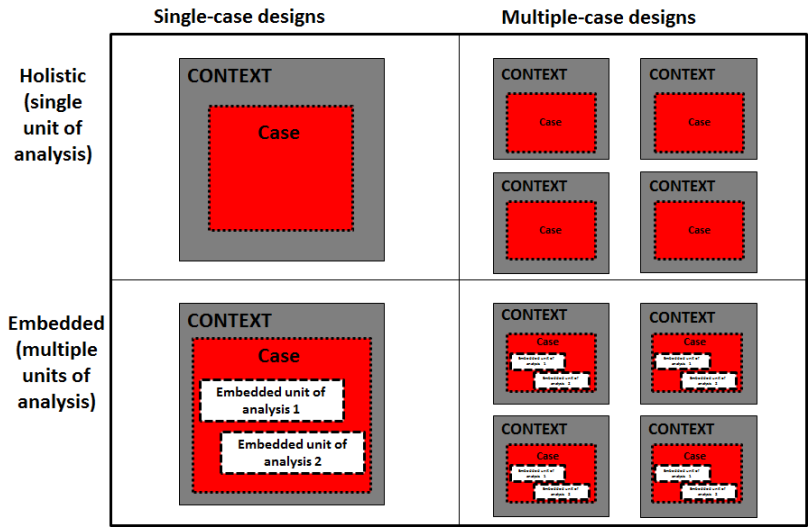


Figure 1. Four types of case study designs. Figure taken from YIN (2003, p. 40).

To interpret the findings of the study rival explanations to study proposition should be made (YIN, 2003). Contrary to the initial study proposition, it is possible that the European cross-border post-trading infrastructure is currently functioning efficiently, and no further means are necessary to improve the efficiency.

It is also possible that the study proposition is only partially correct. In other words, the EU cross-border post-trading network is inefficient and stands on the way of efficient single financial markets, but the efficiency of the financial market cannot be improved just by organising the post-trading network differently. In this case other factors, such as linguistic or cultural differences are so large that they hinder the creation of a single market. This would imply that in order to create a truly efficient European financial market a closer overall integration within EU is required. In any case this scenario would require a rather long time to materialise.

The correctness of the proposition and the alternative explanations are presented in the concluding chapter.

3. Participants in the transaction value chain

In order to be able to study different models for the European post-trading infrastructure market participants in the transaction value chain need to be shortly introduced.

There are three main activities in a transaction value chain: securities need to be traded, the results of the trade need to be confirmed and calculated (i.e. cleared), and the delivery of money and securities to the parties of the trade need to be settled (SERIFSOY & WEISS, 2007, p. 3036). Institutions providing these services include exchanges, clearing houses and CSDs (SERIFSOY & WEISS, 2007, p. 3036). To enable a transaction, custody of securities is also needed.

Below the transaction value chain and the custody of securities are looked into more in detail. Trading of securities is not studied as it is not at the core of this study.

3.1. Confirmation

After a trade has been executed at a trading venue the post-trading process can start. The first step in the post-trading value chain is **confirmation**, whereby the terms of the trade (including the type, amount and price of securities exchanged, as well as the time of transfer and identification of the parties of the trade) are defined (WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, p. 21).

In a regulated market confirmation is usually done automatically in the trading platform, while in alternative market places, like the over-the-counter (OTC) market, confirmation is carried out either electronically, via facsimile or by other means (WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, pp. 21-22).

3.2. Clearing

After the terms of the trade have been confirmed, a clearing entity confirms that the trade fulfils the prerequisites set by the rules and regulations of the clearing entity, and that the settlement can be executed on the date set by the terms of the trade (WORKING GROUP

CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, p. 22). If this is the case, the trade is accepted to be cleared.

As defined by the EUROPEAN COMMISSION (2006, p. 7),

Clearing is the process of establishing settlement positions, including the calculation of net positions, and the process of checking that securities, cash or both are available.

In other words, clearing confirms the rights and obligations of the parties of the trade, and ensures that all prerequisites for settlement are in place (especially the resources of the parties) [WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES (2002, p. 22); EUROPEAN COMMISSION (2006, p. 7)].

Clearing is executed at a (central) counterparty, which can be a separate institution or a CSD (HONKAJUURI-KOKKONEN, 2011). Counterparty clearing is a form of clearing where a third party **interposes** between the counterparties of a transaction with the specific aim of **assuming their rights and obligations**. If the counterparty clearing is done centrally (by a CCP), then the interposition is even stronger as the interposing third party (a CCP) acts as the direct or indirect buyer to **every** seller, and the direct or indirect seller to **every** buyer. This additional element brings the word “central” to the definition. (EUROPEAN COMMISSION, 2006, p. 7).

3.3. Settlement

Settlement takes place after clearing. This step involves the execution of rights and obligations defined in the clearing phase, in other words a transfer of the ownership of a security to the buyer and a payment of a relevant purchase price (WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, p. 23).

Nowadays a physical transfer of securities or cash between transaction parties is rare, and instead assets are transferred electronically by account entries (HOLTHAUSEN & TAPKING, 2007, p. 92).

EUROPEAN COMMISSION (2006, p. 8) has defined a book-entry settlement as follows:

The act of crediting and debiting the transferee's and transferor's accounts respectively, with the aim of completing a transaction in securities.

The central part of the definition is the **completion** of the transaction (EUROPEAN COMMISSION, 2006, p. 8). The trade is completed only after it cannot be cancelled anymore (**finality**) (WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, pp. 23-24). However, it is not necessary to execute debiting and crediting simultaneously (EUROPEAN COMMISSION, 2006, p. 8). A transaction where payment needs to be done in order to receive securities is known as delivery versus payment (DvP) (WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES, 2002, p. 24). Counterparty to DvP is free of payment (FoP), where payment is not needed in order to receive the securities, but instead it can be done separately (HONKAJUURI-KOKKONEN, 2011).[5]

Settlement is often handled by a CSD, or in a case where both parties have a securities account with the same intermediary, the trade can be settled internally at the intermediary (HONKAJUURI-KOKKONEN, 2011). However, internal settlement within the intermediary is not possible if one of the two parties has a securities account with another market participant [be it a CSD or another intermediary (HONKAJUURI-KOKKONEN, 2011)]. In this case, the transaction is settled at the CSD level (HONKAJUURI-KOKKONEN, 2011).

3.4. Custody

EUROPEAN COMMISSION (2006, p. 9) has defined custody, or *account providing*, as

The maintenance of securities accounts.

This activity involves a relationship between the account provider and the account holder (EUROPEAN COMMISSION, 2006, p. 9). Normally there are three providers of custody; a(n) (I)CSD, a custodian bank or an investor bank.

[5] Payment in terms of securities settlement refers to payments between settlement parties, not payments between final customers (HONKAJUURI-KOKKONEN, 2011).

CSDs are central store houses for securities, and if an issuer wants to issue securities in a given country, it usually deposits (electronically) the entire issue with the national CSD (HOLTHAUSEN & TAPKING, 2007, p. 92). An investor must usually have a securities account with the CSD either directly or indirectly via an intermediary (HOLTHAUSEN & TAPKING, 2007, p. 92). The chain can go on as far as possible, since the intermediary can have a securities account at another intermediary who has a securities account at another intermediary et cetera until the last intermediary in the chain has a securities account with the CSD (HOLTHAUSEN & TAPKING, 2007, p. 92).The advantage of having (national) CSDs as central securities holders is that CSDs are very close to issuers and are thus able to process corporate transactions efficiently taking the relevant law and tax requirements into account (EUROPEAN COMMISSION, p. 2).

In some European countries national CSDs have merged with an ICSD (HOLTHAUSEN & TAPKING, 2007, p. 93). ICSDs offer cross-border CSD services [EUROPEAN COMMISSION (p. 2); HONKAJUURI-KOKKONEN (2011)].[6] ICSDs offer many similar services to custodian banks, making the competition between custodian banks and ICSDs fierce (especially over foreign investors). This is the case especially in Germany, France, the Netherlands and the UK. (HOLTHAUSEN & TAPKING, 2007, p. 93).

There can also exist institutions known as global custodians. They offer custodian services internationally, across borders (HONKAJUURI-KOKKONEN, 2011).

In addition to CSDs and ICSDs, securities can be deposited with other intermediaries, which are often members of (I)CSDs (EUROPEAN COMMISSION, p. 2). In some cases, however, they are prime custodians having a direct relationship with the issuer (EUROPEAN COMMISSION, p. 2). There are primarily two types of other intermediaries, a custodian bank and an investor bank.

[6] Examples of these institutions are Clearstream Banking Luxembourg (CBL) and Euroclear Bank of Belgium (HOLTHAUSEN & TAPKING, 2007, p. 93).

A custodian bank is one that holds securities in accounts with other institutions (for example CSDs) on behalf of investor banks, i.e. custodian banks act as intermediaries between investor banks and CSDs (HOLTHAUSEN & TAPKING, 2007, p. 92).

Investor banks are banks holding securities in accounts with other entities (for example custodian banks) on behalf of small or institutional investors. Investor banks have a choice of having a securities account directly with the CSD or with a custodian bank. (HOLTHAUSEN & TAPKING, 2007, pp. 92-93). However, as CSDs and custodian banks offer different services (for example, custodian banks can grant cash credit to investor banks that CSDs in general are prohibited to do) especially many foreign investor banks often find it difficult to use the national CSDs and use the custodian banks instead, while for domestic investor banks using a CSD might be a feasible choice (HOLTHAUSEN & TAPKING, 2007, p. 93).

4. Why should the European post-trading network be restructured?

The European Commission has compared the role of financial markets infrastructure to that of a plumbing in a house – vital, but unglamorous and forgotten until something goes wrong (EUROPEAN COMMISSION, 2006, p. 322).[7] In literature, the role of post-trading services is also compared to that of telecommunications and cash machine networks (CRUICKSHANK, 2001, p. 322), or transport networks and utility infrastructure (MILNE, 2007, p. 2947). A common denominator to all of these industries is that they seem invisible and uninteresting but a failure to provide efficient network services can have significant effects on a much larger sphere, even on the rest of the economy (CRUICKSHANK, 2001, p. 322).

Creating **efficient** (i.e. cost-effective, competitive and safe) clearing and settlement infrastructure is crucial for the completion of internal markets for financial services (EUROPEAN COMMISSION, 2002).[8] In 1985 the Commission created an initiative for welding together the fragmented markets to create a genuinely frontier-free single market by the end of 1992.[9] From 1993 onwards, an increasing number of efforts have been made to create a single market for financial services [for example the Financial Services Action Plan (1999), including the Prospectus Directive, MiFID, et cetera.][10]

However, up to this date the industry remains fragmented in large part due to lacking pan-European infrastructure for trade and post-trade processes (MILNE, 2007, p. 2946). By improving the integration and efficiency of post-trading structures huge economic rents could be exploited. Fragmentation is typical for the European post-trading infrastructure, and it means that financial markets are divided along national borders rather than for

[7] See also the web page of the European Commission. European Commission, http://ec.europa.eu/internal_market/financial-markets/index_en.htm. Consulted on 17.01.2011.

[8] For more information on financial services and policies for achieving the Single Market, see the webpages of the European Commission, http://ec.europa.eu/internal_market/top_layer/index_24_en.htm. Consulted on 17.05.2011.

[9] http://ec.europa.eu/internal_market/top_layer/index_2_en.htm. Consulted on 15.05.2011.

[10] For more information on the Single Markets and its four freedoms, see the webpages of the European Commission. European Commission, http://ec.europa.eu/internal_market/index.htm. Consulted on 27.04.2011.

example industries. There are many small actors, each focused on their own domestic market.

Many studies[11] refer to U.S. as a benchmark for efficient post-trading services; however a main difference separating Europe and U.S. remains the fragmentation of Europe. Fragmentation causes inefficiency in cross-border trading. Investors will have to face high costs when they want to trade across borders, causing them to prefer domestic portfolios. Excess costs and suboptimal risk-return ratios caused by under-diversification have effects on the European economy and thus on the wellbeing of EU citizens. Investors in the EU might be enjoying suboptimal economic benefits caused by the inefficient cross-border post-trading infrastructure hindering the creation of a single financial market [see also CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002, p. 16) and LONDON ECONOMICS (November 2002, p. i) for analysis of under-diversification issues in the European financial markets context].

The purpose of this chapter is to demonstrate why the European post-trading structure should be restructured and further integrated. First the chapter shows that the current, inefficient post-trading system creates many costs to investors, making the EU financial market inefficient. Second, it is shown that by integrating the financial markets EU member states can gain many positive economic advantages.

4.1. Excess costs of an inefficient post-trading network

A portion of inefficiency in the EU financial market can be estimated to be caused by cross-border post-trading. Inefficiency creates excess costs and risks to cross-border investors, the source of inefficiency being in an inefficient combination of and communication between various national post-trading systems across borders (EUROPEAN COMMISSION, 2006, p. 2). Clearing and settlement costs are a subset of total transaction costs facing an investor in

[11] For example CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002) and SCHMIEDEL, MALKAMÄKI, & TARKKA (2002) use the U.S. markets as a comparison point to the European markets.

effecting a trade (GIDDY, SAUNDERS, & WALTER, 1996, p. 986), but in the current inefficient system they form nonetheless a large part of the costs as Table 1 demonstrates.

Excess costs and risks in cross-border trading are divided into three categories by EUROPEAN COMMISSION (2006, pp. 2-3). Below these classes are presented.

Additional costs faced by investors are formed of:

1) **Direct costs** in the form of higher fees for the use of post-trading services[12];
2) **Indirect costs** in the form of higher back-office fees for managing post-trading transactions; and
3) **Opportunity costs** in the form of an inefficient use of collateral, failed trades and trades not undertaken at all because of the inefficiency of arrangements. (EUROPEAN COMMISSION, 2006, pp. 2-3). [13]

Actors in cross-border financial markets face also **heightened risks** in the areas of:

1) **Legal certainty**, i.e. possible conflicts between procedures, rights and duties in different jurisdictions;
2) **Counterparty creditworthiness**, i.e. the possibility that a counterparty may fail to meet its obligations;
3) **Liquidity risk**, i.e. a temporary failure to pay on time; and
4) **Operational risk,** i.e. the threat of processing failures or managerial problems. (EUROPEAN COMMISSION, 2006, pp. 2-3).

Together the heightened risk and additional direct, indirect and opportunity costs create enormous complications in cross-border (post-)trading. The possibility to minimise these complications should be examined when redesigning the European post-trading system.

[12] High brokerage commissions are in most part due to low transaction volumes and different languages (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 15).
[13] Opportunity costs can be defined as "the value of the best alternative use that had to be forgone in order to undertake a given course of action" (WESSELS, 2000, s. 1).

THE GIOVANNINI GROUP (2001, p. 66 ss.) has studied the composition of direct and indirect excess settlement costs (i.e. the extra amount paid of a cross-border settlement in comparison to a domestic settlement). Figure 2 below presents the division. As can be seen from Figure 2, direct costs are very small in relation to indirect costs (THE GIOVANNINI GROUP, 2001, p. 66). Direct costs are only 4 per cent of total excessive cross-border settlement costs, and 96 per cent accordingly is composed of indirect costs (THE GIOVANNINI GROUP, 2001, p. 67), meaning that their role in the restructuration of the European post-trading industry needs to be taken into account before direct costs. For clearing expenses, no data was provided.

As said above indirect costs are mostly compound of extensive back-office support but they also include the costs of needing to employ local agent services (see Figure 2 below) (THE GIOVANNINI GROUP, 2001, p. 66). Lack of harmonised processes in the EU financial markets stimulate the need for these extra resources (THE GIOVANNINI GROUP, 2001, p. 66).

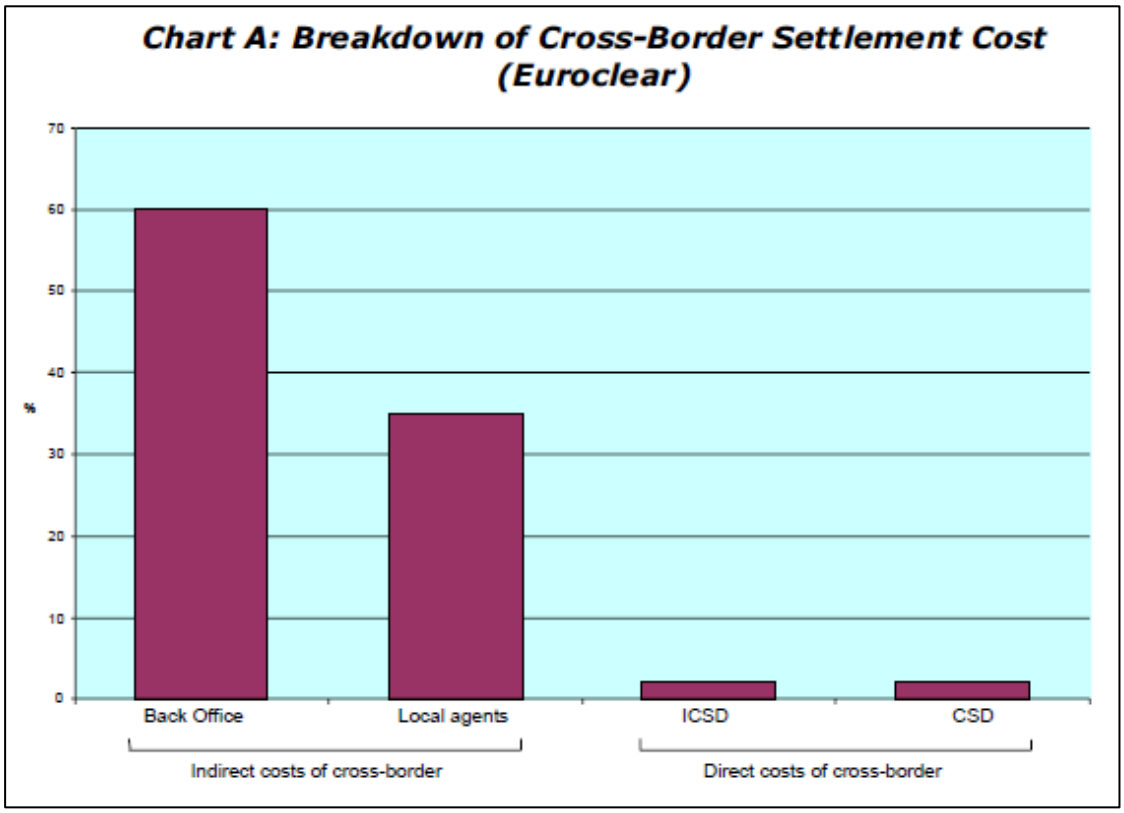


Figure 2. Breakdown of cross-border settlement costs (Euroclear). THE GIOVANNINI GROUP (2001, p. 66).

There have been numerous studies on the amount of excess costs from inefficient European-wide post-trading network (see Table 1 which summarises the study results together). The estimations are somewhat different from each other, but in total they show that the excess costs are massive. European investors have to bear these excess costs and live in a suboptimal, inefficient economy. A reduction in the sources of inefficiency could allow for the creation of more profitable European financial markets and thus a more profitable European economy.

Time comparison	Domestic vs. Cross-border[14]	USA vs. European cross-border	Author
N/A	$3,11 vs. $40,54[15]	$2,90 vs. $40,54[16]	SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, p. 14)
€2,33 vs. €2,88[17]	1,77...2,54[18] 0,94...1,92[19] €0,25 vs. €2,88[20]	N/A	OXERA (2009, pp. 85, 87)
N/A	2...6[21] €15...€20[22] €2 billion...€5 billion[23]	N/A	EUROPEAN COMMISSION (2006, pp. 41-42)
N/A	€4,3 billion[24]	N/A	CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002, p. 15)

Table 1. The costs of cross-border post-trading services in comparison to domestic and US services, and in comparison between year 2006 and 2008. It can be seen that the costs for cross-border

[14] A domestic transaction is one where the domicile of the investor and the domicile of the security are the same, while a cross-border transaction is one where the domicile of the investor is different from that of the security (OXERA, 2009, p. 5)

[15] Difference between average domestic and cross-border settlement costs.

[16] Difference between average U.S. domestic and European cross-border settlement costs.

[17] Cross-border clearing and settlement costs for equities in 2006 versus in 2008 (OXERA, 2009, p. 87).

[18] The ratio between domestic and cross-border settlement fees based on the type of client. Data provided by custodians. (OXERA, 2009, p. 85)

[19] The ratio between domestic and cross-border custody fees based on the type of client. Data provided by custodians. (OXERA, 2009, p. 85).

[20] Difference between average equities clearing and settlement costs (OXERA, 2009, p. 87).

[21] The ratio between costs of cross-border equity transaction and a domestic equity transaction.

[22] The excess costs per transaction of a cross-border equity settlement with respect to a domestic equity settlement. These costs do not involve custody costs, which are higher for cross-border than for domestic holdings of securities. (EUROPEAN COMMISSION, 2006, p. 41).

[23] The aggregated sum of excess cross-border post-trading costs (EUROPEAN COMMISSION, 2006, p. 42).

[24] Total incremental costs of cross-border equity cash-trading and cross-border equity holdings in Europe per year (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 15).

transactions are higher than for domestic transactions in the Europe and in the USA, and that the costs of clearing and settlement have also increased with time.

4.2. Advantages of financial integration

EUROPEAN COMMISSION (2006, p. 2) has identified the benefits of having an integrated EU financial market. By the creation of a truly single market, economic growth and employment would be expected to increase because of more efficient **allocation of capital**, better **risk sharing**, enhanced **capital productivity** and higher rates of **capital accumulation** (EUROPEAN COMMISSION, 2006, p. 2).

More specifically, financial integration would presumably create economic benefits by allowing for

(1) **deeper and more liquid markets**, implying lower transaction costs and a reduced cost of capital for users;
(2) **more diversified investment and financing opportunities** for investors and borrowers respectively;
(3) **a more competitive environment for financial intermediaries**, leading to **lower costs** for borrowers, **higher returns** for investors and greater opportunities for financial innovation; and
(4) additional possibilities for **risk diversification** and a more efficient pricing of risk. (EUROPEAN COMMISSION, 2006, p. 2). [25]

Moreover, "integrated EU financial markets would **improve investor protection** and the **attractiveness of the EU as a location for investment**, thereby **increasing foreign capital inflow** and promoting the **further development of the euro** as an international currency" (EUROPEAN COMMISSION, 2006, p. 2). With efficient financial markets investors can also earn better risk-return ratios caused by an improved diversification of portfolios across

[25] Similar effects on efficient financial infrastructure have also been recognised in academic literature, see for example WESTERHOLM (2003) and LONDON ECONOMICS (November 2002).

national borders [LONDON ECONOMICS (November 2002, p. i); CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002, p. 16)].

In order to reap all of the benefits of a fully integrated EU financial market an efficient and safe post-trading system is required (EUROPEAN COMMISSION, 2006, p. 2). As many studies show, domestic post-trading services are working rather efficiently, but there are severe problems with the efficacy of cross-border post-trading services, which are the main obstacle of the creation of a single financial market.[26]

By creating a more efficient, integrated cross-border post-trading network the costs of cross-border trading can be decreased and economic rents reaped. Decrease in transaction costs has been shown to have a positive effect on transaction volume and securities prices [see WESTERHOLM (2003) for increase in prices and trading volume when transaction costs decrease, and NORDEN (2009) for increase in trading volume and decrease in bid-ask spread when transaction costs decrease]. Some studies also show that volatility decreases as transaction costs decrease, reflecting thus a fairer price formation [see HAU (2006) for increase in volatility when transaction costs increase and WESTERHOLM (2003) for decrease in volatility as transaction costs decrease].

Decreased transaction costs have also been shown to have a positive effect on GDP [LONDON ECONOMICS (November 2002); EUROPEAN COMMISSION (2006); SCHULZE & BAUR (May 2006)] and to promote for lower costs of capital [LONDON ECONOMICS (November 2002); CRUICKSHANK (2001)].

Table 2 below demonstrates the expected effects of decreased transaction costs over GDP, cost of capital, asset prices, turnover, volatility and bid-ask spread. It can be seen that changes in transaction costs have the potential for huge impacts over many characteristics of the European economy that cannot be ignored.

[26] For example CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002) and THE GIOVANNINI GROUP (2001) have found the domestic post-trading operations rather efficient, whereas cross-border trading and post-trading were found inefficient.

Amount of reduction in transaction costs	Estimated growth of GDP (%)	Author
N/A	0,3-2,0[27]	LONDON ECONOMICS (November 2002, p. vi)
7-18 %	0,2-0,6[28]	EUROPEAN COMMISSION (2006, p. 46)
18 %	0,6 [29]	SCHULZE & BAUR (May 2006)
The effects of full European financial market integration	**Estimated reduction in cost of equity capital (basis points)**	**Author**
Full integration	46.7 (weighted average of 15 member states)[30]	LONDON ECONOMICS (November 2002, p. iii)
Amount of increase in transaction costs (basis points)	**Estimated absolute cost effects of higher costs of capital**	**Author**
1	€ 1 billion[31]	CRUICKSHANK (2001, p. 322)
Amount of reduction in transaction costs	**Average transaction cost elasticity in asset prices**	**Author**
N/A	-0,21[32]	WESTERHOLM (2003, p. 236)
Amount of reduction in transaction costs	**Effect on trading volume**	**Author**

[27] The increase is due to decreases in the cost of capital, which is composed of four factors: reduction in the cost of equity finance, reduction in the cost of bond finance, increase of bond finance in total debt finance and a reduced cost of bank finance (LONDON ECONOMICS, November 2002, p. vi). A survey by PwC/London Economics suggests that market participants expect the brokerage fees to decrease by 11 % and bid-ask spread to decrease by 8 % in reaction to EU financial market integration (LONDON ECONOMICS, November 2002, pp. iv-v).

[28] The difference between estimates by LONDON ECONOMICS (November 2002) and EUROPEAN COMMISSION, (2006) are due to differences in underlying econometric models, in particular because the study by EUROPEAN COMMISSION (2006) analyses solely the impact of lower transaction costs (caused by lower post-trading costs) on the cost of capital and GDP, while LONDON ECONOMICS (November 2002) gives a broader analysis where post-trading is only a part of the EU financial market integration. (EUROPEAN COMMISSION, 2006, p. 47).

[29] The authors believe this assessment could be an understatement, and that the actual effects of reduced transaction costs on GDP could be higher, even one per cent or more (SCHULZE & BAUR, May 2006, p. 18).

[30] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK. The total reduction of cost of capital is derived from a decrease in trading costs (effect of 40 basis points on average), and reduced clearing and settlement costs (effect of 10 basis points on average), resulting to a decrease of about 50 basis points (represented in the table as an exact number). (LONDON ECONOMICS, November 2002, p. iii).

[31] The author estimates that these costs will lead to more expensive and thus less internationally competitive goods and services. Moreover, inefficiencies in allocating capital to ideas will damage innovation and the international competitiveness of Europe. (CRUICKSHANK, 2001, p. 322).

[32] Average transaction cost elasticity in turnover. WESTERHOLM (2003, p. 236) has measured the transaction cost elasticity in asset prices for two countries, Finland and Sweden. The elasticity levels for those two were between -0,18...-0,33 for Finland and -0,12...-0,21 for Sweden (WESTERHOLM, 2003, p. 236). On average this make a price elasticity of -0,21.

N/A	-1,142[33]	WESTERHOLM (2003, p. 236)
>22 %	19 %[34]	NORDEN (2009, pp. 1, 20)
Amount of reduction in transaction costs	**Effect on volatility**	**Author**
N/A	[35]	WESTERHOLM (2003, p. 213)
Amount of increase in transaction costs (%)	**Amount of increase in trading volatility (%)**	**Author**
20 %	30 %	HAU (2006, p. 862)
Amount of reduction in transaction costs	**Decrease in bid-ask spread**	**Author**
>22%	27 %[36]	NORDEN (2009, pp. 1, 19)

Table 2. The effects of integrated EU financial markets on GDP, cost of capital, asset prices, trading volume, volatility and bid-ask spread.

4.3. Conclusions

This chapter has shown that the European financial integration would be expected to bring many economic benefits to EU member states and citizens and it is thus an objective worth pursuing. A large source of inefficiency in the European financial market is the cross-border post-trading network, which creates excess costs to European investors and is in the way of more liquid markets, improved financing and investment opportunities, a better risk-return ratio and an improved GDP.

Tackling the source of inefficiency is thus extremely important. By restructuring the European post-trading network so that it operates efficiently the European economy can be improved. Different models of restructuring, including their pros and cons, are discussed in the following chapter.

[33] Turnover rates were also calculated for two countries, Finland and Sweden, and the respective figures were -1,27...-1,39 (Finland) and -0,906...-1,002 (Sweden) (WESTERHOLM, 2003, p. 236).
[34] Increase in trading volume. The study was made over OMXS30 index futures at the OMX Nordic Exchange. In 2006 OMX Nordic Exchange lowered its exchange fee by over 22 % (NORDEN, 2009, p. 2). The exchange fee can be seen as a fixed cost of trading incurred by individual and traders and market makers (NORDEN, 2009, pp. 8-9) which makes it similar to other transaction costs such as the post-trading costs.
[35] The author didn't communicate exact changes or elasticity rates between transaction costs and volatility.
[36] See reference 34 above for explanation of the study conducted by NORDEN (2009).

5. Different models for the European post-trading network

The previous chapter showed why the European post-trading industry needs restructuring. Many academic and EU studies have examined different models for the European post-trading network. In this chapter these options will be presented.

Each model will be analysed based on the ability to abolish the sources of inefficiency presented in EUROPEAN COMMISSION (2006, pp. 2-3) (see chapter 4.1) and the ability of the model to exploit economies of scale and scope. Later, in chapter 7, a suitable model is suggested. However, it needs to be remembered that the models might be more complicated in practice than in theory, and for the sake of being able to compare the models simplifying assumptions are made in the analysis. Figure 3 summarises all of the models analysed in the chapter.

Model	Description	Economies of scale	Economies of scope	Cost of launch	Direct costs	Indirect costs	Opportunity costs	Degree of systematic risk	Risk of legal certainty	Risk of counterparty creditworthiness	Liquidity risk	Operational risk	Dangers	Advantages	Author
Centralisation	Centralisation and bundling of custody, clearing and settlement within a CSD.	Yes, especially for smaller enterprises.	Yes	Probably huge one-off costs.	As volumes grow direct fees become lower.	No need for extra back-office, only one institution to create links with.	Efficient arrangement should increase trading, and lower opportunity costs.	Systematic risk increases.	Collision between local intermediaries and central institution. Which law applies to which transaction?	Unsubstantial, since all operations "guaranteed" by one counterparty. Risk of central counterparty solvency.	Unsubstantial, since all operations "guaranteed" by one counterparty. Risk of central counterparty solvency.	Risk is high since all depends on one institution. Error in processes affects all transactions.	Centralising allows for monopoly pricing. Difficulties to choose service provider.	Cost savings in long term.	(VAN CAYSEELE & WUYTS, 2007)
Centralisation	M&A among smaller settlement institutions, pooling of depository and settlement business.	Yes for small and medium sized enterprises.	Yes	M&A costs.	As volumes grow direct fees become lower. Competition between merged small and large players brings prices down.	Need for back-office resources decreases, however still need for linkages.	As efficiency increases with centralisation opportunity cost decreases.	Systemic risk increases with the increase in size and decrease of number of institution.	Which law applies to which transaction?	Risk for solvency of institutions, however risk becomes smaller with mergers and larger size achieved.	Risk becomes smaller as large institutions guarantee payment.	M&A problems might harm the efficiency of operations.	M&A might prove difficult and costly.	M&A between smaller service providers would enable competition.	(SCHMIEDEL, MALKAMÄKI, & TARKKA, 2002)
Regulation & cooperation	Engines of efficiency are innovation, high technology and competition. Harmonisation of regulation, cooperation between market participants.	No	No	One-off costs not as large as in centralisation.	Once competition between players increases fees should come down remarkably if investors have free access to all institutions.	If multiple service providers, need for back-office resources is high.	Because of high back-office costs trading might be inefficient, and thus decrease trading.	Low systematic risk.	Since the model aims for harmonisation of laws legal risk should decrease remarkably.	Small, competing institutions might have solvency issues more often than large institutions, and regulators might not have resources to monitor all of them.	Larger risk for liquidity problems than with big institutions.	Failure in one institution affects only a small proportion of investors since many service providers. Rerouting easy.	Harmonisation of tax and other regulation might prove difficult.	Allows for innovation and competition, takes advantage of existing infrastructure.	(CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002)

Regulated monopoly	Track 1: Short term solution. Linkages between CSDs and CCPs, EU regulation to prevent free access to services. Track 2: Long-term solution. Unbundling of vertical silos, EU to force a single CSD with clearing & settlement services.	Yes	Yes	Supposedly extremely costly to launch a new institution and to impose regulation.	In Track 1 fees could remain high. In Track 2 fees should come down as volumes increase.	In Track 1 high back-office costs. In Track 2 back-office costs decrease, linkages needed only between intermediaries and the CSD.	As trading becomes more efficient with centralised services opportunity costs decrease.	Systemic risk is very high.	With one CSD forced by EU regulation problems are supposed to be minimised.	Once a regulated and monitored CSD takes care of all post-trading credit risk should decrease notably.	Since the single CSD will face high regulation it is improbable there will be liquidity problems.	With high monitoring and regulation operational risk should be low.	Low innovation due to monopoly, difficulties to force a single CSD. What happens to existing ones?	Regulation prevents monopoly dangers, which are also outweighed by economies of scale and competition at trading level.	(CRUICKSHANK, 2001)
Regulated monopoly	System 1: No competition, strong regulation.	Yes	Yes	Supposedly extremely costly.	Prices should decrease with more volume.	Expensive linkages and back-office costs are minimised.	Efficient trading decreases opportunity costs.	Risk of moral hazard by "too big to fail"	With one CSD regulation problems are supposed to be minimised.	Once a regulated and monitored CSD takes care of all post-trading credit risk should decrease notably.	Since the single CSD will face high regulation it is improbable there will be liquidity problems.	With high monitoring and regulation operational risk should be low.	Low innovation, investment & dynamic efficiency. Risk for monopoly pricing.	Regulation prevents monopoly dangers, which are also outweighed by economies of scale and competition at trading level.	(SERIFSOY & WEISS, 2007)
Competitive fragmentation	System 2: Several service providers, creating fierce competition. Role of regulation is small.	No	No	No immediate costs.	Fierce competition should bring fees down remarkably.	With several service providers back-office fees remain extremely high.	If competition doesn't improve efficiency opportunity cost remains high.	Low incentives to invest in risk management. However, easy re-routing.	Legal risk high, many institutions with different regulatory frameworks.	If no resources to monitor all service providers credit risk might be high.	Smaller players might have severe liquidity issues.	Fierce competition drives players out of markets which is risky for investors.	Cycle of over- and underinvestment. Risk of decreased competition due to birth of natural monopolies.	High level of innovation, easy access to new entrants.	(SERIFSOY & WEISS, 2007)

Contestable monopolies	System 3: Market consolidated, but not completely. Natural monopolies prevail, new entrants are allowed. Regulator prevents vertical silos and guarantees open access.	Yes	Yes	One-time costs lower than for full consolidation.	Direct costs should decrease with competition as long as price cartels are avoided.	There remains some level of indirect costs due to multiple players.	Due to natural monopolies institutions should be efficient, which decreases opportunity costs.	Centralisation of risk management, competition selects naturally the most stable system.	Legal risk lower, however if players in different markets regulation collisions possibly.	Credit risk should be low since players are large.	Liquidity risk should be low thanks to the size of the players.	If a failure in one institution it affects a large amount of investors.	The system degenerating to a single monopoly.	High dynamic efficiency, easy access to new entrants.	(SERIFSOY & WEISS, 2007)
Limited consolidation of clearing and settlement	Model 1: Multiple CCPs and SSSs, but total nro reduced.	No	No	Less one-off costs at launch, not effective in long term.	Direct costs remain approximately same if competition between parties not increased.	Back-office resources still needed.	If efficiency is not remarkably improved opportunity costs remain high.	Less systemic risk, linkages between systems bring contagion effect. Race to the bottom –effect.	With many institutions legal risk remains at a high level.	Credit risk is possible, but with fewer institutions regulators have better resources to monitor them.	Liquidity risk possible, but with fewer institutions regulators have better resources to monitor them.	Operational risk depends on the quality of operations.	No benefits if no free access to all market participants.	Competition secures fair prices & innovation.	(THE GIOVANNINI GROUP, 2003)
Full consolidation of clearing, limited consolidation of settlement	Model 2: Single CCP with multiple SSSs.	Yes at CCPs.	Yes if some activities combined.	Low costs if CCPs can be accessed via existing links.	Single CCP should help to bring direct costs down by netting of all transactions. No effect on settlement fees.	On CCP level indirect costs should decrease, but with SSSs large back-office resources still needed.	With the introduction of a single CCP operations become more efficient and reduce opportunity costs.	Systematic risk increases with the size of CCP.	At the CCP level legal risk is low, at SSS level it is still high.	A single CCP erases all credit risk since the CCP assumes responsibility for every transaction.	Liquidity issues might arise at CCP if the amount of defaults at investor level is abnormally high.	Operational risk increases with the size and concentration of the institution.	Difficult access to market in practice, regulation needed to prevent monopoly dangers. Monitoring to ensure free choice of SSSs.	If entry on market is easy, CCPs cannot exploit monopoly power.	(THE GIOVANNINI GROUP, 2003)
Full consolidation of clearing and settlement	Model 3: Single CCP and single SSS.	Yes	Depends if activities are combined or not.	In long term, can reduce costs due to scale economies.	Direct costs should decrease with higher volumes and efficient operations.	No need for expensive linkages to many service providers, lower back-office costs.	Efficient operations decreases opportunity costs to a minimal level.	Severe systemic risk, financial shocks spread quickly.	Regulation will probably be harmonised with the creation of a single CCP and a single SSS for the whole Europe.	CCP deletes all credit issues.	Liquidity issues might arise at CCP if the amount of defaults at investor level is abnormally high.	With high regulation and monitoring over the two service providers operational risk should be low.	Absence of competition might increase prices & reduce incentives for innovation and investment.	Single service provider has resources to invest in technologies. Only one standard in the market makes operations efficient.	(THE GIOVANNINI GROUP, 2003)

Figure 3. Different models for organising the European post-trading industry.

5.1. Centralisation of custody, clearing and settlement

The basic idea in centralised models is that post-trading services are concentrated in one institution. The two authors, VAN CAYSEELE & WUYTS (2007) and SCHMIEDEL, MALKAMÄKI, & TARKKA (2002) who have suggested centralisation models have some small differences in their models, for example in defining which services should be grouped together in one institution. VAN CAYSEELE & WUYTS (2007) suggest the centralisation of all post-trading services, including clearing, settlement and custody in one CSD, whereas SCHMIEDEL, MALKAMÄKI, & TARKKA (2002) are more for consolidation between small and medium-sized settlement service providers and the pooling of custody and settlement services.

Both of these models are based on economies of scale and scope reached by integrating services (see chapter 6.1 for studies on economies of scale and scope in the industry). Especially small and medium-sized players are found to have a large potential (greater than larger players) for economies of scale and scope [VAN CAYSEELE & WUYTS (2007, p. 3077); SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, p. 36)].

The authors did not specify what would be the costs of launching a single CSD in Europe, but probably the one-off costs would be large. Personnel would need to be hired, technology acquired, linkages created with other institutions et cetera, i.e. all the typical setup costs that can only be avoided if an existing institution is chosen as the service provider. However, in the long term large cost savings can be attained thanks to scale and scope economies and the efficiency created by employing a single institution.

This model would most likely decrease the direct costs associated with post-trading services since as the whole transaction volume would be concentrated in one or a few institutions they could offer services at a lower unit cost. The amount of indirect costs would also be decreased since there would no longer be a need to hire excess back-office resources at the intermediary level. All intermediaries would only have linkages with one or a maximum of a couple of institutions [especially in the model by VAN CAYSEELE & WUYTS (2007)]. The CSDs could also work more efficiently due to scale and scope economies and concentrated transaction volumes, decreasing the level of opportunity costs.

In terms of systematic risk concentration of services is more dangerous. Since the single or a few service providers would have linkages with almost all intermediaries in Europe the contagion effects of an error would be large [see THE GIOVANNINI GROUP (2003, p. 36) for contagion effects in a concentrated structure]. The same problem can be seen with operational risk.

If harmonisation of regulation would not be a part of the creation of a single CSD or a few merged CSDs (which is probable at the case of private and voluntary mergers between small and medium-sized service providers) there might also be collisions of regulation between intermediaries and CSDs. There would also be difficulties in choosing the applicable law if the market participants were located in different countries.

However, credit risk and liquidity risk could be almost avoided at this model, especially in the full consolidation suggested by VAN CAYSEELE & WUYTS (2007). All transactions would be guaranteed by a single counterparty, and if it were large enough with sufficient regulation and monitoring the institution would be unlikely to face solvency problems. However, if there did occur any solvency or liquidity problems they would severely damage the credibility of the whole post-trading system.

Forcing all operations into one or a few CSDs might be difficult from a technical point of view, since effective and safe software would be needed to allow for the post-trading of huge transaction volumes from all over Europe. It would also be very difficult to choose a service provider. Should it be a new institution or an existing one? If the provider was chosen based on bidding, the bidders might lower safety and quality standards in order to offer the cheapest price and win the bid [also known as the “race to the bottom” effect, as described by SERIFSOY & WEISS (2007, p. 3050)].

M&A between small and medium sized enterprises [as suggested by SCHMIEDEL, MALKAMÄKI, & TARKKA (2002), see Figure 3 above] might also turn out to be difficult due to high costs and prices associated with M&As. The newly merged institutions might also have problems in unifying their operations seamlessly together.

As this model is based on concentration or even a monopoly, efficiency losses such as low innovation and high prices might arrive. Heavy regulation would be needed to keep the

monopoly in control. However, if consolidation would only extend to small and medium sized players, monopoly dangers could be avoided since merged smaller institutions would have more power to compete with larger service providers.

5.2. Regulation and cooperation

The model of regulation and cooperation identifies high technology, innovation, cooperation and strong competition between market participants as drivers for efficiency and innovation in the European equity markets (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 9). In short, this model is a total opposite for the centralised model.

Moving into a centralised system would mean compromising some of the drivers for efficiency and innovation. Instead of sacrificing these efficiency drivers with a centralised system, in the model of regulation and cooperation more importance would be put on the removal of regulatory and tax barriers within Europe and on cooperation between the EU, national governments and industry players (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 26).

Harmonisation of laws, tax systems and regulations would be done by the EU, national governments, regulators and legislators (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 26). Market participants such as intermediaries, exchanges, clearing houses and CSDs would cooperate with each other by creating mutual CSD links, promoting international consolidation along or across the industry value chain and agreeing on common industry standards (CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002, p. 28).

Since operations would not be centralised in one institution but instead they would remain fragmented, there would be no possibilities to take advantage of scale and scope economies. On the other hand the one-off costs of creating linkages and harmonising regulation would not be as large as in a centralised model. Even though the individual institutions cannot take advantage of increased volume to lower their direct prices, competition between institutions should decrease prices assuming that investors have a free access to all service providers, i.e. they are not tied to use a certain institution. However,

competition does not affect the need for back-office resources which still remain important, keeping the indirect costs at a high level. High indirect costs might prevent some investors from executing transactions, and thus the opportunity cost would also remain at a high level.

Because of fragmentation the systematic risk could remain low. A systematic harmonisation of regulation and tax policies should also decrease the legal risk substantially. However, because the players in the market would be small they might have more liquidity and credit problems than larger institutions (having a large number of institutions would also demand more resources from monitoring authorities). A good thing is that a failure in one institution (i.e. operational risk) affects only a small proportion of investors and rerouting should be easy.

An advantage of this model is that it is rather quick to establish since there would be no need to build a new institution but instead linkages could be created among existing players. Monopoly dangers would also be avoided, and innovation and competition would drive the industry forward.

Dangers in this model are mostly due to difficulties in reaching harmonisation in different regulatory areas, most importantly taxes. It is unlikely that a total harmonisation of regulation and tax policies within EU member states will be achieved, which puts the applicability of the whole model in question. Moreover, while the creation of electronic linkages might decrease transaction costs, they would still be expected to remain at somewhat high level if harmonisation is not done.

5.3. Regulated monopoly

This model heads towards a regulated monopoly, where there would be no competition over consolidated activities and where regulation controls monopolies. Competition is not believed to provide a long-lasting solution, but a monopoly would be able to provide economies of scale which would outweigh any monopoly dangers [SERIFSOY & WEISS (2007, p. 3047); CRUICKSHANK (2001, p. 328)]. Heavy regulation would also be used to nullify monopolistic inefficiencies (CRUICKSHANK, 2001, p. 328). The monopoly could be publicly

owned, and even ultimately forced by the EU [SERIFSOY & WEISS (2007, p. 3047), CRUICKSHANK (2001, p. 331)].

Two authors have suggested a regulated monopoly, SERIFSOY & WEISS (2007) as one option out of three models ("System 1") and CRUICKSHANK (2001) ("Track One" and "Track Two") as a combination of two sequential phases.

In System 1 by SERIFSOY & WEISS (2007, p. 3047) there would be no competition at the level of activities that are consolidated, and the role of the regulator would be very pronounced. The infrastructure could be publicly owned (SERIFSOY & WEISS, 2007, p. 3047). Consolidation of services could take place at various levels of the transaction value chain, and the strength of the monopoly would vary according to the structure chosen (SERIFSOY & WEISS, 2007, p. 3047). Figure 4 presents three different combinations of trading and post-trading services and the location of a so-called power centre, i.e. the place where power is concentrated. In a regulated monopoly the power lies with regulator. As can be seen, the monopoly can either take place at clearing and settlement services, at all stages of the value chain or only at clearing level.

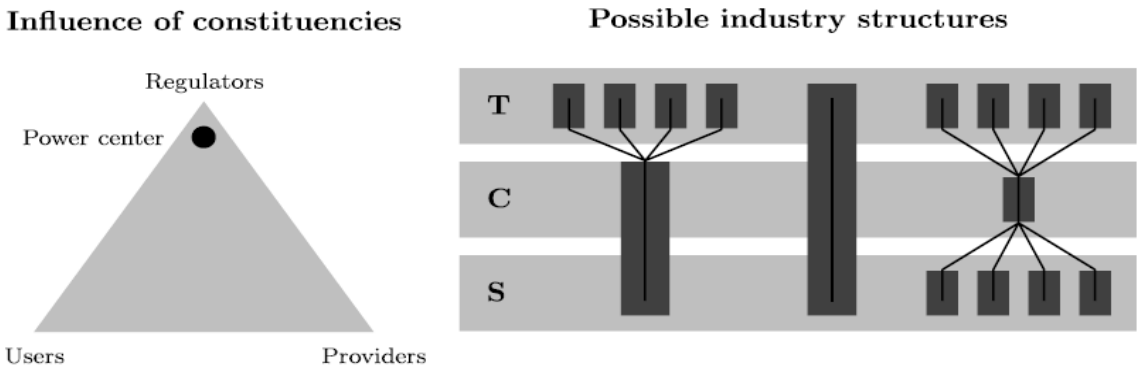


Figure 4. Regulated monopoly and different ways to organise the transaction value chain. In a regulated monopoly power is concentrated with the regulator. SERIFSOY & WEISS (2007, s. 3048). T=Trading, C=Clearing, S=Settlement.

The two sequential phases offered by CRUICKSHANK (2001) should be followed in parallel because they target different time scales. The first phase ("Track One") of the model offers a short-term solution. Electronic linkages would be built between existing CSDs and CCPs in Europe so that manual, expensive inter-system links could be abandoned. (CRUICKSHANK, 2001, pp. 329-330). Intervention of EU competition law would also be required to prevent

tying the use of an exchange to access to clearing and settlement services, bundling of trading, clearing and settlement services or the offer of "integrated" tariffs, and charging excessive prices for clearing and settlement services (CRUICKSHANK, 2001, p. 330).

The second phase ("Track Two") involves more agressive actions than the first phase. First, the EU should enforce splitting clearing and settlement from trading services, in other words unbundling any vertical silos (CRUICKSHANK, 2001, p. 331)[37]. The EU should investigate how it could create a single clearing and settlement system in Europe and ultimately force a single CSD (CRUICKSHANK, 2001, p. 331). Most efficient prices would be benchmarked by the EU in order to make pricing more transparent and encourage consolidation (CRUICKSHANK, 2001, p. 332).

Individual governments would have to align national laws to allow for the efficient functioning of a single CSD (CRUICKSHANK, 2001, p. 332). Users, both intermediaries and investors, are suggested to "vote with their feet". Especially large institutional investors should pay attention to whether they buy services from inefficient or efficient systems. (CRUICKSHANK, 2001, p. 332).

A regulated monopoly could take advantage of very strong scale and scope economies since some operations (especially clearing and settlement) would be unified in one, European-wide institution. Regulation along with competition at trading level would guarantee reasonable prices (CRUICKSHANK, 2001, p. 328).

However, launching a regulated monopoly might turn out to be extremely difficult and costly. It is probable that existing institutions would object the creation of a single insitution, especially when forced by the EU. If acceptance was not received but the model would still be forced, future cooperation and efficiency might be impossible because of a non-positive starting point. If a totally new institution would be created to take care of the European post-trading, one-off costs would also be huge since everything, including new regulation,

[37] See chapter 6.2 for an efficiency estimation of vertical silos.

would have to be created.[38] The position of existing institutions is also left open in this model. Would they still remain in operation, and if not, how could the EU force their closedown?

Direct fees should come down as trading volumes increase and also because regulation would control prices. Expensive back-office resources and manual linkages could be removed, which would bring the indirect costs down. Achieved efficiency would also bring opportunity costs at a low level.

Systemic risk would increase as the size and centralisation of the institution increases even though centralisation would allow for concentrated risk management (SERIFSOY & WEISS, 2007, p. 3048). If the institution would be forced and owned by the EU, the effect of "too big to fail" would be even more pronounced and would bring severe risks of morally hazard behavior (SERIFSOY & WEISS, 2007, s. 3048). However, in terms of legal risk it is likely that harmonisation would take place and legal risks would decrease notably taken that the EU would be the driving force in this model. High and harmonised regulation would also decrease credit, liquidity and operational risks, and as all transactions would be ultimately assumed by a single CCP the counterparty risk would decrease substantially.

Even though the pricing policy and certain risks of a monopoly can be regulated, innovation, investment and internal efficiency cannot be controlled by regulation. An insititution in a safe monopoly position does not have any obvious incentives to innovate and to improve internal efficiency. Also, if the institution would be publicly owned it is questionable whether strict price regulation would be posed upon it – after all, the revenue would be directed to the EU.

It has not been suggested by CRUICKSHANK (2001) nor SERIFSOY & WEISS (2007) whether the institution should be owned solely by the EU or jointly between member states. If a joint ownership would be chosen difficulties might arrive when deciding which country has

[38] It should also be noted that regulation and its surveillance is very costly (SERIFSOY & WEISS, 2007, p. 3048).

representatives at the board, who finances the activities and at which quota, et cetera. Fast decision making would also be rather difficult with 27 country representatives.

5.4. Competitive fragmentation

Competitive fragmentation involves several providers of trading, clearing and settlement services, thus inducing a fierce competition at each level of the transaction value chain (SERIFSOY & WEISS, 2007, p. 3049). High competition would allow for a high level of technological innovation and the use of open standards because of the need to communicate between different service providers (SERIFSOY & WEISS, 2007, p. 3049). Open standards would also allow for easier access to new entrants (SERIFSOY & WEISS, 2007, p. 3049).

In order to guarantee a high level of innovation, ownership of service providers would be private (SERIFSOY & WEISS, 2007, p. 3049). The role of regulators would be very small, since with too much intervention incentives for investment could decrease (SERIFSOY & WEISS, 2007, p. 3049). Instead, regulators would concentrate on ensuring an open access to new entrants (SERIFSOY & WEISS, 2007, p. 3049). Institutions would have incentives to create self-regulation in order to differentiate themselves from competitors (SERIFSOY & WEISS, 2007, p. 3049).

Figure 5 describes the structure of the system. At each level there are multiple service providers who all have created linkages with other market players. Power lies between users and providers depending on the provider's ownership structure (SERIFSOY & WEISS, 2007, p. 3049).

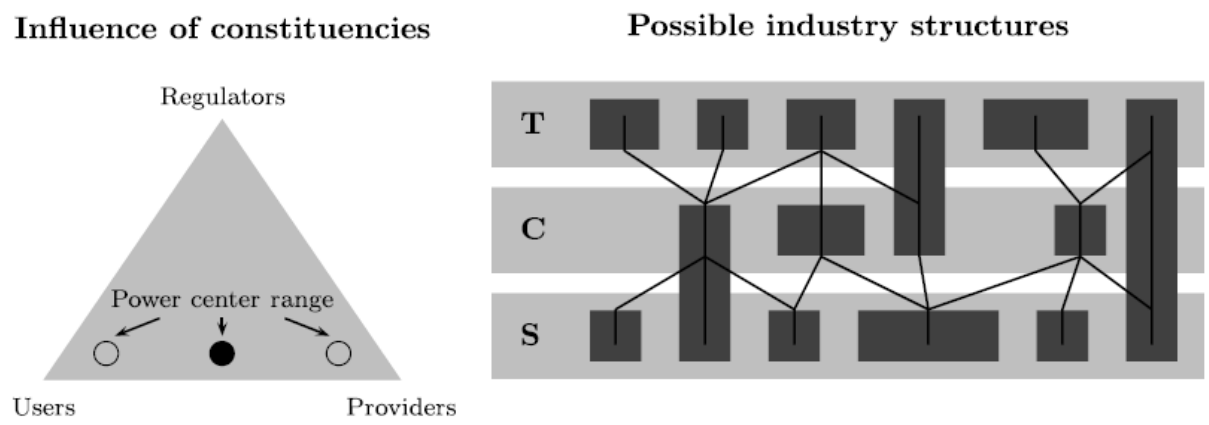


Figure 5. Competitive fragmentation and ways to organise the transaction value chain. In competitive fragmentation fierce competition can be seen in all levels of the transaction value chain. Power is concentrated in between users and providers depending on the provider's ownership structure. SERIFSOY & WEISS (2007, s. 3049).

This system does not take advantage of economies of scale and scope, a strong characteristic of the industry (SERIFSOY & WEISS, 2007, p. 3050). On the other hand, as no new structures would be needed and as the amount of regulation would be minimal, there would be no significant launch costs associated with the model. Fierce competition at all levels should bring direct prices down remarkably, however since there would be multiple service providers the need for extra back-office support would remain extremely high. With high indirect costs transactions might remain so inefficient that the opportunity cost would remain at a high level.

Since risk management would not be regulated, competition for the most stable system would presumably lead to a natural selection of the most secure service providers (SERIFSOY & WEISS, 2007, p. 3050). However, as risk management systems are not very transparent users might find it difficult to evaluate them (SERIFSOY & WEISS, 2007, p. 3050). There might also exist speculative service providers in the market, meaning that they cut their investment in risk management operations and offer cheap prices in order to attract customers ("a race to the bottom") (SERIFSOY & WEISS, 2007, p. 3050).

If monitoring of all small players would not be tight enough there might be a severe risk of credit and liquidity problems, and the legal risk would also remain high due to strong fragmentation of the industry. As a reliable financial infrastructure is extremely important for the well-being of a modern society, it is at least questionable whether natural selection

can act as the only measurement of reliability, thus risking the loss of money for those individuals who used the services of inferior providers.

Since competition in this model is extremely fierce, an unhealthy cycle of over- and underinvestment could be born (SERIFSOY & WEISS, 2007, p. 3050). Open standards prevailing in the industry (necessary to allow for communication) do not encourage for innovation, but on the other hand competition can induce too much uncoordinated investment (SERIFSOY & WEISS, 2007, p. 3050). It is also questionable how long this kind of competition would last since the scale and scope economies of the industry naturally drive towards consolidation.

However, dynamic efficiency in this model would be high and new innovation and price competition would be recreated continuously (SERIFSOY & WEISS, 2007, p. 3050). New entrants would be able to enter the business rather easily (SERIFSOY & WEISS, 2007, p. 3050). In case of emergency a re-routing of services would be relatively easy thanks to multiple service providers (SERIFSOY & WEISS, 2007, s. 3050).

5.5. Contestable monopolies

A model of contestable monopolies is a mixture between a full monopoly and full competition. In this model there are only a few service providers who are large enough to benefit from scale and scope economies but who nonetheless compete with each other (SERIFSOY & WEISS, 2007, p. 3051). A public regulator should ensure the use of open standards and an access for new entrants in order to rule out vertical silos and monopoly dangers (SERIFSOY & WEISS, 2007, p. 3051). A mutual ownership by the users would further restrict the birth of vertical silos (SERIFSOY & WEISS, 2007, p. 3051). The power centre in this model would thus lie divided between regulators and users (see Figure 6).

While new entrants are allowed in the market, their number is restricted due to scale and scope economies and the birth of natural monopolies (SERIFSOY & WEISS, 2007, p. 3051). At the same time the users get to benefit from the merits of a large network of service providers (SERIFSOY & WEISS, 2007, p. 3051).

Figure 6 describes different possible structures for contestable monopolies. As can be seen, there are few competitors, and most activities are naturally concentrated on one or two institutions.

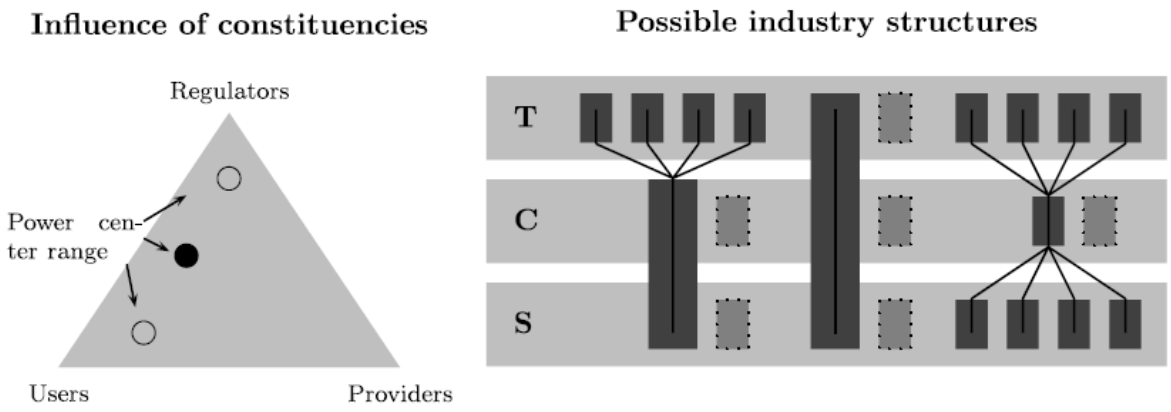


Figure 6. Contestable monopolies and different ways to organise the transaction value chain. In contestable monopolies there are only a few competitors. Power is concentrated between users and regulators, who use their strength to stop the birth of vertical silos and monopoly dangers. SERIFSOY & WEISS (2007, s. 3051).

Contestable monopolies is a good model because it can exploit the best features of centralisation (scale and scope economies) and fragmentation (innovation and price competition). The model does not involve as large setup costs as full centralisation, because existing institutions and linkages could be exploited, neither does it have the fragmented nature of a full competitive model. Competition between institutions should guarantee a decrease in prices as long as a price cartel is avoided, and while there would still remain some level of back-office costs they would be notably decreased. Efficient operations in natural monopolies decrease also the level of opportunity costs.

The model allows for centralised risk management, but at the same time competition is needed to ensure the survival of the most secure system (SERIFSOY & WEISS, 2007, p. 3052). Here the same critique can be applied as with competitive fragmentation. The safety of customers' assets should not be left with the hands of natural selection, but instead regulation should ensure that all providers fulfil strict security standards.

Legal risk would be diminished notably with the decrease of the amount of service providers, however if the providers were facing different regulatory frameworks due to for example

location in different countries regulatory collisions might take place. The size of the players is assumed to lower the credit and liquidity risk since the institutions are supposed to be under monitoring and have better financial resources due to their size. However, because of the size of the institutions failure in one affects a larger number of investors.

It is questionable whether there would exist enough competition and regulation to stop the model from regressing into a full monopoly. At some point companies might want to merge due to mutual interests and to gain even more scale and scope economies, so the question is whether all M&A should be prohibited.

5.6. Limited consolidation of clearing and settlement

This system is the first step in the series of three models suggested by THE GIOVANNINI GROUP (2003, p. 30), where each of the models is a progressive step towards further consolidation.

Limited consolidation ("Model 1") would entail keeping multiple clearing and settlement service providers in the market, but their number would be reduced (THE GIOVANNINI GROUP, 2003, p. 30). Market participants would need to create links between each other in order to guarantee efficient operations (THE GIOVANNINI GROUP, 2003, p. 31). In short, consolidation between market participants would be limited (THE GIOVANNINI GROUP, 2003, p. 30).

Since this system does not really demand consolidation, it might be difficult to take advantage of scale and scope economies, which would be inefficient in the long term – the counterparty of low one-off costs (THE GIOVANNINI GROUP, 2003, p. 31). If competition and efficiency would not grow from the current system the degree of direct, indirect and opportunity costs would remain approximately unchanged.

Systemic risk in this model is limited; however it grows when linkages between market participants increase because of higher contagion through linkages (THE GIOVANNINI GROUP, 2003, p. 32). There is also a similar risk of race-to-the-bottom as with the models of centralisation of custody, clearing and settlement and competitive fragmentation – decreasing risk management measures in order to perform better in tight competition (THE

GIOVANNINI GROUP, 2003, p. 32). Since there would still be multiple institutions at the market legal collision would be probable. However, as the number of institutions would be reduced regulators would have better resources to monitor them and to decrease credit and liquidity risk. Operational risk of each institution would depend, as in the current system, on the quality of management of each institution, however with improved monitoring the risk could be decreased.

This model does not give any benefits to investors if free access is not guaranteed towards all market participants within the network (THE GIOVANNINI GROUP, 2003, p. 31). If there is no free access to all market participants competition will be limited, entailing that the model would be unable to take advantage of scale economies and innovation brought by competition (THE GIOVANNINI GROUP, 2003, p. 31). This situation would not bring any improvements in comparison to the current, inefficient European-wide post-trading system.

However, if competition could be created limited consolidation might work because it would prevent monopoly dangers and promote fair prices and innovation (THE GIOVANNINI GROUP, 2003, p. 31). The model also involves very little one-off costs, however if the number of links between market participants would need to be increased that would increase costs (THE GIOVANNINI GROUP, 2003, p. 31). This model is not as fragmented as competitive fragmentation, since this system aims for progressively reducing the amount of service providers. However, the same question arrives as with other consolidation models – who can decide and on which basis which institutions will stay in operation?

5.7. Full consolidation of clearing, limited consolidation of settlement

This model is a step two in the series of three models by THE GIOVANNINI GROUP (2003). Model 2 entails a full consolidation of clearing services, leaving only one CCP at the market (THE GIOVANNINI GROUP, 2003, p. 33). Settlement would be less consolidated with a limited number of service providers still in the markets (THE GIOVANNINI GROUP, 2003, p. 33). Clearing is chosen to be completely centralised because it is believed to have more scale economies and network externalities than settlement (THE GIOVANNINI GROUP, 2003, pp. 32-33).

Full consolidation of clearing and limited consolidation of settlement holds many scale economies especially at the CCP level. At settlement level scale economies would increase as the size of the institutions increases. However, as the two operations would be separated no scope economies could be exploited unless custody and settlement would be combined in the security settlement system (SSS).

Setting up this model would be relatively cost efficient if market participants could use existing links to access the CCP (THE GIOVANNINI GROUP, 2003, p. 33). Setting up the CCP might entail large one-off costs, however the institution could bring large cost savings in the future due to netting and scale economies (THE GIOVANNINI GROUP, 2003, p. 33). Moreover, if the entry to markets was easy new competitors could enter the market when prices of the CCP would be too high (THE GIOVANNINI GROUP, 2003, p. 33).

Direct fees at the settlement level would remain untouched. Keeping multiple SSSs at operation would mean that indirect costs would also remain unchanged since linkages to all SSSs would be needed. Opportunity costs should decrease as efficiency increases, however if all costs remain unchanged the efficiency will not be improved.

Systemic risk would increase especially at the CCP level once the concentration of services increases, however at the same time counterparty risk would be reduced (THE GIOVANNINI GROUP, 2003, p. 34). Liquidity problems might arrive at the CCP level if the degree of defaults of investors was abnormally high. At CCP level legal risk is considerably reduced, however at settlement level there is still a risk of regulatory collisions. Similarly to systemic risk the operational risk increases with the size and concentration of the institutions (THE GIOVANNINI GROUP, 2003, p. 34).

In terms of competition things might not be as simple in practice as in theory. Legal requirements, high start-up costs and difficulties to compete with existing institutions might prevent new entrants from penetrating the market (THE GIOVANNINI GROUP, 2003, p. 33). Especially the single CCP could enjoy a monopoly position, and regulation would be needed to keep prices in control and to allow for a free choice of settlement services (THE GIOVANNINI GROUP, 2003, pp. 33-34). One can already see the monopoly dangers starting to show at the CCP level.

5.8. Full consolidation of clearing and settlement

The last phase of the three models by THE GIOVANNINI GROUP (2003) entails a full consolidation of both clearing and settlement. There would be only one CCP and one SSS taking care of all post-trading activities in the EU (THE GIOVANNINI GROUP, 2003, p. 35). This model is different from the centralisation model since it does not suggest vertical consolidation between different post-trading activities but instead keeps clearing and settlement separate.

This model can exploit scale economies (THE GIOVANNINI GROUP, 2003, p. 35). Moreover, centralised service providers would have more economical strength to invest in new technologies (however, it is uncertain if they would have incentives to do so), which might further increase efficiency and reduce risks (THE GIOVANNINI GROUP, 2003, p. 35). Markets would also have only one standard (THE GIOVANNINI GROUP, 2003, p. 35) which would reduce inefficiency. However, economies of scope would be left unexploited unless custody would be consolidated to either one of these institutions.

While one-off launch costs could be massive, high cost savings could be attained in the future not only due to scale economies but also because of the financial strength of institutions to invest in new, more efficient technologies (THE GIOVANNINI GROUP, 2003, p. 35). Direct costs should be reduced due to increased volumes and economies of scale, and expensive back-office costs along with opportunity costs would also be drastically decreased thanks to centralised, more efficient services.

However, the model involves a very high level of systematic risk since any financial shocks would reach the whole financial market quickly (THE GIOVANNINI GROUP, 2003, p. 36). On the other hand it would take fewer resources to regulate and monitor only one or two institutions in comparison to multiple ones (THE GIOVANNINI GROUP, 2003, p. 37).

With the deliberate creation of single service providers it is probable that regulation would also be harmonised, thus entailing a decrease of legal risk. As with the model of full consolidation of clearing and limited consolidation of settlement the creation of a single CCP would remove all credit risks, however there might be some liquidity problems if the level of default at investor level was abnormally high. Operational risk should be reduced with high

regulation and monitoring, however in case of any problems they would spread quickly via linkages.

This structure with full consolidation and centralisation involves all typical monopoly dangers. Without proper regulation lack of competition could increase prices and decrease incentives for innovation and investment (THE GIOVANNINI GROUP, 2003, p. 35). The model is also very theoretical since it does not elaborate how the creation of this kind of a structure would be possible. Who would control it, and what would happen to various domestic players?

5.9. Conclusions

The literature has suggested eight different structures for the European post-trading industry. Most, if not all, of the solutions are towards further consolidation at least via increasing linkages among market participants.

While there is no general view on which individual model is the best, all authors more or less agree that the current fragmented, non-consolidated and non-competitive system does not work at all. Indeed, the current system fails to capture the benefits of a monopoly (economies of scale and scope) and the benefits of a competitive market (efficiency, innovation, and low prices) (SERIFSOY & WEISS, 2007, p. 3052). In any case the models described above could bring many improvements to the prevailing one in the EU.

The next step is to choose the appropriate models that could best accomplish the aim of efficient, integrated financial markets. In order to decide which models to choose it is important to define the features that are crucial in the efficiency of the structure. Next chapter will define characteristics that are important in choosing a post-trading structure.

6. The characteristics that matter in choosing a post-trading model

This chapter studies which characteristics of those described in Figure 3 (chapter 5) should be prioritised over others when choosing a post-trading model for Europe. Some of these characteristics are explicitly brought up and recognised by the academic literature (those of economies of scale and scope, and the inefficiency of vertical silos) while others can be found by studying Finland, a Nordic country with a centralised, but vertically diversified post-trading structure.

One might ask "Why Finland?". The question is good and the answer is enlightening. Finland demonstrates an excellent example for those who wish to study the practical applicability of the eight models, i.e. for anyone who is interested in the economic future of the EU. For several years Finland has exercised a centralised post-trading structure that is supposed to be extremely efficient but is not, at least from the investors' point of view. Why this is the case? Why have the centralised models described in chapter 5 not worked? This chapter will tell the answer.

6.1. Economies of scale and scope

Economies of scale and scope in clearing, settlement and custody are found to exist in the post-trading industry by many authors, including SERIFSOY & WEISS (2007), VAN CAYSEELE & WUYTS (2007), SCHMIEDEL, MALKAMÄKI, & TARKKA (2002) and OXERA (2009, p. iii).

By definition, economies of scale refer to a situation where "the increased size of a single operating unit producing or distributing a single product reduces the unit cost of production or distribution" (CHANDLER, 1990, p. 17). Economies of joint production or distribution (i.e. economies of scope), on the other hand, are "those resulting from the use of processes within a single operating unit to produce or distribute more than one product" (CHANDLER, 1990, p. 17).

For settlement and safekeeping (or custody) institutions, the units of output are namely the number of clients and the number of securities held (VAN CAYSEELE & WUYTS, 2007, p. 3070). Economies of scope in the post-trading industry refer to processing different types of

securities on the same platform with only low incremental costs (SERIFSOY & WEISS, 2007, p. 3037).

It has been studied that the average cost per unit decreases quite rapidly as the number of clients and securities [see Figure 7 and Figure 8 by VAN CAYSEELE & WUYTS (2007, p. 3071)] and the volume of settlement instructions and value of deposited securities [see Figure 9 and Figure 10) by SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, p. 17)] held in a settlement institution increases. A minimum efficient scale in the European settlement institutions (i.e. the value for the output at which an institution operates in the most efficient way, in other words the values of output CSDs minimally should attain) was noticed to be around 25.000 for securities and 1.500 for clients (VAN CAYSEELE & WUYTS, 2007, pp. 3068, 3071). Up to this point the unit cost decreases as the number of securities and clients increases, and when these limits are reached the unit cost stays more or less constant (VAN CAYSEELE & WUYTS, 2007, pp. 3070-3071).

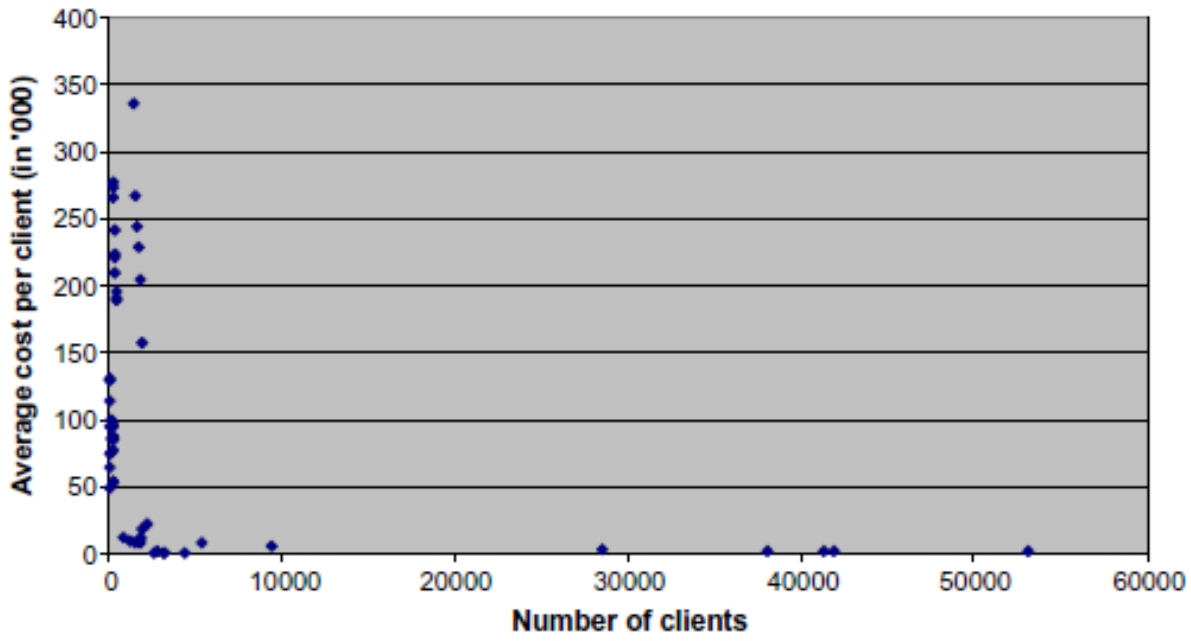


Figure 7. Economies of scale in settlement and depository industry. The unit cost decreases as the number of clients increases. VAN CAYSEELE & WUYTS (2007, p. 3071).

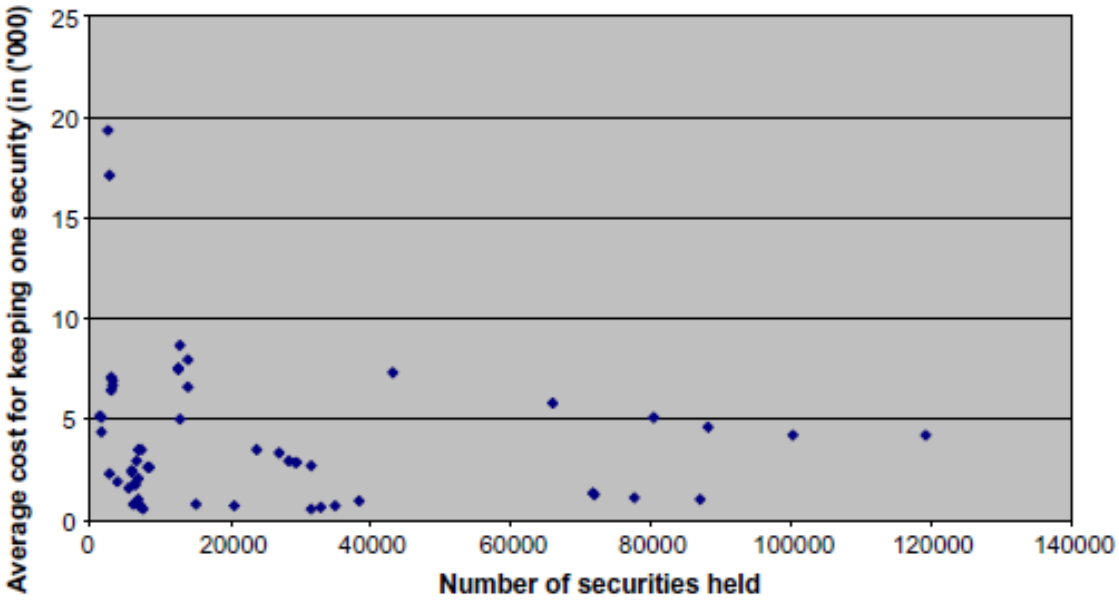


Figure 8. Economies of scale in settlement and depository industry. The unit cost decreases as the number of securities held increases. VAN CAYSEELE & WUYTS (2007, p. 3071).

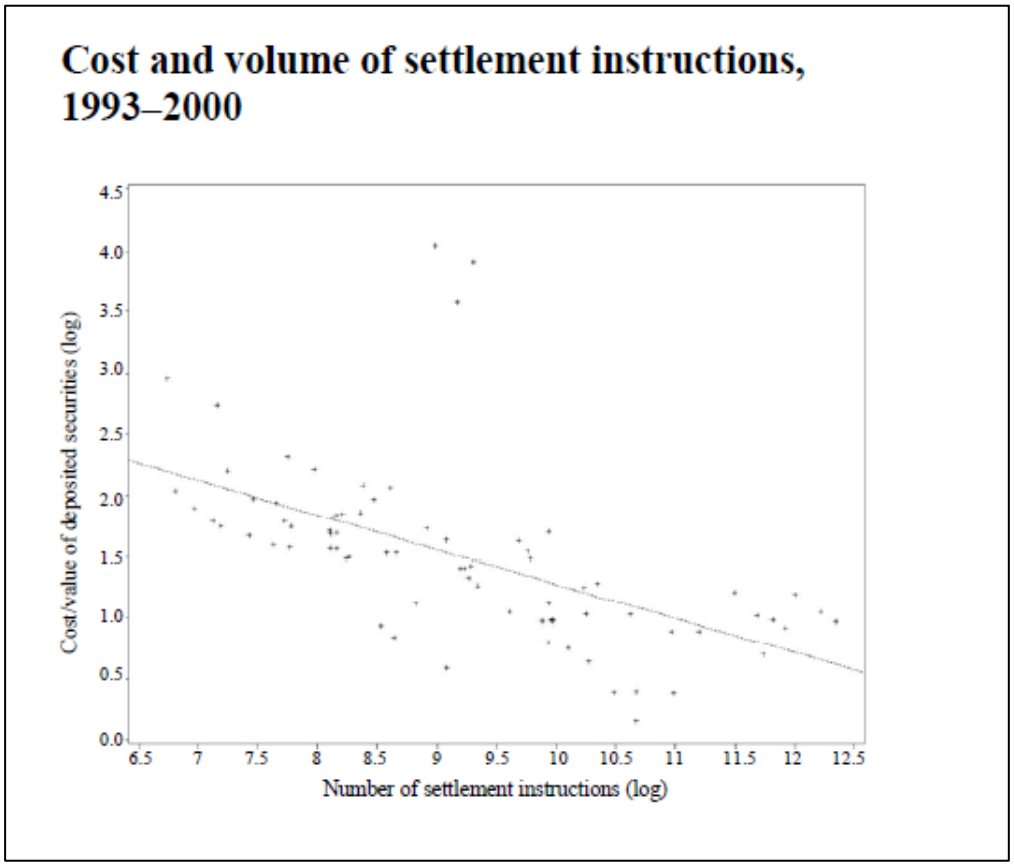


Figure 9. Relationship between costs and volume of settlement instructions, years 1993-2000. The more there are settlement instructions the lower the cost is. SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, p. 17).

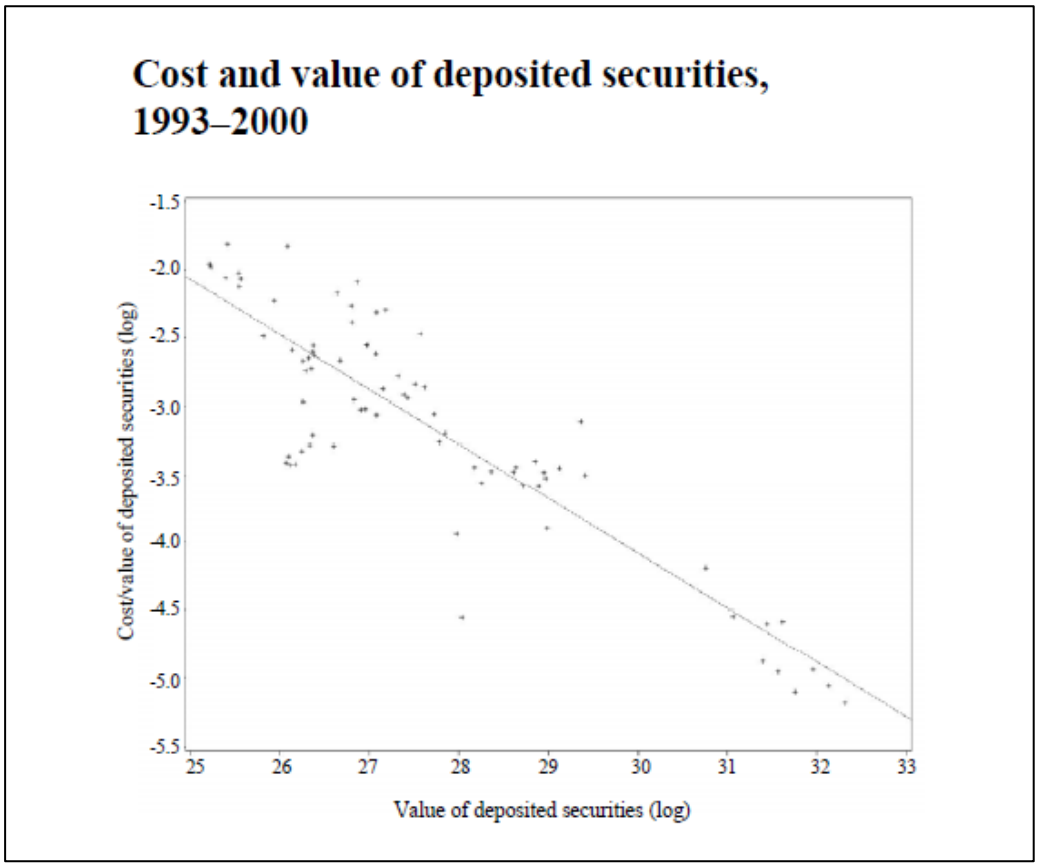


Figure 10. Relationship between costs and value of deposited securities, 1993-2000. The higher the value of deposited securities the lower the costs are. SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, p. 17).

The largest potentials for cost savings are found within the smallest settlement and custody institutions [VAN CAYSEELE & WUYTS (2007, p. 3075); SCHMIEDEL, MALKAMÄKI, & TARKKA (2002, pp. 31-32)]. For small institutions a doubling of settlement instructions is estimated to increase costs only by 56 %, while for the largest institutions the estimation of cost increase is 80 % (SCHMIEDEL, MALKAMÄKI, & TARKKA, 2002, pp. 31-32).

Efficiency gains are discovered particularly in the joint production of settlement and custody services (VAN CAYSEELE & WUYTS, 2007, p. 3077). If a CSD holding 2.000 clients and 5.000

securities was broken up in separate safekeeping and settlement institutions costs would be estimated to increase by more than ten per cent (VAN CAYSEELE & WUYTS, 2007, p. 3077).[39]

6.2. Effects of vertical silos

Chapter 6.1 showed that there are economies of scope in the joint production of custody and settlement services. One might then wonder if it would not be even more efficient to combine all the stages in the transaction value chain, including trading, clearing and settlement, in one institution, i.e. to organise the industry in a vertical silo. This chapter studies if vertical silos would create more efficiency in the industry.

From an investor's point of view vertical silos can be seen as a package, a convenient one-stop-shop allowing for the offering of better and lower priced services (EUROPEAN CENTRAL BANK, p. 3). These improvements of efficiency come from a more fluent communication between the three functions and the exploitation of economies of scope (SERIFSOY & WEISS, 2007, p. 3041).

However, the combination of trading, clearing and settlement might have negative effects over competition (EUROPEAN CENTRAL BANK, p. 3). Economies of scale and scope might act as a barrier to entrance for competitors which reasserts the (natural) monopoly position of such an institution (SERIFSOY & WEISS, 2007, pp. 3041, 3047). With a monopoly position the institution might be able to cross-subsidize its activities and thus to further strengthen its position as the single service provider (SERIFSOY & WEISS, 2007, p. 3041). Once all competitors are forced out of the market with subsidised prices the exploitation of monopoly rents can begin (SERIFSOY & WEISS, 2007, p. 3041).

To minimise a decrease in competition an open access between services in the transaction value chain should be guaranteed, and the use of certain services in the value chain should not be made conditional on using another service from the same service provider

[39] The increase of >10 % in costs is received by adding together the operating costs of the two separate institutions (VAN CAYSEELE & WUYTS, 2007, p. 3077).

(EUROPEAN CENTRAL BANK, p. 3). However, the creation of linkages between different service providers might be difficult due to operational problems and the fact that service providers cannot be compelled to create linkages with each other (EUROPEAN CENTRAL BANK, p. 3). Also, as the amount of linkages grows the degree of systemic risk increases (EUROPEAN CENTRAL BANK, p. 30).

Moreover, the existence of vertical silos might harm the horizontal consolidation between service providers (KÖPPL & MONNET, 2007, p. 3014). There is no guarantee that vertically integrated structures could offer trading and settlement services efficiently after the merger, as noticed in practice in the mergers of Euronext, NYSE and Norex where all the post-merger institutions decided to separate clearing and settlement from trading services (KÖPPL & MONNET, 2007, p. 3027).

It seems that vertical silos have many similar qualities to centralised structures. On one hand they decrease the need for expensive linkages between service providers and offer the comfort of one-stop shopping, while on the other hand they pose the risk of monopoly prices and inefficiency and an increased degree of systemic risk. As with other models entailing monopolies, in order to take full advantage of vertical silos regulation or competition should be created. [40]

[40] See also KÖPPL & MONNET (2007, p. 3013) who state that if vertical silos are allowed and created, competition across vertical silos should be created by forcing cross-listing. The vertical silos would be forced to "offer trading and settlement to the whole market and not only to their own market segment" (KÖPPL & MONNET, 2007, p. 3015). The competition caused by cross-listing will lead to prices that fully reveal costs, resulting at clearing and settlement services to take place efficiently at the lowest cost (KÖPPL & MONNET, 2007, p. 3015). See also EUROPEAN CENTRAL BANK (p. 3) for a similar suggestion requiring a free choice for customers between different trading, clearing and settlement systems.

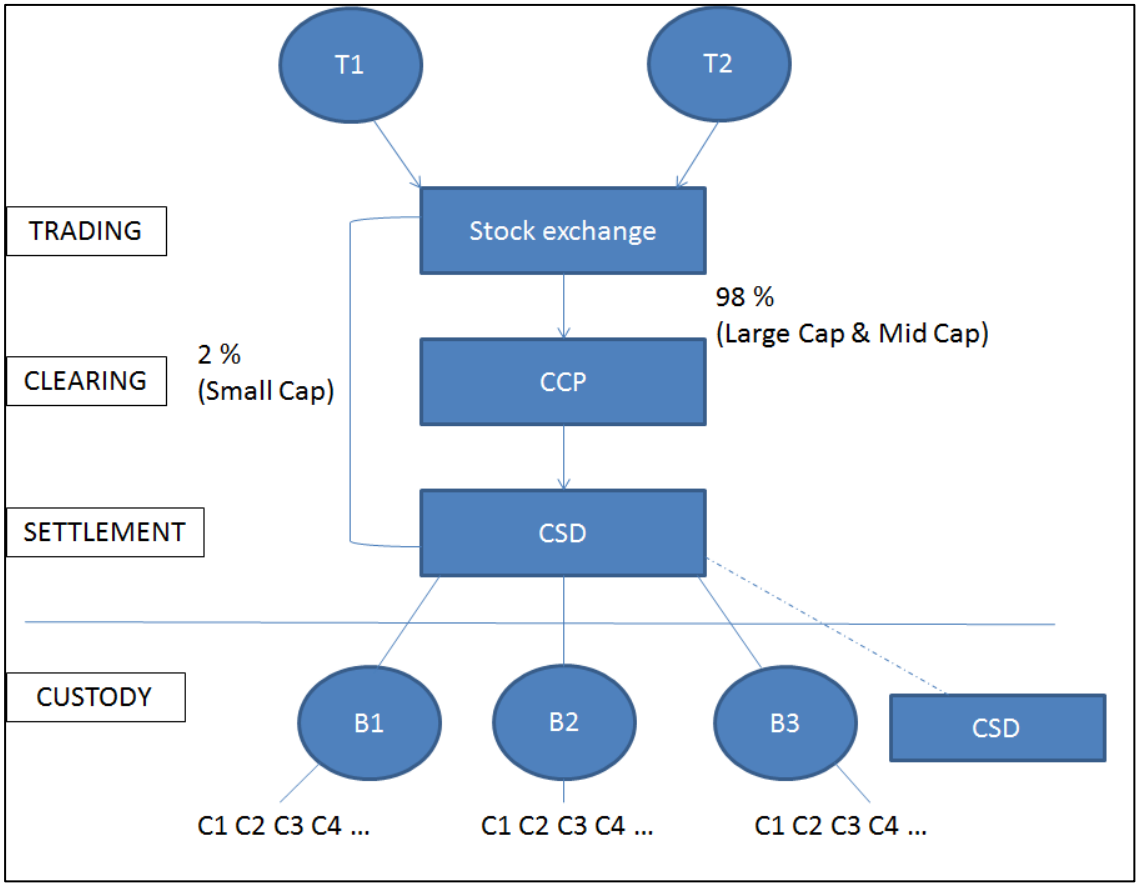
6.3. Centralised models in practice: Case Finland

Finland is an interesting topic for a mini case study because it offers a practical view over a post-trading network organised centrally with natural monopolies thriving the industry. The model is similar to those described in chapters 5.1 and 5.3, except that it only consolidates custody and settlement in one institution (i.e. clearing is executed mostly in a separate institution, which is a difference to model in chapter 5.1) and it has no considerable regulation over monopolies (a difference to model in chapter 5.3). It is indeed a mixture of different models which allows for the examination of the importance of the missing elements in the functioning of the models.

Figure 11 below shows how the transaction value chain is organised in Finland. After trading the executed transactions go to a separate clearing institution (a CCP) in which approximately 98 % of all trades are cleared.[41] In practice all trades are settled in a CSD along with the custody of securities which is also centralised at the CSD.[42]

[41] The remaining 2 % of trades is cleared in a CSD (TAIPALE, 2011). The two percentage estimation of Small Cap trading might be an overstatement, because in March 2011 the percentage of total turnover (including OTC) of Small Cap equity instruments amounted to only 0,7 per cent (NASDAQ OMX, 2011). See https://newsclient.omxgroup.com/cdsPublic/viewDisclosure.action?disclosureId=446818&lang=en. Consulted on the 17.05.2011.

[42] Securities are held either directly with the CSD (in case of Finnish investors) or indirectly via intermediaries (in case of foreign investors). Either way, there is always a final account with the CSD.



T = Trader
CCP = Central Counterparty
CSD = Central Securities Depository
B = Bank / Intermediary
C = Customer/Investor

Figure 11. Organisation of the transaction value chain in Finland. As can be seen, the industry has a centralised structure, where all activities at each transaction level take place at a separate institution, except for custody which is concentrated at the CSD. TAIPALE (2011).

Since the majority of trades are cleared at a single CCP and settled in one CSD which also takes care of custody of securities, it can be said from an economic point of view that each of the institutions has a (natural) monopoly position.

Figure 3 in chapter 5 described the efficiency gains exploited in centralised and consolidated systems. Economies of scale and scope should be exploited, making the direct and indirect

fees lower because of increased volumes and decreased need for linkages between institutions. The opportunity costs should also decrease as the efficiency increases. In the long term the centralised model should bring multiple cost savings.

There are many features in the Finnish post-trading system that should make it an efficient and inexpensive model. However, the model does not reach efficiency and low costs at all stages of the value chain. From the cost point of view, most of the value chain is efficient. A part of custodian services offered by a CSD are free of charge due to regulatory reasons (see ACT ON BOOK-ENTRY SYSTEM 10§ which stipulates that issuers must cover the maintenance costs of book-entry accounts).[43] Clearing fees are the same throughout Europe since the EMCF acting as a CCP in Finland offers services in 19 European countries with same prices everywhere.[44] However, huge differences can be seen in settlement service fees offered by the CSD.

Table 3 below shows how the costs to investors in settlement services offered by the CSD exceed the European average. While the settlement industry might be efficient internally due to scale and scope economies, these efficiency gains are not passed to investors.[45]

[43] However, this applies only to investors' accounts opened at the CSD's own system. If an investor opens an account with an intermediary who then has an account with the CSD, the CSD charges the intermediary a payment who then charges this payment from the final investor. (HONKAJUURI-KOKKONEN, 2011).

[44] See the pricelist of the EMCF. EMCF N.C., http://www.emcf.com/images/regulation_fees_and_penalties.pdf. Consulted on 13.4.2011.

[45] VAN CAYSEELE & WUYTS (2007, p. 3077) state that the efficiency of an institution should not be measured by its revenues (i.e. customer prices) but by its internal costs. However, in this study costs to investors are used as a measurement of the efficiency of a post-trading model because what are important are the efficiency gains to the financial market as a whole. As was shown in chapter 4, excess transaction costs for investors have many side-effects over the whole economy.

VAN CAYSEELE & WUYTS (2007, p. 3071) defined the minimum efficient scale for a CSD to be 1 500 clients and 25 000 securities. NIEMELÄINEN (2008, p. 17) has discovered that in 2006 there were a bit over one million accounts at the Finnish CSD. If we assume that each of the accounts holds only one security (which is not, by the way, an unrealistic assumption since on average one Finn owns three shares (TAIPALE, 2011) both the criteria set by VAN CAYSEELE & WUYTS (2007) are met. This indicates that the Finnish CSD can take advantage of scale economies. Since custody and settlement services are concentrated in the CSD scope economies are also met (see chapter 6.1 for scope economies when combining custody and settlement services).

Activity	Cost in CSD in Finland	Cost on average in Europe	Service provider in the foreign country
Settlement	2.021€ (LILJEBLOM, 2010, pp. 42-43).[46]	0.43 € (OXERA, 2009, pp. 81-82)	(I)CSD
	12.81 $ (SCHMIEDEL, MALKAMÄKI, & TARKKA, 2002, p. 14)	3.86 $ (SCHMIEDEL, MALKAMÄKI, & TARKKA, 2002, p. 14)	CSD
Costs for settlement before CCP clearing in Finland	0.537 € (NIEMELÄINEN, 2008, p. 21)[47]	--	N/A

Table 3. Comparison of costs between settlement services offered by a CSD in Finland to the European average. Costs can be seen to be multiple in Finland in comparison to the European average.

[46] Price of settlement/transaction party with the prices provided by Euroclear Finland in March 2010 (LILJEBLOM, 2010, p. 43).

[47] The costs per party of settlement for a typical transaction completed at a regulated market place (NIEMELÄINEN, 2008, p. 21).

Why are the settlement fees at the Finnish CSD so high in comparison to the European average? It was said at the beginning of this chapter that the Finnish centralised model has certain differences in comparison to the other centralised models described in chapter 5. The answer must be found in these differences, otherwise there would be no explanation to the high settlement price taken that the model fills the efficiency requirements.

The Finnish model is first of all similar to that of a centralisation of custody, clearing and settlement (chapter 5.1). This model at its strictest form [as presented by VAN CAYSEELE & WUYTS (2007)] demands that custody, clearing and settlement services should be concentrated in one institution. The model is based on reaching economies of scale and scope in the joint production of different services. The Finnish model is different from centralisation of custody, clearing and settlement as suggested by VAN CAYSEELE & WUYTS (2007) because in the Finnish model only custody and settlement are consolidated, and most of the clearing is offered by an independent institution.

In Finland before November 2009 the costs per party of settlement for a typical transaction completed at a regulated market place used to be 0.537 € (as seen in Table 3 above) (NIEMELÄINEN, 2008, p. 21), while after the establishment of a separate CCP the cost increased to 2.021 € per party (LILJEBLOM, 2010, pp. 42-43). One reason for the price increase could be that there are significant economies of scope at the consolidation of clearing, settlement and custody services, and as they are not combined in Finland the prices are high. Even though the relationship has not been highlighted in academic literature, it is possible that the combination of clearing, custody and settlement brings large economies of scale and the three services should not be separated. This would suggest that the model chosen to serve as the European post-trading system should combine all three services.

Another, possibly a more important reason for this could be that netting of transactions executed by the CCP has decreased the total number of transactions settled at the CSD, which has led the CSD to increase its prices in order to be able to maintain the same revenue flow as before [see also LILJEBLOM (2010, p. 42)]. As there is no significant competition over settlement services this kind of price increase would be possible. This would imply that competition is needed for the European post-trading model in order to prevent the possibility for price increases when the number of clients decreases, i.e. in other words to prevent monopoly pricing.

Second, the Finnish model is similar to the regulated monopoly (chapter 5.3). To recapitulate that stated in chapter 5.3, the model of regulated monopoly imposes strong regulation over the monopoly and there is no competition over consolidated services. The monopoly could be publicly owned and the power lies with the regulator.

The Finnish system follows the model of a regulated monopoly in the competition aspect. The CSD does not have significant competition over settlement services, probably because other service providers have not found the market interesting enough (i.e. the CSD has a natural monopoly position).[48] However, differences can be found in the ownership structure and regulatory burden of the CSD. The Finnish CSD is privately owned, and faces only little regulation over pricing of services.[49] With little competition and a restricted amount of regulation the CSD can have a monopoly position and it is thus able to price its services above market prices.

It is unclear whether the ownership structure of the CSD has significant importance over pricing. However, if one compares the Finnish model to the model of regulated monopoly, it seems that regulation is the missing element that would help to keep investor prices at a competitive level. The model of a regulated monopoly supposes that monopoly dangers are controlled by regulation, and since it is missing, the centralised model cannot function correctly. This would suggest that any centralised post-trading model implemented in the EU would require regulation in order to prevent the institution from taking advantage of monopoly rents.

6.4. Conclusions

This chapter has shown that there are significant economies of scale and scope in the post-trading industry and as can be seen from the example of Finland, internal efficiency does not correspond to external pricing of services when there is a lack of competition and regulation

[48] KILPAILUVIRASTO (19.1.2001) has also stated that the Finnish CSD has a dominant position.
[49] ACT ON BOOK-ENTRY SYSTEM 10a§ only stipulates that the prices of the CSD need to be “reasonable” and equal to all issuers and intermediaries.

for post-trading services. If all services are concentrated at one institution for the sake of reaping economies of scale and scope and there is no regulation or competition to control customer prices the post-trading network might not work at its optimal efficiency. Choosing the recommended post-trading model seems to be a compromise between advantages of monopoly and competition.

However, with the help of these results it is possible to create a list of factors that could be considered and that would have to take priority over other characteristics when choosing a new model for European post-trading. These characteristics help to ensure the internal and external efficiency of the post-trading infrastructure. The results are listed below.

Note 1: **Scale economies.** In order for the institution to take advantage of scale economies the minimum efficient scale was estimated to be 25.000 securities and 1.500 clients. **The new European post-trading model should ensure that all the institutions are large enough to meet these limits.**

Note 2: Scope economies. Economies of scope were found especially in the joint production of custody and settlement services. Possible scope economies could also come from the joint production of clearing and settlement services. **The model should ensure at least the consolidation of custody and settlement services.**

Note 3: Consolidation between smaller service providers. The largest potential cost savings were found within the smallest settlement and custody institutions in Europe. **The model should ensure further consolidation in Europe especially among smaller settlement and custody institutions.**

Note 4: Avoid vertical silos. Vertical silos function only with open access to all service providers, and it demands a strict balance between competition and monopoly. The efficiency of vertical silos might be hard to sustain in the long run. **While economies of scale and scope are found in the joint production of custody and settlement services, consolidating all levels in the transaction value chain is not recommended.**

Note 5: Ensure competition or regulation. When there are neither competitive service providers nor regulation of pricing, centralised institutions can take advantage of their monopoly position. **The model should ensure competition or regulation in order to keep investor prices at a reasonable level.**

The next chapter will look at the models presented in chapter 5 from the basis of the five characteristics listed above. It will rule out models which do not match the five criteria and then it will put in the order of preference the remaining models based on their ability to fulfil the listed requirements. Finally, one of the models will be chosen as the recommended one for the European post-trading industry.

7. Choosing a recommended model for European post-trading

This chapter will put the models of chapter 5 in an order of preference by first listing out the models that do not correspond to the five criteria, and by evaluating the remaining models based on their ability to fulfil the five criteria. The ability to decrease indirect costs will also be used to estimate the potential of the remaining models, since they form the majority of excess costs to investors (see chapter 4.1).[50] Indirect costs will be mostly decreased by the centralisation of operations since it effectively decreases the need for costly back-office resources and linkages. Finally, the riskiness of the remaining models and the probability to regress back to a non-functioning model will also be estimated.[51]

Of course a perfect model can never be created, and despite of all measures taken there will probably still remain some room for improvement. However, it is important to choose a structure that has the fewest structural flaws.

7.1. Evaluating the models based on the five attributes

Figure 12 lists all the suggested models for the European post-trading industry. Remarks are made to the table based on the evaluation below.

Note 1: **Scale economies. The new European post-trading model should ensure that all the institutions are large enough to meet the minimum efficient scale.**

Based on **Note 1** it should be estimated which models would build large enough institutions to fulfil the minimum efficient scale of 25.000 securities and 1.500 clients. VAN CAYSEELE & WUYTS (2007, pp. 3071-3072) claim in their study that only two institutions in Europe would hold values

[50] Cost-effectiveness was also described as one of the objective for the European clearing and settlement environment in (EUROPEAN COMMISSION, 2002).

[51] Safeness was also set as one of the objectives for the European clearing and settlement environment in EUROPEAN COMMISSION (2002). Downgrading back to an inefficient system was used by SERIFSOY & WEISS (2007, p. 3052) as one of the criteria when defining suitable models for the European post-trading structure.

beyond both these cut-off rates. However, they do not share the names or types of these institutions with readers. Based on the estimation that there would currently exist only two large enough institutions in Europe it can be logically concluded that most of the small and medium-sized institutions cannot fulfil these requirements. This would imply that in order to meet the limits the institutions created in the new model should be rather large.

This objective rules out all models that suggest the creation or conservation of small and medium-sized institutions, i.e. models that suggest fragmentation. Models that are thus abandoned include regulation and cooperation (chapter 5.2), competitive fragmentation (chapter 5.4), limited consolidation of clearing and settlement (chapter 5.6) and full consolidation of clearing, limited consolidation of settlement (chapter 5.7)[52]. In Figure 12 these models are crossed with a green X.

Note 2: Scope economies. The model should ensure at least the consolidation of custody and settlement services.

Note 3: Consolidation between smaller service providers. The model should ensure further consolidation in Europe especially among smaller settlement and custody institutions.

According to **Note 2** and **Note 3** the post-trading models should ensure further consolidation in Europe especially among smaller settlement and custody institutions. Settlement and custody services should be produced together by the same institution, and the combination of clearing services with custody and settlement could bring even further benefits. Of the remaining models centralisation of custody, clearing and settlement (chapter 5.1) underlines especially consolidation between small and medium-sized institutions. In Figure 12 it is circled in red. The other remaining

[52] The model of full consolidation of clearing, limited consolidation of settlement is abandoned because it entails consolidation only at clearing level, which means that settlement institutions would remain fragmented. For CSDs the limits of securities and clients would not be met, and it is the CSD that is important according to VAN CAYSEELE & WUYTS (2007, p. 3071).

models do not particularly mention the combination of custody and settlement services, but it would probably be possible to combine these two services together also in other models.

Note 4: Avoid vertical silos. While economies of scale and scope are found in the joint production of custody and settlement services, consolidating all levels in the transaction value chain is not recommended.

Based on **Note 4**, it is not recommended that all services in the transaction value chain except for custody and settlement would be consolidated in one institution. All of the models described in chapter 5 fulfil this requirement; they all ensure the unbundling of vertical silos. All remaining models are thus in contention.

Note 5: Ensure competition or regulation. The model should ensure competition or regulation in order to keep investor prices at a reasonable level.

According to **Note 5**, the chosen model should ensure competition or regulation in order to keep investor prices at a reasonable level. While not mentioned at the list of characteristics at the end of chapter 6, competition would have the additional benefit of ensuring an increased level of innovation and development activities. Models which do not explicitly take advantage of neither competition nor regulation will be ruled out and marked with a yellow cross. These include centralisation of custody, clearing and settlement (chapter 5.1) and full consolidation of clearing and settlement (chapter 5.8)[53]. Any remaining models that highlight competition will be circled with blue, including contestable monopolies (chapter 5.5).

[53] Even though there has been some level of consideration of regulation in the model of full consolidation of clearing and settlement, it is not explicitly and absolutely pointed out as a necessary element which is why the model is ruled out at this phase.

7.2. Deciding the winning model

The technical ruling executed in the last chapter leaves two models under consideration for the European post-trading structure: a regulated monopoly and contestable monopolies. Both models are expected to ensure a sufficient level of consolidation in order to reach a minimum efficient scale of clients and securities, and they both allow for the integration of custody, clearing and settlement services. Both models also demand explicitly the unbundling of vertical silos.

When it comes to regulation and competition, both of these models are superior to others. The model of a regulated monopoly involves a very high level of regulation imposed over the monopoly, ensuring reasonable investor prices. However, regulation cannot monitor innovation and technical development (at least in an effective way) which means that the institution might soon become outdated and old-fashioned.

The model of contestable monopolies includes both regulation and competition. There would be a couple of large service providers in the market, ensuring the level of innovation and competition in prices. Moreover, there would also be regulation to ensure open access to new entrants in order to prevent monopoly dangers.

Since the purpose of the new post-trading structure is to enable the creation of a single European financial market, it is important that the institution is cost-effective[54]. Indirect costs are the biggest group of costs caused by the inefficiency of the post-trading system, and a model that is able to decrease them should be prioritized. Indirect costs are caused by the need for extra back-office resources and the need to use local agents [EUROPEAN COMMISSION (2006, pp. 2-3); THE GIOVANNINI GROUP (2001, p. 66)]. The more there are service providers the more linkages are needed between different institutions, and the higher the need for back-office resources and the use of local agents is. Thus centralisation is the key to diminishing indirect costs.

[54] See also THE GIOVANNINI GROUP (2003, p. 25), where cost-effectiveness of the post-trading system is highlighted as one of the most important objectives for the European clearing and settlement environment.

In the model of contestable monopolies the amount of back-office costs would be larger than in the model of a regulated monopoly. With contestable monopolies intermediaries and local agents should create linkages with several service providers, while with a regulated monopoly there would only be one institution to create linkages with. Thus the amount of back-office resources needed would be considerably smaller in the model of a regulated monopoly. This would imply that a regulated monopoly would be a better structure in terms of cost-effectiveness.

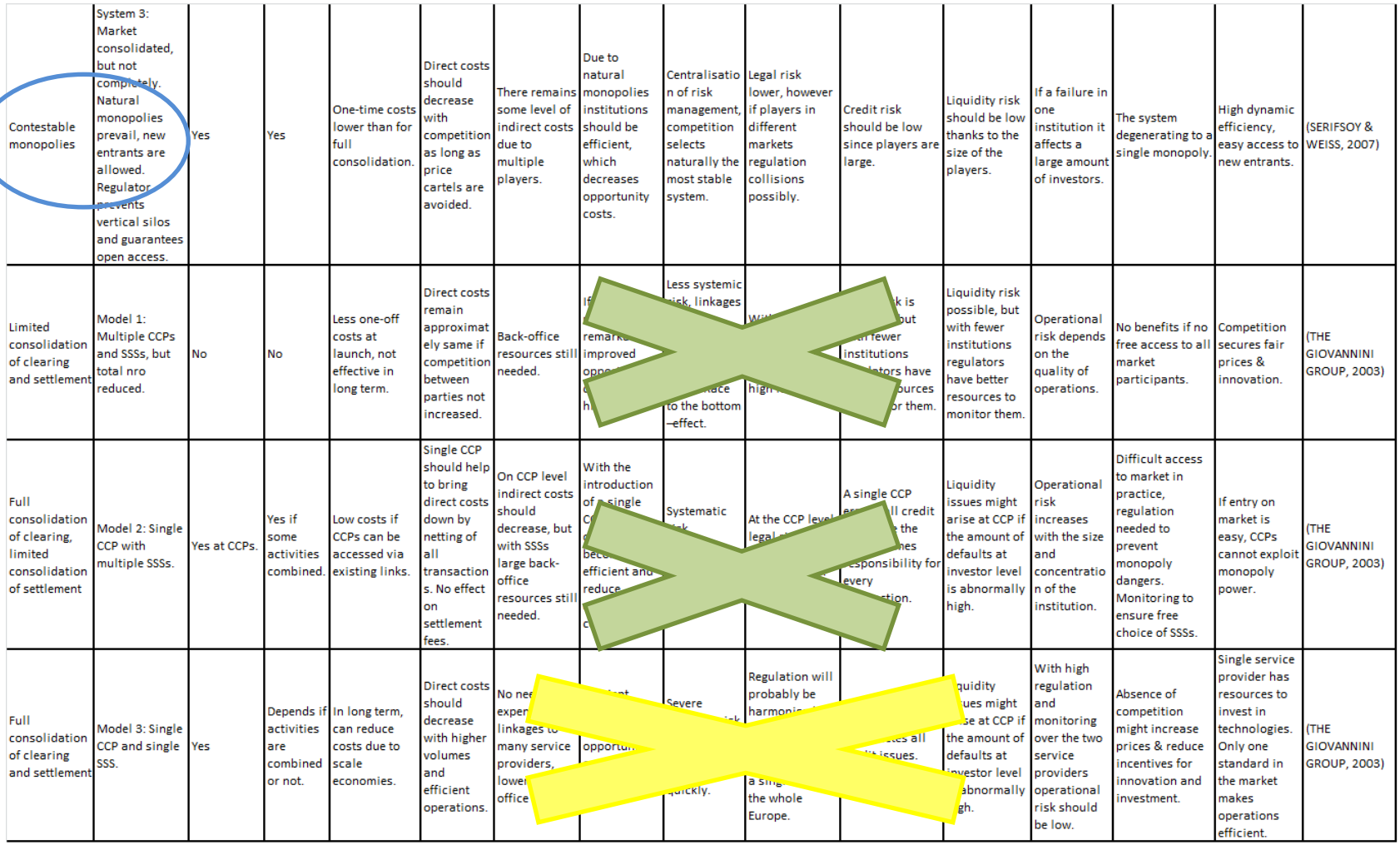
In terms of pure riskiness, a regulated monopoly would involve more systematic risk, and it would also be under a larger risk to regress back into a non-functioning model than the model of contestable monopolies. However, monitoring a regulated monopoly in terms of risk control would be easier than monitoring several service providers. Centralisation would also allow for concentrated risk management (SERIFSOY & WEISS, 2007, p. 3048).

The creation of a centralised monopoly might be easier than the creation of contestable monopolies. Contestable monopolies are based on natural monopolies born from the free initiative of market participants. Forcing such a structure would be impossible, and thus there would exist very few measures for the EU to impose this kind of model. The creation of a single CSD, a regulated monopoly, could be easier since all regulatory and operational threads would be held by the EU. Problems would only arise when deciding the ownership and control structure of the institution and the “disposal” of current private institutions.

It is a tough choice between these two models. Both are remarkably more efficient in comparison to the current, fragmented but non-competitive post-trading structure. Based especially on the abovementioned reasons of facility of launch and the ability to decrease indirect cost, it seems that the **regulated monopoly** would be the recommendable choice to serve as the European post-trading model. The regulated monopoly can take more advantage of scale and scope economies, thus bringing the indirect costs down. It can also be controlled easier than contestable monopolies, thus allowing for better risk control. Finally, the launch of a regulated monopoly can be assumed to be more straightforward than the creation of a system of contestable monopolies.

Model	Description	Economies of scale	Economies of scope	Cost of launch	Direct costs	Indirect costs	Opportunity costs	Degree of systematic risk	Risk of legal certainty	Risk of counterparty creditworthiness	Liquidity risk	Operational risk	Dangers	Advantages	Author
Centralisation	Centralisation and bundling of custody, clearing and settlement within a CSD.	Yes, especially for smaller enterprises.	Yes	Probably huge one-off costs.	As volumes grow direct fees become lower.	office, one	Efficient opportunity costs.		Collision which transaction?	substantial, ce all rations "guaranteed" by one nterparty. k of central unterparty solvency.	Unsubstantial, since all operations "guaranteed" by one counterparty. Risk of central counterparty solvency.	Risk is high since all depends on one institution. Error in processes affects all transactions.	Centralising allows for monopoly pricing. Difficulties to choose service provider.	Cost savings in long term.	(VAN CAYSEELE & WUYTS, 2007)
Centralisation	M&A among smaller settlement institutions, pooling of depository and settlement business.	Yes for small and medium sized enterprises.	Yes	M&A costs.	As volumes grow direct fees beco lower. Competi between merged small ar large players brings prices down.	resour decrea linkages.	As efficiency cost decreases.	Systemic risk increases decrease number of institution.	ies to	k for solvency nstitutions, however risk becomes smaller mergers and ger size hieved.	Risk becomes smaller as large institutions guarantee payment.	M&A problems might harm the efficiency of operations.	M&A might prove difficult and costly.	M&A between smaller service providers would enable competition.	(SCHMIEDEL, MALKAMÄKI, & TARKKA, 2002)
Regulation & cooperation	Engines of efficiency are innovation, high technology and competition. Harmonisation of regulation, cooperation between market participants.	No	No	One-off costs not as large as in centralisation.	Once competitio between players increases fees should come down remarkably if invest have free access to all institutions.	provider need for b	use of ease trading.		nisation s legal	Small, competing nstitutions ght have vency issues more often than large institutions, and gulators might have sources to monitor all of them.	Larger risk for liquidity problems than with big institutions.	Failure in one institution affects only a small proportion of investors since many service providers. Rerouting easy.	Harmonisation of tax and other regulation might prove difficult.	Allows for innovation and competition, takes advantage of existing infrastructure.	(CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP, 2002)

Regulated monopoly	Track 1: Short term solution. Linkages between CSDs and CCPs, EU regulation to prevent free access to services. Track 2: Long-term solution. Unbundling of vertical silos, EU to force a single CSD with clearing & settlement services.	Yes	Yes	Supposedly extremely costly to launch a new institution and to impose regulation.	In Track 1 fees could remain high. In Track 2 fees should come down as volumes increase.	In Track 1 high back-office costs. In Track 2 back-office costs decrease, linkages needed only between intermediaries and the CSD.	As trading becomes more efficient with centralised services opportunity costs decrease.	Systemic risk is very high.	With one CSD forced by EU regulation problems are supposed to be minimised.	Once a regulated and monitored CSD takes care of all post-trading credit risk should decrease notably.	Since the single CSD will face high regulation it is improbable there will be liquidity problems.	With high monitoring and regulation operational risk should be low.	Low innovation due to monopoly, difficulties to force a single CSD. What happens to existing ones?	Regulation prevents monopoly dangers, which are also outweighed by economies of scale and competition at trading level.	(CRUICKSHANK, 2001)
Regulated monopoly	System 1: No competition, strong regulation.	Yes	Yes	Supposedly extremely costly.	Prices should decrease with more volume.	Expensive linkages and back-office costs are minimised.	Efficient trading decreases opportunity costs.	Risk of moral hazard by "too big to fail"	With one CSD regulation problems are supposed to be minimised.	Once a regulated and monitored CSD takes care of all post-trading credit risk should decrease notably.	Since the single CSD will face high regulation it is improbable there will be liquidity problems.	With high monitoring and regulation operational risk should be low.	Low innovation, investment & dynamic efficiency. Risk for monopoly pricing.	Regulation prevents monopoly dangers, which are also outweighed by economies of scale and competition at trading level.	(SERIFSOY & WEISS, 2007)
Competitive fragmentation	System 2: Several service providers, creating fierce competition. Role of regulation is small.	No	No	No immediate costs.	Fierce competition should bring fees down remarkably.	With several service providers back-office fees remain extremely high.	[illegible]	Low [illegible] easy [illegible] routing.	[illegible] risk high, [illegible] institutions with different [illegible] meworks.	If no resources to monitor all service providers credit risk might be high.	Smaller players might have severe liquidity issues.	Fierce competition drives players out of markets which is risky for investors.	Cycle of over- and underinvestment. Risk of decreased competition due to birth of natural monopolies.	High level of innovation, easy access to new entrants.	(SERIFSOY & WEISS, 2007)



Contestable monopolies	System 3: Market consolidated, but not completely. Natural monopolies prevail, new entrants are allowed. Regulator prevents vertical silos and guarantees open access.	Yes	Yes	One-time costs lower than for full consolidation.	Direct costs should decrease with competition as long as price cartels are avoided.	There remains some level of indirect costs due to multiple players.	Due to natural monopolies institutions should be efficient, which decreases opportunity costs.	Centralisation of risk management, competition selects naturally the most stable system.	Legal risk lower, however if players in different markets regulation collisions possibly.	Credit risk should be low since players are large.	Liquidity risk should be low thanks to the size of the players.	If a failure in one institution it affects a large amount of investors.	The system degenerating to a single monopoly.	High dynamic efficiency, easy access to new entrants.	(SERIFSOY & WEISS, 2007)
Limited consolidation of clearing and settlement	Model 1: Multiple CCPs and SSSs, but total nro reduced.	No	No	Less one-off costs at launch, not effective in long term.	Direct costs remain approximately same if competition between parties not increased.	Back-office resources still needed.	remark… improved opp…	Less systemic …isk, linkages … to the bottom –effect.	Wi… high…	…k is …but …n fewer institutions …tors have …ources …r them.	Liquidity risk possible, but with fewer institutions regulators have better resources to monitor them.	Operational risk depends on the quality of operations.	No benefits if no free access to all market participants.	Competition secures fair prices & innovation.	(THE GIOVANNINI GROUP, 2003)
Full consolidation of clearing, limited consolidation of settlement	Model 2: Single CCP with multiple SSSs.	Yes at CCPs.	Yes if some activities combined.	Low costs if CCPs can be accessed via existing links.	Single CCP should help to bring direct costs down by netting of all transactions. No effect on settlement fees.	On CCP level indirect costs should decrease, but with SSSs large back-office resources still needed.	With the introduction of …single C… bec… efficient and… reduce… c…	Systematic …isk	At the CCP level … legal …	A single CCP … …ll credit … the …nes …sponsibility for …every …tion.	Liquidity issues might arise at CCP if the amount of defaults at investor level is abnormally high.	Operational risk increases with the size and concentration of the institution.	Difficult access to market in practice, regulation needed to prevent monopoly dangers. Monitoring to ensure free choice of SSSs.	If entry on market is easy, CCPs cannot exploit monopoly power.	(THE GIOVANNINI GROUP, 2003)
Full consolidation of clearing and settlement	Model 3: Single CCP and single SSS.	Yes	Depends if activities are combined or not.	In long term, can reduce costs due to scale economies.	Direct costs should decrease with higher volumes and efficient operations.	No ne… exper… linkages … many service providers, lower… office…	opportu…	Severe … …quickly.	Regulation will probably be harmoni… a sing… the whole Europe.	…tes all …t issues.	…quidity …ues might …se at CCP if the amount of defaults at …nvestor level …abnormally …gh.	With high regulation and monitoring over the two service providers operational risk should be low.	Absence of competition might increase prices & reduce incentives for innovation and investment.	Single service provider has resources to invest in technologies. Only one standard in the market makes operations efficient.	(THE GIOVANNINI GROUP, 2003)

Figure 12. Models for the European post-trading. Unsuitable models are ruled out by different symbols.

7.3. Regulated monopoly in practice

A careful analysis of each model ended with recommending a regulated monopoly as the new European post-trading model. Organising the post-trading industry in the form of a regulated monopoly would mean that there is only one clearing and settlement system in the Europe. Clearing and settlement would be thus taken care of by a single CSD.

The CSD could be owned by the EU or together by member states, and heavy regulation would control the institution in terms of for example pricing. There would be no competition over consolidated activities and the EU would really run the show of creating and controlling the society.

This model seems to be the best of all the options presented in the framework of this study because it is able to take advantage of scale and scope economies to increase internal efficiency and also the external prices would be held at a reasonable level thanks to regulation. Also the level of excess indirect costs would be remarkably decreased. Having an efficient post-trading structure like the regulated monopoly allows for better functioning financial markets.

However, while this model was found to be the best available there still remain problems that need further discussion. For example, if the institution was owned by EU, how would the management of the institution work in practice? If the institution was owned by the EU it is probable that the EU would also receive all income the CSD generates – who can then guarantee that prices would be kept at a reasonable level?[55]

It would also be extremely difficult to force the institution to innovate and to improve efficiency by regulatory measures, which means that the CSD might suffer from certain internal inefficiencies. Last but not least, what would happen to the existing institution? Who would have the power and gut to force their closedown, or would the European CSD just play off its competitors by superior

[55] One solution for the problem of overpricing would be to have the CSD owned by all member states in co-ownership. Each member state would have to carry the effects of a suboptimal economy if they overpriced the CSD services, making the price formation a little bit more reasonable than under the full ownership of the EU.

efficiency and cheaper prices? These issues would need to be solved before the launch of a regulated monopoly could take place.

8. Conclusions

The objective of this thesis has been to examine how the European post-trading network should be organised in order to facilitate the creation of a single European financial market. The current, fragmented and inefficient post-trading network damages the European financial markets and causes a suboptimal economy.

The research questions set initially are answered below:

1) Should the European post-trading industry be reorganised, and if yes, why?

   A: Yes, the post-trading industry should be reorganised. Not only are there excessive costs involved in the current inefficient post-trading system, but there are also financial advantages that can be attained by a more integrated financial market (chapter 4).

2) Which characteristics should be taken into account when choosing the most suitable European post-trading model?

   A: Several options for the structure of the European post-trading network have been presented. Each of the models were analysed based on their ability to take advantage of economies of scale and scope, to decrease direct, indirect and opportunity costs and to minimise systemic, legal, counterparty, liquidity and operational risks. A winning model was chosen based on its ability to fulfil these characteristics.

3) Based on the important characteristics, what is the best way to organise the European post-trading network in order to create a truly efficient single market for financial services?

   A: A careful analysis of each model ended with recommending a regulated monopoly as the new European post-trading model.

It has also been shown that the initial research proposition is correct. Indeed, it has been shown that

The existing EU cross-border post-trading infrastructure is inefficient and stands in the way of a truly efficient, single financial market. The European post-trading infrastructure needs to be

completely restructured in order to allow for more integrated, safe and efficient European financial markets. One of the models suggested by the academic literature will serve as a good enough model based on which the European post-trading industry will be structured.

Rival explanations can also be overruled. The first rival explanation (chapter 2) claims that "the European cross-border post-trading infrastructure is currently functioning efficiently, and no further means are necessary to improve the efficiency." This proposition is not true; chapter 4.1 has demonstrated that the current post-trading system is not efficient and it needs restructuring because it damages the efficiency of financial markets.

The second rival explanation (chapter 2) claims that the initial proposition is partly, but not completely correct. In other words, "the EU cross-border post-trading network is inefficient and stands on the way of efficient single financial markets, but the efficiency of the financial market cannot be improved just by organising the post-trading network differently. In this case other factors, such as linguistic or cultural differences are so large that they hinder the creation of a single market. This would imply that in order to create a truly efficient European financial market a closer overall integration within EU is required."

The second rival explanation has more truth in it than the first one, but it can also be overruled. Chapter 4 has shown that by organising the post-trading industry differently significant economic gains could be received. However, it is true that there are cultural and linguistic differences within the EU that cause some level of difficulties in comparison to for example the United States which has a more seamless financial market.

It has been estimated by CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP (2002, p. 15) that 40 per cent of excess costs caused by inefficient post-trading processes cannot be affected by the EU, member state or private parties, since they are caused by low volumes (home bias) and language differences. However, trading volumes could be increased by offering cheaper and more efficient services, and linguistic differences can also be dealt with by deciding on a single operating language for the single CSD. Thus, the second rival proposition is also incapable of disproving the validity of the initial study proposition.

While this study has suggested a regulated monopoly to serve as the European post-trading structure, there are many issues that have to be solved before any restructuring can begin. Different parties, such as the existing institutions and member states might have their own interests that slow down the creation of a single financial market. It remains to be seen at which measures will the European post-trading environment be improved, but it is desirable that some action would be taken sooner rather than later. Fortunately there are a few future projects coming within the EU in the area of post-trading, including TARGET2-Securities, a Securities Law Directive and the creation of a regulatory framework for CSDs.[56] For further study it would be interesting to see in which measure these upcoming projects lead the integration of the European financial markets.

[56] For more description of these projects, see the webpages of the European Central Bank and the European Commission. European Central Bank (TARGET2-Securities) http://www.ecb.int/paym/t2s/html/index.en.html, the European Commission (Securities Law Directive and the creation of a regulatory framework for CSDs) http://ec.europa.eu/internal_market/financial-markets/securities-law/index_en.htm and http://ec.europa.eu/internal_market/consultations/docs/2011/csd/consultation_csd_en.pdf. All consulted on 15.05.2011.

9. Bibliography

ACT ON BOOK-ENTRY SYSTEM *(17.5.1991/826)*.

CHANDLER, A. D. (1990). *Scale and Scope: The Dynamics of Industrial Capitalism.* Cambridge, MA: Harvard University Press.

CLEARSTREAM INTERNATIONAL & DEUTSCHE BÖRSE GROUP. (2002). *Cross-Border Equity Trading, Clearing & Settlement in Europe.* Deutsche Börse Group & Clearstream International.

CRUICKSHANK, D. (2001). Clearing and Settlement - The Barrier to a Pan-European Capital Market. *International Finance*(4(2)), 321-333.

EUROPEAN CENTRAL BANK. (n.d.). *The Eurosystem's Policy Line with Regard to Consolidation in Central Counterparty Clearing.* http://www.ecb.int/pub/pdf/other/centralcounterpartyclearingen.pdf

EUROPEAN COMMISSION. (2002). *Clearing and settlement in the European Union - Main policy issues and future challenges.*

EUROPEAN COMMISSION. (2004). *Communication from the Commission to the Council and the European Parliament - Clearing and Settlement in the European Union - The way forward.*

EUROPEAN COMMISSION. (2006). *Draft Working Document on Post-trading.*

EUROPEAN COMMISSION. (n.d.). *Functional Definition of a Central Counterparty Clearing House. http://ec.europa.eu/internal_market/financial-markets/docs/clearing/2004-consultation/each-annex3_en.pdf*

GIDDY, I., SAUNDERS, A., & WALTER, I. (1996). Alternative models for clearance and settlement: The case of the single European capital market. *Journal of Money, Credit and Banking, 28*(4), 986-1000.

HAU, H. (2006). The role of transaction costs for financial volatility: Evidence from the Paris bourse. *Journal of the European Economic Association*(4(4)), 862-890.

HOLTHAUSEN, C., & TAPKING, J. (2007). Raising rival's costs in the securities settlement industry. *Journal of Financial Intermediation, 16*, 91-116.

HONKAJUURI-KOKKONEN, K. (2011, March 24). Interview. (J. LAININEN, Interviewer)

KILPAILUVIRASTO. (19.1.2001). *Suomen Arvopaperikeskuksen kilpailuoikeudellinen asema ja hinnoittelu arvopaperien selvitystoiminnassa.*

KÖPPL, T. V., & MONNET, C. (2007). Guess what: It's the settlements! Vertical intergration as a barrier to efficient exchange conslidation. *Journal of Banking & Finance, 31*(10), 3013-3033.

LILJEBLOM, E. (2010). *Arvopaperien moniportaisen hallinnan ja hallintarekisteröinnin laajentamisen taloudelliset vaikutukset.* Helsinki: Valtiovarainministeriö.

LONDON ECONOMICS. (November 2002). *Quantification of the Macro-Economic Impact of Integration of EU Financial Markets.* London Economics in association with PricewaterhouseCoopers and Oxford Economic Forecasting.

MILNE, A. (2007, March 30). The industrial organisation of post-trade clearing and settlement. *Journal of Banking & Finance, 31*(10), 2945-2961.

NASDAQ OMX. (2011). *Monthly Report - Total Equity Trading March 2011. https://newsclient.omxgroup.com/cdsPublic/viewDisclosure.action?disclosureId=446818&lang=en*

NIEMELÄINEN, J. (2008). *Suomen osakekaupan kaupankäynti- ja selvitysjärjestelmä: Toimialan tehokkuus, transaktiokustannukset ja kehityssuunnat.* Helsinki: Valtiovarainministeriö.

NORDEN, L. (2009, August). A Brighter Future with Lower Transaction Costs? *Journal of Futures Markets, 29*(8), 775-796.

OXERA. (2009). *Monitoring prices, costs and volumes of trading and post-trading services.* Oxera.

SCHMIEDEL, H., MALKAMÄKI, M., & TARKKA, J. (2002). *Economies of Scale and technological development in securities depository and settlement systems.* Helsinki: Suomen Pankki.

SCHULZE, N., & BAUR, D. (May 2006). *Economic Impact Study on Clearing and Settlement - Annex II.* European Commission - DG JRC.

SERIFSOY, B., & WEISS, M. (2007). Settling for efficiency - A framework for the European securities transaction industry. *Journal of Banking and Finance, 31*(10), 3034-3057.

TAIPALE, A. (2011, January 4). Valtiovarainministeriö. (J. Laininen, Interviewer)

THE GIOVANNINI GROUP. (2001). *Cross-Border Clearing and Settlement Arrangements in the European Union.* Brussels.

THE GIOVANNINI GROUP. (2003). *Second Report on EU Clearing and Settlement Arrangements.* Brussels.

VAN CAYSEELE, P., & WUYTS, C. (2007). Cost efficiency in the European Securities Settlement and Safekeeping Industry. *Journal of Banking & Finance, 31*(10), 3058-3079.

WESSELS, W. J. (2000). *Economics.* New York: Barron's Educational Series, Inc.

WESTERHOLM, J. (2003). The Impact of Transaction Costs on Turnover, Asset Prices and Volatility: The Cases of Sweden's and Finland's Security Transaction Tax Reductions. *Liiketaloudellinen Aikakauskirja*(2), 213-241.

WORKING GROUP CLARIFYING THE MULTI-TIERED OWNERSHIP STRUCTURE OF SECURITIES. (2002). *Arvopaperien moniportainen hallinta.* Helsinki: Valtiovarainministeriö.

YIN, R. K. (2003). *Case Study Research: Design and Methods* (3rd ed.). Thousand Oaks, California: Sage Publications, Inc.