

CITY RESEARCH SERIES  
**NUMBER ONE**




THE DIRECT COSTS  
OF CLEARING  
AND SETTLEMENT:  
AN EU-US  
COMPARISON

NERA Economic Consulting  
JUNE 2004



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## FOREWORD

**Michael Snyder**  
**Chairman, Policy and Resources Committee**  
**Corporation of London**

I am pleased to introduce this comparative study into the direct costs of clearing and settlement, the first in the Corporation's new *City Research Series*. The series is intended to investigate issues that have direct relevance to City practitioners and to the policy-makers who influence the regulatory environments in which the international financial services industry operates. This *City Research Series* is a successor to the influential City Research Project of the last decade, and seeks to update that seminal piece of analysis through a range of complementary and cross-cutting studies.

This is part of a wider effort by the Corporation to tackle international financial regulatory and competition issues. The new City Office in Brussels will also help our EU Advisory Group to shape our thinking about the future make-up and direction of the wholesale market for financial services in the EU. As the single market for financial services develops further, we will co-ordinate and develop a strategic approach in Europe designed to maintain the City's competitiveness.

To enable us to achieve our objectives, the Corporation will continue to commission independent, relevant research. This study - *The Direct Costs of Clearing and Settlement: An EU-US Comparison* - by NERA Economic Consulting deals with one of the central issues in EU market efficiency. Through a bottom-up analysis of different pricing and charging regimes, NERA has quantified the significant gaps between the direct costs of clearing and settlement in the US and Europe, and assessed the scope for reducing these variations. I hope that the conclusions of this report will stimulate debate on how we make European capital markets more competitive.

*Michael Snyder*  
*London*  
*June 2004*



## **EXECUTIVE SUMMARY**

- This study investigates the *direct* costs of clearing and settling an equity transaction in Europe and in the US. Compared with previous “top-down” studies, the “bottom-up” methodology used in this report means that the study is restricted in scope, but it does allow a more accurate comparison of the costs examined.

### **Domestic Transactions**

- Our results indicate that there is a significant gap between the costs of clearing and settlement in the US and Europe. This is consistent with the findings of previous research on this subject.
- For an exchange-traded equity transaction settled on a net basis, the cost in the US is around €0.10; in a selection of major European markets the cost is in the range of €0.35 to €0.80.
- With respect to these findings, it is worth noting that on-exchange transactions are highly automated, implying significant cost advantages for the US due to economies of scale.

### **Non-Domestic Transactions**

- Cost differentials between the US and Europe are more significant when comparing US costs against the costs of European non-domestic transactions. However, comparing US costs against European non-domestic costs is harder as these costs also differ very significantly within Europe. For example, an internal settlement within an International Central Securities Depository (ICSD) can cost as little as €0.57, whereas a standard cross border trade settled through an ICSD can cost €35 or more. Thus low cost, non-domestic settlement is available for some transactions in Europe but the majority of transactions are still settled at a high cost.

- The main reason for the variation in cost observed within Europe is the differing degree of interoperability between systems. Where a direct link exists or transactions can be settled internally to one system, the costs of non-domestic settlement are generally low.
- There may be scope for reducing costs by improving interoperability. This could, in theory, be achieved by horizontal integration. Given the fragmentation in the European industry at present, however, this appears unlikely. Alternatively, interoperability could be improved by investment in links between existing systems.
- However, many non-domestic settlements are still settled externally through an ICSD or through an agent bank at a relatively high cost. These high costs are, in our view, predominantly a result of the legal, regulatory, and cultural barriers to cross border settlement. Therefore, we do not think that average costs will fall significantly until some of these barriers are reduced.

### **Reasons for Higher Clearing and Settlement Costs in Europe**

In our view, the main reasons for higher clearing and settlement costs in Europe are:

- *Lower volumes* – since clearing and settlement involves high fixed costs (particularly associated with automated facilities), the higher the volumes, the lower the cost per transaction. The US has significantly greater volumes than most European markets and thus benefits from economies of scale. In particular, volumes of non-domestic trade in Europe are very low compared to volumes traded within the US.

- *Legal, regulatory and technical barriers to non-domestic clearing and settlement in Europe* – Without a consolidated model for clearing and settlement provision, there will almost inevitably be a gap between service provision in Europe and in the US. This reflects the benefits the US market gains from consolidation of transaction flows through a single platform. Nonetheless, sections of the European market are now approaching a par with the US system in terms of providing a comparable service for some transaction types.
- *Market structure* – the US Depository Trust and Clearing Corporation (DTCC) is user-owned, while European clearing and settlement providers are mostly now in private hands, operating on a for-profit basis. European operators are therefore making higher margins than the US operators, with a corresponding impact on costs. This raises the question of whether clearing and settlement providers have a natural monopoly over some or all of their activities, which in turn leads on to the issue of regulation.



# 1. INTRODUCTION

Clearing and settlement is the process that follows the execution of a trade and culminates with the final and irrevocable exchange of cash and assets between counterparts to the trade. The total cost of these services to European investors is estimated at \$12.5 billion a year.<sup>1</sup>

With the move towards a single European capital market, the efficiency of the arrangements for cross-border clearing and settlement within Europe has been widely debated. Part of this debate has centred on attempts to estimate the cost differential in clearing and settlement services between Europe and the US. One recent study estimated that the direct costs of clearing and settling a cross border trade is between 1.25 and 5.16 times higher in Europe than in the US,<sup>2</sup> while another found that the cost differential between the US and Europe is equivalent to adding ten basis points to the EU cost of capital.<sup>3</sup>

The implication that there may be inefficiencies in the European capital market has sparked a number of initiatives backing major structural change in the European market. Deutsche Börse spearheaded the campaign for vertically integrated, country-based silos establishing interconnectivity for cross border trading and minimising the costs of domestic trading through a single trading clearing and settlement infrastructure. Euronext and Virt-x have emerged as the first pan-European stock exchanges providing cross border clearing and settlement through a series of links between existing clearinghouses and central securities depositories (CSDs).

In this report we focus on the *direct costs* of clearing and settlement, by which we mean the charges made by clearing and settlement service providers. Other costs incurred during clearing and settlement include *indirect costs* (e.g. brokers' own back office costs) and *opportunity costs* (e.g. the cost of collateral).<sup>4</sup> While indirect and opportunity costs may represent a significant proportion of the total, we have

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<sup>1</sup> G30 (2003)

<sup>2</sup> Lannoo and Levin (2001)

<sup>3</sup> Harvard Research Group (2003)

<sup>4</sup> The cost classification is based on the methodology used by the Giovannini group.

excluded them from the analysis in this study, choosing instead to investigate direct costs in detail.

Previous research into the direct costs of clearing and settlement has taken a “top-down” approach, estimating the operating income per transaction for different providers. The main limitation of this “top-down” approach is that it is based on highly aggregated data. Clearing and settlement providers may offer a number of different services, which means that operating income figures for different providers may reflect different service offerings. Other difficulties with the approach include the treatment of netting (whether the number of transactions is counted on a gross or net basis) and differences in accounting treatment across jurisdictions.

The Corporation of London asked NERA to conduct a “bottom up” analysis of the costs of clearing and settlement in Europe and the US, looking at the charges that clearing and settlement providers make for different services. The objective of the research is to see whether a bottom up approach confirms the prevailing view, based on existing research, that the costs of clearing and settlement are high in Europe compared to the US.

Our analysis is based on the tariff schedules of clearing and settlement providers. To check our interpretation of the tariff data, and to explore qualitative issues, we surveyed a number of clearing and settlement providers and users of these services. Using this information, we estimated charges for a model client and model transaction – we chose to focus on equity trades.

The main advantage of our approach is that it allows a direct comparison of the charges made for specific services. The main limitation is that the results cannot be definitive, in that they reflect the choice of model client and transaction. For this reason, we do not attempt to draw conclusions about the total cost of clearing and settlement in Europe or in the US. We do, however, provide a detailed and meaningful comparison of the direct costs of clearing and settling an equity transaction in different jurisdictions.

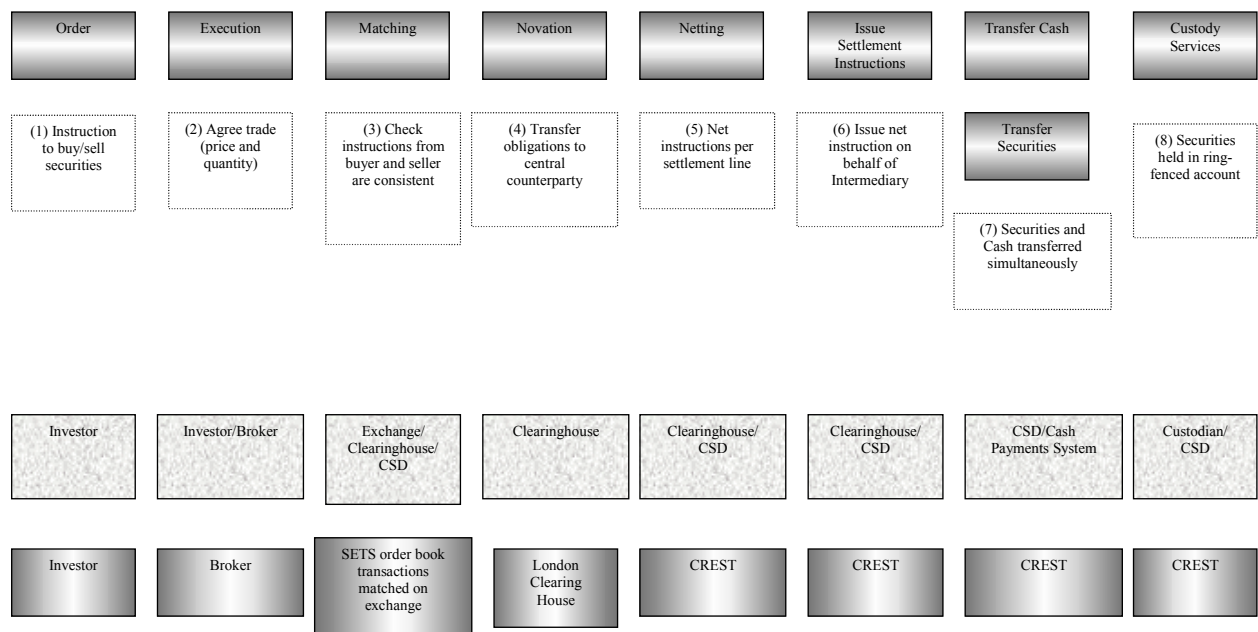
## 2. WHAT IS CLEARING AND SETTLEMENT?

Clearing and settlement is the process that follows the execution of a trade and culminates with the final and irrevocable exchange of cash and assets between counterparts to the trade.

The clearing and settlement process is illustrated in Figure 2.1 below. The figure shows the activity chain from execution to custody, and the type of organisation responsible for each step in the process. The figure also shows, by way of example, the organisations responsible for each service in the UK. The process is generic, although there may be differences between jurisdictions in the types of organisation providing each component of the service.

In this study, we focus on all processes from matching through to the transfer of cash and securities, where these services are provided by a clearinghouse or central securities depository (CSD).

**Figure 2.1**  
**The Clearing and Settlement Process**



## **2.1. Clearing**

The clearing process involves finalising the obligations of each party to a transaction during the period between execution and settlement (boxes 3-6 in Figure 2.1). The clearing process starts once the counterparts have executed a trade and ends with agreement on, and issuance of, settlement instructions. It can take place either on a real time basis or in a batch process. Normally, real time settlement is associated with settlement on a gross basis, and a batch process with net settlement.

Clearing services may be provided by either a separate department at the exchange, a clearinghouse (this may be part of the exchange), a Central Securities Depository (CSD) or an International Central Securities Depository (ICSD). For example, the London Clearing House (LCH), an independent clearinghouse, clears UK equity trades executed on the SETS order book. By contrast, in Sweden, clearing services are provided by the OM group, which also operates the national exchange.

Where an intermediary is a direct member of the relevant clearing organisation, it is entitled to clear directly and (in some cases) provide clearing services for other non-members. Where an intermediary is a non-member, it must employ the services of a member for which it will pay additional agency fees.

There are two important aspects to clearing: trade processing (including matching and in some cases netting) and counterparty risk management (the novation of a transaction to a central counterparty).<sup>5</sup> We discuss each in turn below.

### **2.1.1. Trade Processing**

Trade execution is completed by an intermediary on behalf of an investor (boxes 1 and 2 in Figure 2.1). An investor can execute a trade through an intermediary using either a broker or an Internet based “online broker”. Execution may take place either on- or off-exchange. On-exchange transactions are normally executed on an electronic order book. Off-exchange executions take place between two counterparties independent of the exchange and are not subject to the full rules of the

exchange.<sup>6</sup> On-exchange, electronic execution can result in a higher level of clearing and settlement automation.

The matching process (box 3 in Figure 2.1) may be undertaken by the exchange, clearinghouse or CSD. On-exchange trades may be automatically matched and fed to the clearinghouse or CSD through an automated link. Where the trade is executed either off-exchange or on a non-electronic exchange, the counterparties may match manually between themselves, or the clearinghouse or CSD may provide a matching service.

The clearinghouse or CSD may take a direct feed of transactions executed on-exchange whereas off-exchange transactions will be received by data transfer from the relevant intermediaries. Figure 2.2 shows the case where there is a central counterparty (CCP) and the trade is fed from the exchange to the CCP for novation and settlement.<sup>7</sup> The CCP will normally charge both explicit per transaction fees and it will require the deposit of collateral. Both practices represent a cost to the end user.

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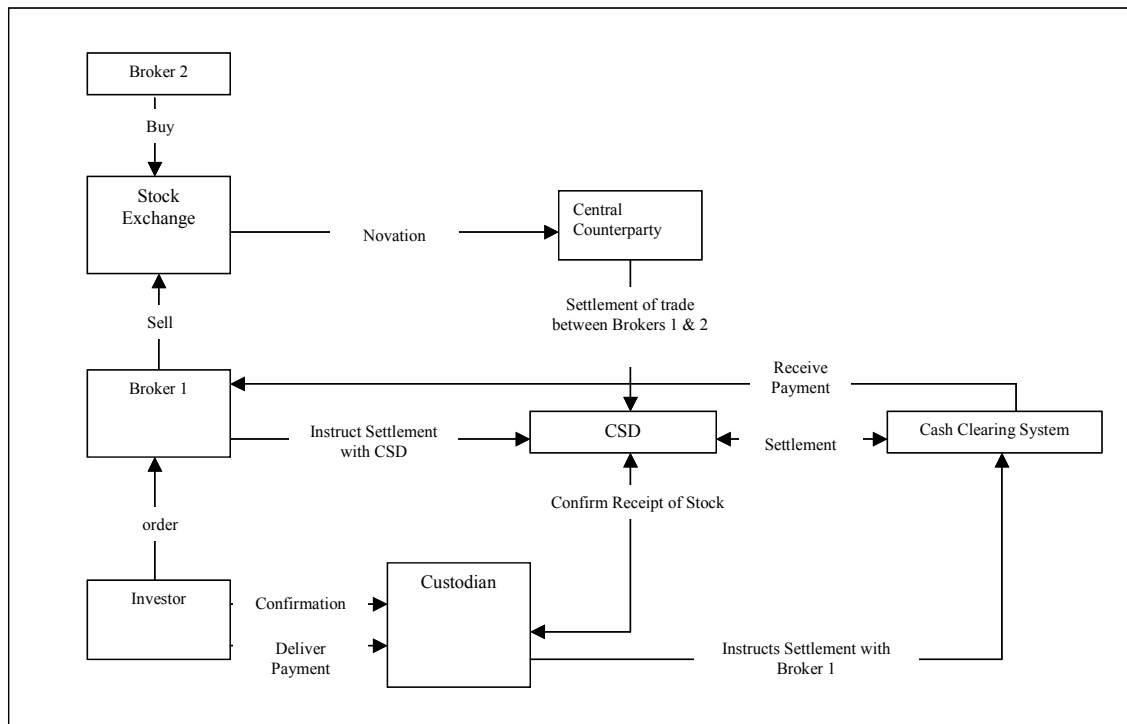
<sup>5</sup> Novation is the term for an action that substitutes a new party and discharges one of the original parties to a contract, by agreement of all parties.

<sup>6</sup> The rules of an exchange normally cover requirements such as the reporting of transactions and may, in some cases, be applied in a limited fashion to off-exchange transactions.

<sup>7</sup> In practice, this step may not exist as some exchanges conduct settlement bilaterally - see section 2.2.

**Figure 2.2**

**Flows and Costs in a Domestic Transaction**



**2.1.2. Counterparty Risk Management**

A clearinghouse acts as a CCP when it becomes the buyer to every seller and the seller to every buyer, assuming the associated risks of counterparty default. This process is referred to as novation, meaning the substitution of one party to a contract by another, with the consent of the other contracting party. Novation usually takes place soon after execution, following the matching of trade details between counterparties (box 4 in Figure 2.1). This process is usually followed by netting (box 5 in Figure 2.1), whereby obligations between clearing members are offset, thus decreasing the overall liabilities of each clearing member. For example, if company A has traded stock X with seven different counterparties, at the end of the day company A will have only one liability in stock X with the CCP. This type of netting is referred to as exposure netting or risk netting and results in reduced counterparty risk to the user. Fees for exposure netting are normally bundled in the CCP's overall clearing charge. This should be differentiated from settlement netting that is performed by a CSD to rationalise the number of settlement transactions that take place, as this is not always undertaken by the same organisation. For example, in the UK CREST provides settlement netting services for executions transacted on the

London Stock Exchange's electronic order book, while the London Clearing House (LCH) is the CCP and provides exposure netting. By contrast, in the US the National Securities Clearing Corporation (NSCC) carries out both exposure and settlement netting.

The advantages to an intermediary of dealing with a CCP are twofold:

- Provided that each intermediary executes multiple trades in each security each day, there will be a significant reduction in risk as buys offset sells and the overall position is reduced. In addition, the CCP will operate a guarantee fund insuring members against the default of other members and will hold collateral against members' obligations. Thus, the provision of exposure netting by a CCP significantly reduces counterparty credit risk. Where netting takes place across products as well as in individual securities, counterparty exposure is reduced even further.
- The other advantage of the use of a CCP to intermediaries is that it facilitates anonymous trading.

Dealing with a CCP, however, also entails costs for the intermediary, including the requirement to lodge collateral against obligations held with the CCP. This entails administrative costs such as the maintenance of margin accounts and the calling and calculation of margin requirements. It also entails the opportunity cost of the collateral that is lodged. Collateral requirements are discussed in more detail in section 8.2.

This discussion illustrates the point that direct costs are only one aspect of an overall comparison of clearing and settlement providers. Users of clearing and settlement services will also consider other costs (their own administration costs and the opportunity cost of collateral) as well as the quality of service provided (including the reduction in counterparty exposure).

## 2.2. Settlement

Settlement of a securities transaction comprises the delivery of securities and the payment of funds between the buyer and the seller (box 7 in Figure 2.1). After settlement has occurred the transaction is complete. Settlement of securities takes place within a CSD or ICSD with the corresponding cash payment usually taking place via a banking or payments system. Settlement normally takes place over a three-day cycle.

Settlement can take a number of different forms, ranging from the physical exchange of certificates to the book entry transfer of dematerialised or immobilised certificates. For the purpose of this research, we have focused on the exchange of dematerialised or immobilised certificates, which accounts for most of the business within Europe and the United States.

Settlement transactions can be organised in a number of different ways. The most common is delivery versus payment (DVP), whereby securities and cash are transferred simultaneously. Alternatively a transaction may be settled free of payment (FOP), meaning that the stock may be delivered before the cash, or vice versa. Other transaction types may attract different tariffs, for example stock lending transactions. Since the majority of transactions are settled delivery versus payment, we have focused on this type of transaction.

Following settlement, in some jurisdictions it is necessary for securities to be registered formally as belonging to the buyer. CSDs may offer registration as an additional service.

If the intermediary is not a direct member of the relevant CSD, a custodian will be employed as an agent to intermediate the transaction. The custodian would receive securities into a ring-fenced account (box 8 in Figure 2.1) and may provide further services such as the management of corporate actions, tax services, dividend receipts and interest payments. We have not included custody services in our analysis, although they may represent a significant cost.

### **2.3. Non-Domestic Clearing and Settlement**

We use the term “clearing and settlement of non-domestic transactions” for the use of ICSDs and CSD-CSD links. This is sometimes referred to as “cross-border clearing and settlement” but this is not wholly accurate since the majority of these transactions are simply settlements of a non-domestic security (to the executing broker) in the home market by a local agent – in other words they do not involve a cross-border transfer.

#### **2.3.1. Clearing**

Clearing of non-domestic transactions operates in the same way as for domestic transactions. However, as an intermediary is less likely to hold a membership of a non-domestic clearinghouse there are some additional services provided by agents which result in increased external fees to intermediaries.

However, the presence of a clearinghouse in the case of non-domestic transactions also has a number of benefits to the overall cost of clearing and settling a non-domestic transaction. In cases where a transaction is executed on a market with a CCP the settlement of non-domestic transactions can be completed at a reduced cost. This is because where settlement is with a CCP, the CCP would in most cases hold accounts with both of the major European ICSDs. This means that many transactions are settled internally within an ICSD. In contrast, where a transaction is settled bilaterally counterparties may not hold accounts with the relevant ICSD thus requiring an external settlement to take place. For example, LCH.Clearnet provides a service to both the London Stock Exchange and Euronext for settlement within the Euroclear group of CSDs and ICSDs.

#### **2.3.2. Settlement**

In principle, the same steps are involved in non-domestic settlement as in domestic settlement. In practice, however, there are a number of differences, reflecting the costs and regulatory issues involved in obtaining membership of CSDs and clearinghouses in another jurisdiction. These barriers mean that, to transact business on a foreign CSD, a network of sub agents is often required.

There are three basic models for non-domestic clearing and settlement: using a CSD-CSD link; using a network of local brokers; and using an International Central Securities Depository (ICSD). We discuss each in turn.

### **2.3.3. Using a CSD-CSD link**

The settlement of a non-domestic transaction via CSD-to-CSD link is illustrated in Figure 2.4. In this example the link is used to transfer the stock on a free of payment basis, while cash is settled through the local cash clearer and a network of sub-agents. In this case non-domestic settlement works by the opening of reciprocal accounts creating a link between two CSDs. These accounts may have parallel additional arrangements for payment, facilitating the settlement of DVP transactions. However, in many cases (including our example) they do not, requiring FOP settlement of cross-system transactions and the transfer of payment by a different system.<sup>8</sup> Where settlement is FOP there are increased risks to the intermediary and additional indirect costs due to higher levels of manual intervention.

### **2.3.4. Using a Network of Local Brokers**

An alternative model for non-domestic settlement is shown in Figure 2.3. Here, settlement is entirely in the local market, with a local broker acting on behalf of the intermediary in the home market as a settlement agent. The costs of using an agent in this way can be significant. In addition an agent will often provide a number of value added services, in addition to clearing and settling transactions, such as corporate actions processing and taxation services.

### **2.3.5. Using an International Central Securities Depository**

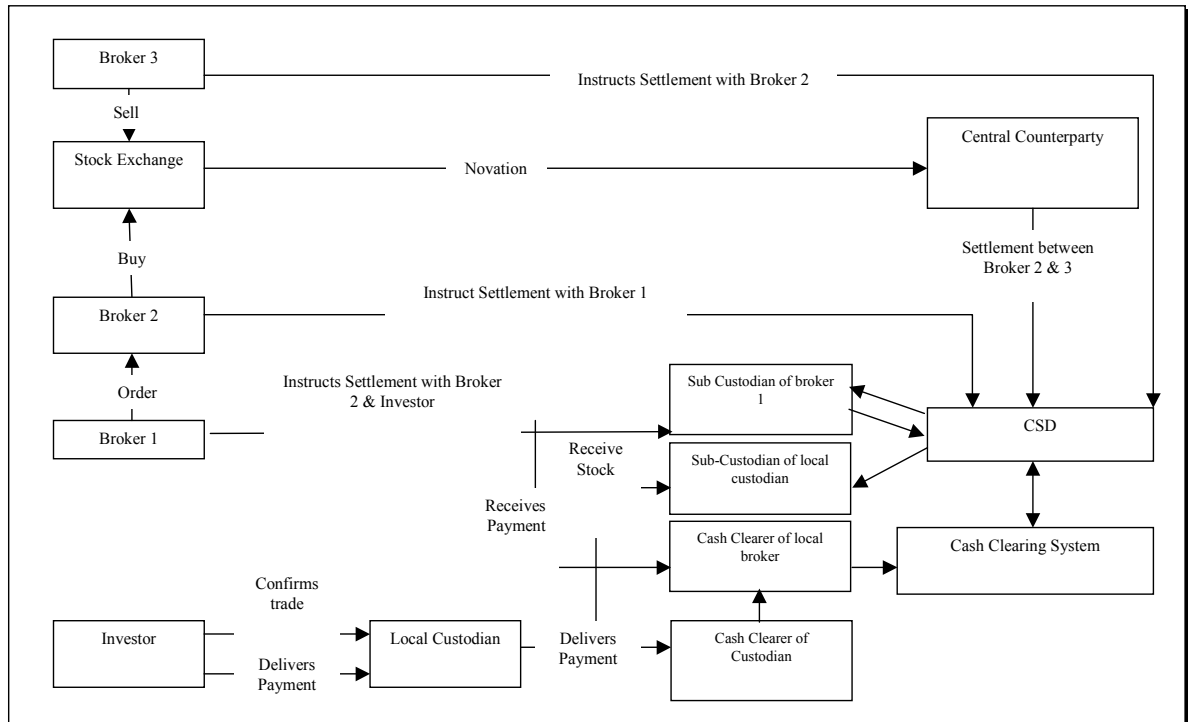
An international central securities depository (ICSD) is an organization providing settlement in multiple markets to its members. Using an ICSD is similar to using a local or global agent in that it allows the broker to settle on a market without holding a membership of the depository.

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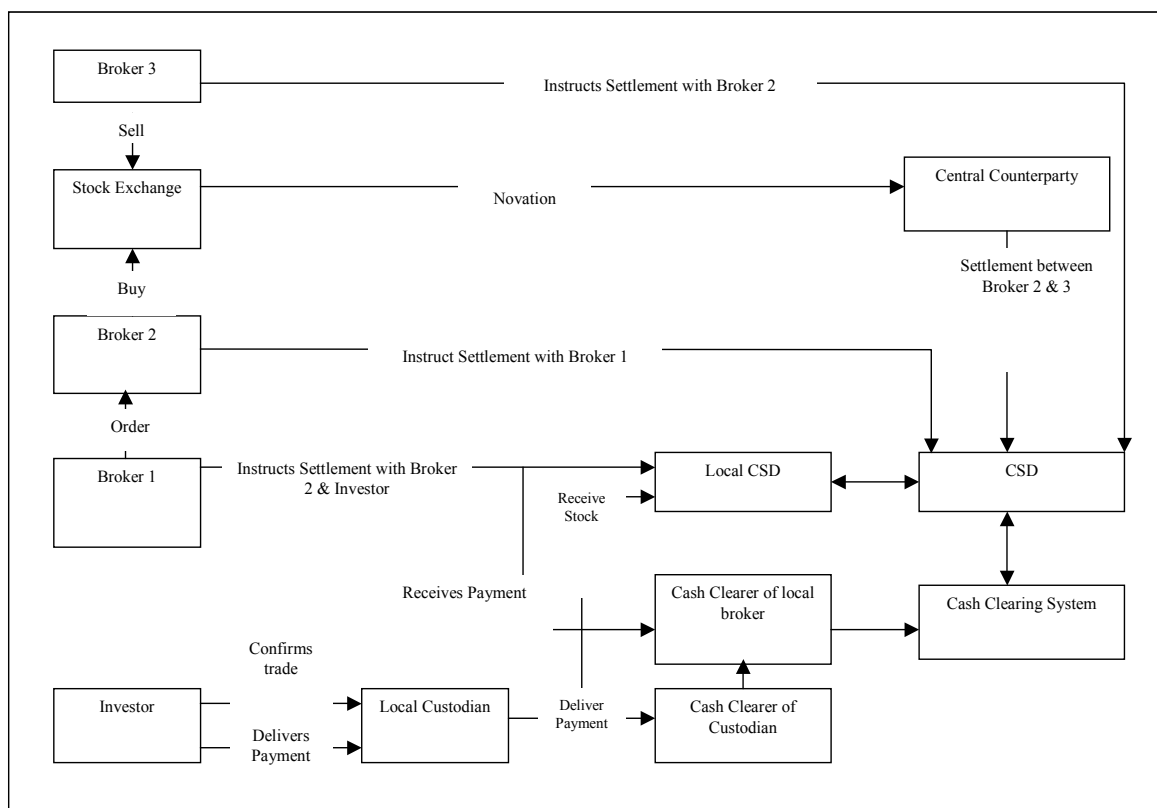
<sup>8</sup> The costs associated with inter-European cash transfers have greatly decreased following the introduction of the Euro and the creation of the TARGET system linking the large value payment systems of the various EU countries.

ICSDs settle transactions either (i) through their own network of local agents or (ii) internally on their own books. ICSDs tend to provide fewer value added services in addition to clearing and settlement than do agent banks.

**Figure 2.3**  
**Flows in a Non-Domestic Transaction Through an Agent**



**Figure 2.4**  
**Flows in a Non-Domestic CSD Link Transaction**



#### 2.4. Differences in Clearing and Settlement Between the US and Europe

The framework for clearing and settling a transaction is the same worldwide and comprises the processes shown in Figure 2.1. There are important differences, however, in the services offered by different providers. It is important to be aware of these differences when comparing the direct costs of clearing and settlement between European and US institutions.

The key differences in service provision relate to: the role of the CCP, the netting process, collateral management, CSD to CSD links, and the Foreign Securities Comparison and Netting Service (FSCN). We discuss each in turn.

### **2.4.1. Central Counterparty**

In the US, the NSCC clears all equity trades that take place between brokers, and provides a central counterparty (CCP) service for these transactions. This service both significantly reduces counterparty exposure and simplifies back office processes.

In Europe, most major markets now provide a CCP service covering most products, including cash equities. Notable exceptions are Finland, Luxembourg, Spain, Greece, and Denmark.<sup>9</sup> When comparing costs between this latter group of markets and the US, it is important to be aware that the comparison is between clearing with CCP in one case, and clearing a bilateral transaction in the other. This may be regarded as an unfair comparison.

The use of a CCP affects costs to the investor in two ways. First, there are additional costs to providing this service that will be reflected in the headline clearing tariff (since there is not normally an explicit CCP charge). Second, there are benefits in terms of service provision where a CCP is available that may impact on indirect costs.<sup>10</sup> Any comparison of the costs of these services should, therefore, also make allowance for the impact of a CCP service on the total cost per trade.

### **2.4.2. Netting Process**

There are two respects in which the netting process can differ between the US and Europe: the party that provides the netting may differ; and product coverage may differ.

#### *Netting by Clearinghouse vs. CSD*

In the US, netting (both settlement and exposure), clearing and CCP services are provided by the NSCC. The NSCC charges a fee per transaction (per each executed trade) for clearing services. For settlement, however, the DTC (Depository Trust Company) charges a tariff per net settlement (for each delivery).

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<sup>9</sup> The Giovannini Group (2001)

<sup>10</sup> Indirect costs that are reduced as a result of using a CCP include costs associated with counterparty risk management and processing and data costs which are dependent on the number of counterparties to settlement.

In some European markets (e.g. the UK and Italy), the CSD undertakes settlement netting whilst the CCP undertakes separately exposure netting, i.e. it receives instructions for each gross trade but settles on a net basis. In this case, the CSD makes a charge per transaction (e.g. per executed trade). Other European markets follow the US model, with both exposure and settlement netting services provided by a clearing house (e.g. Germany). In these cases, however, settlement fees are still charged per executed trade rather than per net settlement. Euronext is the most similar market to the US in this respect with transactions charged on a net basis for settlement. It is only possible to compare charges under both arrangements by making a number of assumptions about the ratio of gross to net transactions – we have taken this approach in our analysis.

### **2.4.3. Collateral Management**

One of the most important indirect costs of clearing and settlement is the cost of collateral. In all cases where a CCP service is provided, participants are required to submit collateral during the settlement cycle.

From our survey of clearing and settlement service users, it emerged that the collateral and margin costs associated with the CCP are a key consideration in the total costs of clearing services. In many cases, this outweighs the significance of direct costs in terms of the impact on total cost per transaction.

There are three factors that can affect the cost of this collateral requirement. First, the margin calculation can vary between CCPs, this may alter the overall reduction in exposure that results from counterparty netting. Second, the cost depends on the sort of collateral that the CCP accepts and whether it pays interest on any portion of collateral that is required in cash. Third, it depends on whether the CCP provides collateral management services that facilitate intermediaries' efficient use of collateral.

The NSCC provides a comprehensive collateral management service. Some European markets have a similar service but others do not. Both netting services and collateral management are discussed further in section 8.2.

#### **2.4.4. Non-Domestic Settlement**

There are a variety of approaches to settling a non-domestic transaction in Europe (discussed further in section 7). For equity trades, the most common method is settling in the local market through an agent. Settling through a direct link between local and non-local CSDs is less common. For example, a CREST member can settle a Swiss stock through a direct link between CREST and SIS (SegaInterSettle is both the Swiss CSD and an ICSD) worldwide, but the majority of transactions are settled directly in SIS.

Similarly in the US, the most common method of settlement is through a local agent. Settlement via CSD-CSD link is more common in the US than in Europe as the DTC has multiple links available, including many of the major European and Asian markets.

#### **2.4.5. Foreign Securities Comparison and Netting Service**

A small proportion of transactions executed in the US are settled via the Foreign Securities Comparison and Netting service (FSCN) provided by the NSCC. This is a mechanism by which all transactions in foreign securities transacted by two members of the NSCC are matched and netted pre-settlement. The service also allows cash settlement to take place in the DTC rather than in the local market.

No comparable service exists in Europe. Virt-x, the cross-border European exchange, offers a similar service but only for on-exchange transactions. It should be noted that the majority of business traded on Virt-x is in fact settled domestically. This means that a US user (provided it executes sufficient volumes per day) will be subject to substantially lower settlement costs for non-domestic transactions than a European user.

### **3. LITERATURE REVIEW**

This section provides an overview of the existing literature on the issues surrounding clearing and settlement costs in Europe and the US. We review three strands of the literature, covering regulatory issues, competition and costs. These three topics are the key themes of the debate and encompass a large proportion of the literature. Other papers looking at taxation, legal issues and other aspects of clearing and settlement are not reviewed here.

On regulation, there have been a number of papers and consultative documents issued by or commissioned by the European Commission and other governmental organizations, as well as private sector research. The key piece of research on this topic is the Giovannini report, which identifies a number of barriers to the creation of an efficient Europe-wide clearing and settlement infrastructure. These barriers relate to differing legal, tax and regulatory frameworks in the countries of the European Union. The regulatory literature prioritises the removal of these barriers as a precursor to rationalisation of the industry. It also emphasises the role of governments and the EU in removing these barriers. Most recently the European Commission has published a Consultative Communication in April of the year setting out its strategy and priorities for clearing and settlement. This literature is reviewed in section 3.1.

A second part of the literature focuses on the competition issues surrounding the provision of clearing and settlement services. Two models for the European industry are discussed. The first model is based on the creation of a pan-European structure similar to the US model. The second model maintains the current structure of multiple clearing houses and CSDs but introduces measures to improve interoperability. The former implies creating a regulated monopoly, while the latter implies increasing competition between national CSDs by reducing the barriers to non-domestic settlement. The key pieces of literature in this area are studies by Cruickshank and Milne. This literature is reviewed in section 3.2.

The literature on costs centers on two papers that attempt a direct estimate of the costs of clearing and settlement by creating a measure of operating income per transaction.<sup>11</sup> These studies have confirmed the industry consensus that there is a significant difference in the cost of clearing and settlement between Europe and the US, particularly in non-domestic transactions. Further studies include papers by both Euroclear and Clearstream that emphasize the issues underlying cost differentials. There is also a paper looking at inefficiencies and related cost impacts in the US market which identifies the key technical issues associated with the US model and makes some broad estimates of the costs involved. This literature is reviewed in section 3.3.

### **3.1. Regulatory Studies**

#### **3.1.1. EU Commission - Clearing and Settlement in the European Union: Main Policy Issues and Future Challenges<sup>12</sup>**

In the context of completing the internal market for financial services, the Commission has a responsibility to promote an efficient clearing and settlement infrastructure in the EU. It is the view of the Commission that there exists an efficient market for domestic transactions but not for non-domestic transactions. The Commission identified two key policy objectives aimed at creating an integrated clearing and settlement environment (a pre-condition for efficient post-trade processing). The first objective is to remove differences in technical requirements, market practices, tax procedures and laws applying to securities that create a barrier to the finalisation of individual non-domestic transactions. This objective must be met primarily by the private sector, with the role of the EU limited to developing international standards and intervening on issues of law. The second objective is to remove competitive distortions or unequal treatment of entities performing similar clearing and settlement activities. This objective will be met to some extent by the proposed revision to the Investment Services Directive (ISD). The ISD is discussed in section 4 of this report.

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<sup>11</sup> These papers are Lannoo and Levin (2001) and London Stock Exchange (2002)

<sup>12</sup> Communication from the Commission to the Council and the European Parliament (2002)

### **3.1.2. EU Commission - Clearing and Settlement in the European Union: The Way Forward<sup>13</sup>**

This document is the second communication issued by the European Commission on securities and settlement and outlines the Commissions action plan to achieve an integrated and efficient market for clearing and settlement at the European level.

The key message of the Communication is that clearing and settlement markets must be based on a level playing field and must be efficient and safe. To achieve this objective the Commission will apply the principles of the Financial Services Action Plan including access to all EU markets for all EU operators, mutual recognition by member states of each other's rules and full transparency allowing users to compare the quality and costs of services in each market.

Specific proposals of the Communication include the preparation of a framework Directive on Clearing and Settlement, this Directive would have the objective of increasing competition and efficiency and, as a result, to drive down costs. The Directive would include:

- comprehensive rights of access for clearing and settlement providers to all EU markets;
- choice for intermediaries in their service provider;
- a common regulatory framework covering the functions performed by the various players in clearing and settlement; and
- appropriate governance arrangements such as disclosure requirements, accounting separation and unbundling of specific services for entities who play a determining role in the clearing and settlement process.

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<sup>13</sup> Communication from the Commission to the Council and the European Parliament (2004)

### **3.1.3. The Committee of Wise Men (CWM)<sup>14</sup>**

The European Union's Economic and Finance Ministers (ECOFIN) commissioned a report from the Committee of Wise Men (CWM) on the regulation of European Securities Markets. ECOFIN ministers required the report to refine their initial proposals for regulatory change considering the balance of power between the Treaty and national regulators. The report included the following conclusions with regard to the clearing and settlement industry:

- Further restructuring is necessary but should be in the hands of the private sector. Public policy should focus on competition issues and removing barriers to consolidation. In the event that the private sector cannot deliver an efficient pan-European clearing and settlement system, however, a clear public policy orientation would be needed.
- Serious consideration should be given to whether the EU needs to establish a regulatory framework for clearing and settlement activities. Any such framework would need to consider the importance of systemic issues and the resulting implications for monetary policy operations and the smooth functioning of payment systems.
- On competition issues, careful examination is required by the European Commission to ensure that competition policy is being upheld in the sector.

The CWM report has been an important influence on the direction of market development within Europe, along with the work of the Giovannini group and the debate on the Investment Services Directive II. The European clearing and settlement industry is expected to undergo major structural changes, which will have concurrent effects on competition, market structure and costs.

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<sup>14</sup> European Commission (2001)

### 3.1.4. Giovannini<sup>15</sup>

The Giovannini Group has produced two influential reports. The focus of the first report is an assessment of the current arrangements for cross-border clearing and settlement with the aim of identifying the main sources of inefficiency in non-domestic services relative to domestic ones. The second report outlines the prospects for the EU clearing and settlement infrastructure, with particular emphasis on public policy aspects.

The first report reviews the underlying reasons for differences in costs of non-domestic and domestic clearing and settlement within the European Union. The report does not include any independent quantitative analysis but refers extensively to data from a study by the Centre for Economic Policy Studies (see section 3.3.2). This data is broadly supportive of the conclusion that non-domestic clearing and settlement is expensive in Europe relative to the US.

The report identifies a number of barriers to efficiency that are relevant to European markets and, more specifically, to non-domestic transactions relative to domestic transactions. These barriers are broadly grouped into technical and regulatory aspects. It is the hypothesis of the Giovannini report that these barriers underlie the cost differences between domestic and non-domestic transaction costs. The barriers identified are listed in Table 3.1.

**Table 3.1**  
**Barriers to Non-domestic Clearing and Settlement**

<b>Type</b>	<b>Barrier</b>
Technical	National differences in information technology and interfaces
Technical	National clearing and settlement restrictions that require the use of multiple systems.
Technical	National differences in operating hours/settlement deadlines
Technical	Practical impediments to remote access to national clearing and settlement systems
Legal	National differences in the legal treatment of bilateral netting for financial transactions

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<sup>15</sup> The Giovannini Group (2001) and (2003)

Legal	Uneven application of national conflict of law rules
Technical	Absence of intra-day settlement finality
Technical	National differences in settlement periods
Technical	National restrictions on the activity of primary dealers and market makers

The conclusions of the report centre on what market participants and governments can do to remove the barriers identified. The report states that a market-led convergence on technical barriers could have a significant effect on efficiency without the need for government-led changes in regulations. The report cites the possibility of removing barriers to remote access as a way of decreasing costs to all parties.

The second Giovannini report looks at policy considerations that follow from the first report. The key conclusion is that efforts should be made to remove barriers, preferably through market mechanisms. One strategy would be to remove the barriers that restrict the location of settlement activities. Investors would then be able to choose the most cost-effective settlement location, thus setting in train a market-led integration of clearing and settlement arrangements across the EU.

The group notes that this may be a difficult strategy to implement as legal and operational risk may prevent the market from progressing toward integration. The group suggests that, to remove all existing barriers effectively, a regulatory structure that can function on a pan-European basis would be required.

### **3.1.5. G30 – Global Clearing and Settlement: A Plan of Action<sup>16</sup>**

The G30 report starts from the view that the clearing and settlement industry has experienced rapid growth, structural change and market shocks and argues that the combination of these factors is grounds for a re-examination of the way the market functions.

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<sup>16</sup> Global Clearing and Settlement: A Plan of Action (2003)

The conclusions of the report are embodied in 20 recommendations. These are wide-ranging, covering issues from data capture to consistent regulation. Some of the key recommendations are listed below.

#### *Creating a Strengthened Interoperable Global Network*

- Eliminate paper and automate communication, data capture, and enrichment
- Harmonise messaging standards and communication protocols
- Develop and implement reference data standards
- Synchronise timing between different clearing and settlement systems and associated payment and foreign-exchange systems
- Automate and standardise institutional trade matching
- Expand the use of central counterparties
- Permit securities lending and borrowing to expedite settlement
- Automate and standardise asset servicing processes, including corporate actions, tax relief arrangements, and restrictions on foreign ownership

#### *Mitigating Risk*

- Ensure the financial integrity of providers of clearing and settlement services
- Reinforce the risk management practices of users of clearing and settlement service providers
- Ensure final, simultaneous transfer and availability of assets
- Ensure effective business continuity and disaster recovery planning
- Address the possibility of failure of a systemically important institution
- Strengthen assessment of the enforceability of contracts
- Advance legal certainty over rights to securities cash or collateral
- Recognise and support improved valuation and closeout netting arrangements

#### *Improving Governance*

- Ensure appointment of appropriately experienced and senior board members
- Promote fair access to securities clearing and settlement networks
- Ensure equitable and effective attention to stakeholder interests
- Encourage consistent regulation and oversight of securities clearing and settlement service providers

In recommending these improvements to the current system, the G30 attempt to assess the costs and benefits of doing so. They quote estimates which put the non-domestic premium in Europe in a range of 30 per cent for a wholesale trade to 150 per cent for a retail trade, and suggest the scope for cost saving is large. They also estimate the operating costs of providers of clearing and settlement infrastructure and other intermediaries (broker dealers and custodians). They conclude that the operating costs of other intermediaries are four times that of infrastructure providers, totaling US \$10 billion excluding the cost of capital. In addition, the paper estimates the additional costs associated with cross-border trading by estimating the average number of fails in a non-domestic relative to a domestic transaction. They find a ratio of 4 to 1.

The paper does note that a full business case for its proposals is not within the scope of their analysis. The aim of the paper is therefore focused on an assessment of the costs and benefits of implementing a CCP in markets that do not currently have one. The implications of the G30 report are all relevant to the efficiency of providers of clearing and settlement infrastructure and therefore have a bearing on the costs of these institutions.

### **3.1.6. Completing the Single Market in Securities Trading – A Surgical Revision of the Investment Services Directive<sup>17</sup>**

Steil relates the developments in trading platforms to the resulting structure of clearing and settlement organisations. He concludes that the rapid growth in automated trading systems competing with the incumbent exchange has increased pressure for exchanges and platforms to consolidate. Like Giovannini, he points out a number of barriers to this consolidation, the key barrier being the Investment Services Directive (ISD). The issue with the ISD, according to Steil, is the restriction attached to the principle of “regulated markets”; this is enshrined in the first version of the ISD and infers advantages on incumbent exchanges. For example, national regulators can restrict the provision of CCP services to “regulated exchanges”. Amendment of the ISD would encourage electronic trading platforms to compete directly for

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<sup>17</sup> Steil, B (2001)

incumbents' business, as well as setting up cross-border exchanges and competing for only a portion of the domestic incumbents' business. These potential developments in the structure of cross-border trading would have important implications for the provision of post-trade services.

### **3.2. Competition Studies**

Competition is a key theme in looking at the causes of the relative inefficiency of the European clearing and settlement infrastructure. Through DG Competition, the European Commission has investigated the competition issues resulting from the current structure of the European clearing and settlement industry. Specifically, the Commission has been concerned with the creation of vertical silos combining trading, clearing, settlement and custody in one organisation. Vertical silos raise concern when service providers operate on a for-profit rather than a mutual basis.

#### **3.2.1. Milne<sup>18</sup>**

Milne looks at the competition aspects of the clearing and settlement market structure. He makes the basic point that book entry depositories and related corporate actions services are a natural monopoly. As a consequence of this, the national depository also has a virtual monopoly over ancillary services such as custody and securities lending. This virtual monopoly can be circumvented by tiered ownership agreements, but this is difficult where differing national regulations apply to tiers of ownership. As most European depositories are now run on a for-profit basis, there is a legitimate concern that monopolists could abuse their position.

Milne goes on to suggest that securities settlement can be likened to a network monopoly. He suggests that forcing national depositories to separate the book entry functions they provide from ancillary services could improve competition in ancillary services and allow regulation of monopoly services. This would include a separation of fees for book entry and other services. This approach would, in theory, allow any depository to provide post-settlement services on another market at a competitive

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<sup>18</sup> Alistair Milne (2002)

cost. In practice, however, this would require depositories to harmonise communication standards.

### **3.2.2. Clearing and Settlement - The Barrier to a Pan-European Capital Market<sup>19</sup>**

In contrast to Milne's paper, many of those inside the clearing and settlement industry believe the optimal market structure for Europe would be a regulated single clearing and settlement system similar to the DTCC in the US. Cruickshank cites the maximization of economies of scale and network externalities as key reasons for recommending the US model. The high proportion of fixed to variable costs are the main reasons for this view and the network externalities created by lower inter- versus intra-system charges.

The main argument for a pan-European clearing and settlement organisation is the minimisation of non-domestic costs. Cruickshank does not focus on the high costs of settling domestic transactions - he points out that, although there is scope for additional economies of scale in all areas, the most significant drivers are non-domestic costs.

## **3.3. Cost Studies**

### **3.3.1. London Stock Exchange (LSE)/OXERA<sup>20</sup>**

In response to the first report of the Giovannini Group, the LSE published a paper by OXERA that used similar methods to look at the costs of clearing and settlement organisations in the European Union. The LSE report emphasises the problems of looking at a comparison based on direct costs only. It points out the importance of indirect costs and netting arrangements to the investor:

According to Euroclear, the direct costs of using the ICSD represent only four per cent of the total cost of a cross-border settlement transaction. The bulk of the costs (60 per cent) stems from back-office expenses, while another thirty five per cent reflects the cost of using

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<sup>19</sup> Cruickshank, D. (2001)

<sup>20</sup> London Stock Exchange (2002)

intermediaries (such as custodians). According to Clearstream, thirty per cent of cross-border clearing and settlement costs faced by users are direct costs of clearing and settlement systems, while the remainder stem from intermediary charges, multiple-access maintenance and other factors.<sup>21</sup>

These findings suggest the emphasis of the debate should shift from the charges made by clearing and settlement service providers to the total costs incurred by investors.

OXERA develops an alternative approach to measuring the difference between the cost of domestic and international transactions. They use a comparison of inter-system and intra-system charges. This simple comparison allows one to work out the premium for comparable services in different locations per CSD. The drawback of this approach is that there is limited availability of data so a full comparison is not possible. However, a simple comparison of the premium charged by Crest for an intra-system trade reveals a lower cost than that reported in the operating cost per transaction analysis of ICSDs.

OXERA examines in detail the options available to European CSDs and ICSDs to reduce costs. They outline two options: to introduce interoperability between systems; or to introduce a single system for European clearing and settlement. No estimate of the cost savings associated with each approach has been produced. By way of comparison, OXERA quotes the SEC's estimated cost savings of the implementation of the DTCC. The SEC calculated cost savings for each of three options as follows:

- Introducing interoperability by linking the seven existing settlement systems would have produced estimated savings of 9.6 per cent
- Maintaining and linking three of the existing systems would have produced estimated savings of 33 per cent
- Moving to a single, properly regulated settlement system would have produced estimated savings of 64 per cent

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<sup>21</sup> London Stock Exchange (2002), p.11

This analysis lends some support to the view that a single European settlement system would generate substantial cost savings. However, it should be noted that this analysis was conducted in 1975, since which time significant technological advances have been made.

### **3.3.2. Lannoo & Levin – The Securities Settlement Industry in the EU: Structure, Costs and the Way Forward<sup>22</sup>**

In a paper published by the Centre for European Policy Studies (CEPS), Lannoo and Levin look at the operating costs of institutions providing non-domestic settlement, with reference to internal costs and operational structure. They also consider the existence of variable tariffs based on the type of transaction, volume and size of transaction, and the nature of the client.

Overall they find that European costs are 1.86 times higher than those in the US, based on the final netted positions of the different institutions involved before settlement. They note that their results are sensitive to the use of pre- and post-netting figures and the inclusion or exclusion of ICSDs. They find that, on a post-netting basis, European domestic settlement organisations are as cost-efficient as the DTCC, while their operational margins are higher, indicating scope for competition to drive down margins in Europe.

Their recommendations include an increase in the use of remote membership agreements allowing direct access to settlement systems, which should result in a fall in the indirect and direct costs of clearing and settlement. They also note the need for increased vigilance by competition authorities.

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<sup>22</sup> Lannoo and Levin (2001). Following publication, the DTCC challenged the conclusions of the CEPS report in an open letter.

## *Categorisation of Costs*

The authors identify the range of costs that come under the umbrella of clearing and settlement costs. They are classified as follows:

i. Infrastructure costs

These are fees charged to users by the operators of settlement systems and/or clearing houses. (Our study uses the term ‘direct costs’ to describe infrastructure costs.)

ii. Indirect costs to users<sup>23</sup>

*Back-office costs*: users have to maintain back-office personnel, and invest in back-office systems.

*Interface costs*: users have to make sure that their communications networks can interface with a variety of CSDs employing widely differing technology and standards.

*Banking and financial costs*: this cost may be interest charges in the case of overdraft, or fees on securities borrowing if an investor lacks securities on the date of settlement.

*Cross-collateralisation opportunity costs*: sometimes it is not possible for investors to use securities deposited at one CSD as collateral when borrowing from a third party. This increases net financing costs.

*Failed transaction penalties*: this cost comes in the form of penalty charges, which are imposed if a party cannot fulfill its obligations by the settlement date.

*Pipeline liquidity costs*: this is the cost that arises if a process is stuck due to gaps in the time between the processing cycles of CSDs. If this

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<sup>23</sup> These costs may depend on the channel used for cross border settlement

happens, either on the delivery or payment side of the transaction, there may be an additional cost for the banking sector for the provision of intra-day credit.

### *Measurement of Costs*

Lannoo and Levin use a measurement of operating income per transaction as a proxy for the infrastructure cost of clearing and settlement per transaction. This is due to the complexity of a settlement transaction. They go on to identify a number of variables which give rise to this complexity. These include whether settlement is internal or external, the location of settlement, the instrument settled, the volume of business the client transacts, the method of payment (DVP, FOP), and other customer-specific characteristics such as expenditure on custody services.

The paper also outlines some problems with its own approach to measuring operating costs using publicly available information via annual reports and accounts. These include problems with comparability between entities, the use of accounts at the group level, and differing accounting standards. To combat these issues, the authors have excluded those CSDs that are an integral part of an exchange or bank. In addition, the authors have tried to identify and remove non-settlement costs from their calculations.

The report also notes the comparison of Europe and the US is implicitly based on the assumption that the EU will migrate to a single centralised system, as happened in the US. This is, however, dependent on a number of factors including political will and legal harmonisation.

### **3.3.3. US – Harvard Research Group<sup>24</sup>**

There is no comparable literature on costs in the US clearing and settlement industry. This is due to the uniformity and transparency of pricing and the consensus that the US industry is relatively low cost. A variety of factors allow the US to operate a

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<sup>24</sup> Harvard Research Group (2003)

lower cost system. For example, the US does not face the same tax and legal barriers as exist within the European market. Also the US has significant economies of scale.

The Harvard Research Group, in a paper entitled “Making Financial Information Flow”, outlines the barriers to efficiency that do persist in the US. Barriers are technical or related to trade management capability of counterparties. Estimates by the Securities Industry Association of the potential cost savings from overcoming these barriers are approximately US \$2.7 billion per year. This illustrates the fact that, although the US is often seen as a model benchmark for the European system, there may still be a long way to go in minimising costs in the US.

Table 3.2 lists the barriers outlined by the Harvard Research Group. This illustrates the differences between the European and US systems. In Europe there are legal and regulatory barriers, while in the US barriers are technical in nature.

**Table 3.2**  
**Barriers to US Clearing and Settlement Efficiency**

<b>Type</b>	<b>Barrier</b>
Technical	Batch process orientation of most trading systems prevents shortening of settlement cycle
Technical	Manual error in trade entry and late matching
Technical	High number of trades exempt from automatic process due to counterparties requirement to monitor stock or lack of transaction status control functionality
Technical	High number of fails mostly due to seller not having stock, need to have control of transaction status

### **3.3.4. Euroclear – Delivering Low-Cost Cross-Border Settlement<sup>25</sup>**

This report outlines the views of the Euroclear group on how cross-border settlement can be made cheaper and less risky. The key issues it outlines are as follows:

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<sup>25</sup> Euroclear (2003)

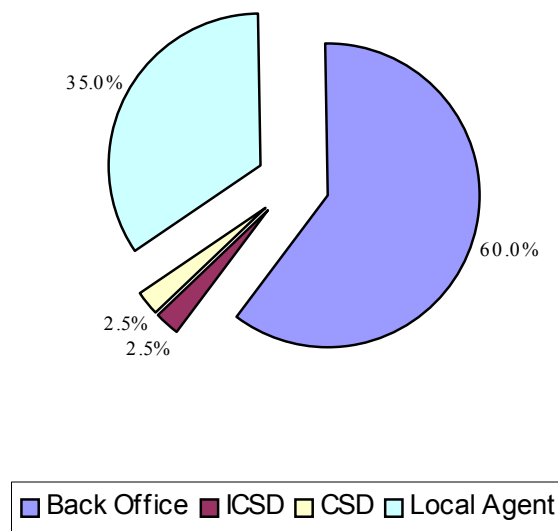
i. Higher Costs for ICSDs

Euroclear tariffs range from four to thirty Euros per transaction. It indicates that higher tariffs “reflects the higher costs that the ICSD incurs, partly through the use of local agents to manage the cross-border interface and partly through increased operational risk.”<sup>26</sup>

ii. Fragmented Infrastructure

The costs of an inter-system trade versus an intra-system trade are pinpointed as one of the major causes of increased costs of non-domestic settlement. Euroclear identifies the direct costs of the fragmented infrastructure as the cost associated with managing multiple interfaces. These include “managing multiple interfaces to multiple settlement systems leading to duplicate investment, high internal costs, settlement failures and high transaction fees”.<sup>27</sup>

**Figure 3.1**  
**Euroclear’s Estimate of the Breakdown of Clearing and Settlement Costs**



The high level of outsourcing to agent banks, and the costs of using these agent banks, indicate the complexity of maintaining the infrastructure required (see Figure 3.1).

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<sup>26</sup> Euroclear (2003), p. 17

<sup>27</sup> Euroclear (2003), p. 6

The CEPS report estimated that around 35 per cent of the total costs of cross-border settlement are generated by local agents, who in turn have around 90 per cent of the market of cross-border settlement of equity trades.<sup>28</sup>

### **3.3.5. Deutsche Börse<sup>29</sup>**

Deutsche Börse does not conduct any primary research on costs. Rather, they refer to results established in the Giovannini and London Stock Exchange research. They estimate incremental costs for cross-border trading and equity holdings of €4.3 billion per year (this includes both direct and indirect costs). They go on to estimate that 40 per cent of the incremental cost is due to the need for regulatory translation, while another 40 per cent is due to different languages and cultures and home bias effects leading to lower cross border-trading volumes.

They allocate the remaining 20 per cent of the incremental cost to intermediaries, exchanges, clearinghouses and CSDs. They suggest that these costs could be mitigated by harmonisation of market practices and industry consolidation. This suggests that there are inefficiency gains of €860 million per year which could result from improvement in non-domestic clearing and settlement infrastructure. By contrast, they do not find that there are any major cost differences between European and US domestic clearing and settlement.

The paper identifies areas of inefficiency in the industry in a similar style to the Giovannini paper. The factors they highlight as critical for increased efficiency are advanced technology and high innovation, demutualisation, horizontal cross-border competition and increased competition between market organisers and intermediaries. Unlike Giovannini, they emphasise structural constraints of the market that, if reversed, could increase competition and innovation.

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<sup>28</sup> Lannoo and Lewin (2001)

<sup>29</sup> Deutsche Börse Group and Clearstream International (2002)

### 3.3.6. Z/Yen<sup>30</sup>

Z/Yen conducted a back-office cost benchmarking survey covering a broad range of financial instruments including cash equities. Their data is based on a detailed analysis of the costs of a number of survey participants and illustrates the make-up of the total costs of transaction processing including direct costs and a breakdown of indirect costs. The overall findings of the 2002 report, covering equity and debt products, are that the cost per trade has fallen steadily over the last three years. They also find that cost reductions have been more pronounced for bonds than for equities or derivatives.

A key finding is that trade volume is the primary driver of low processing costs for cash products. The finding that economies of scale are indeed a key driver of transaction processing costs suggests that, other things being equal, one would expect the costs of processing to be lower in the US where volumes are higher.

A further study by Z/Yen on the ability of banks to reduce their processing costs found that costs could be brought down for cash products, with the main driver being external fees.<sup>31</sup> This finding supports the direction of the considerable work that has gone into looking at the direct costs of clearing and settlement.

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<sup>30</sup> Z/Yen Competitive Cost Benchmark, Equity and Debt Products, (2002)

<sup>31</sup> Jeremy Smith (2001), p. 16

## 4. REGULATORY FRAMEWORKS AND MARKET STRUCTURES

The different regulatory frameworks and market structures of the clearing and settlement industry in Europe and the US contribute to significant differences in clearing and settlement costs.

It is possible that “regulated market” status in Europe has restricted competition from new exchanges. In the US, “regulated markets” were expanded to include Alternative Trading Systems in 1999. Other European regulatory restrictions may also affect the costs of clearing and settlement.

In Europe, the majority of exchanges and clearinghouses have demutualised and now operate on a for-profit basis. This has resulted in consolidation of the market and the emergence of two competing market models – horizontal integration and vertical integration. In the US, clearing and settlement operates as a mutually-owned utility providing all post-trade services. The DTCC is a monopoly provider of clearing and settlement services for equity transactions, with competition restricted to exchanges and alternative trading systems.

In this section we review regulatory and market structure issues in more detail, highlighting the implications for the direct costs of clearing and settlement.

### 4.1. Regulatory Restrictions

CSDs are regulated in their local market. For example, in the UK the LCH.Clearnet Ltd and CREST are regulated by the FSA as Recognised Clearing Houses with oversight by the Bank of England. In addition, CSDs and clearinghouses are subject to European regulation. This will soon include the European Central Bank and Committee for European Securities Regulators (ECB-CESR) standards.<sup>32</sup>

Four directives govern the regulatory framework in the EU. The *Settlement Finality Directive* (SFD) addresses the systemic risk associated with a payment and securities

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<sup>32</sup> European Central Bank and Committee of European Securities Regulators (2003)

settlement system and mandates protection against the insolvency of a system member. The *Banking Co-ordination Directive* (BCD) and the *Capital Adequacy Directive* (CAD) affect the treatment of exposures to central counterparties, settlement systems, and custodians, as well as setting out capital requirements for participating institutions. The *Investment Services Directive* (ISD) sets out the framework for a single capital market in Europe and, as such, governs non-domestic transactions. The ISD provides for mutual recognition of regulated exchanges by European states. The principle of mutual recognition allows investors and brokers to operate under the regulatory regime of their home country but to gain access to other markets, including membership of other European exchanges, via a single “passport”. This allows investors to reduce transaction costs by participating directly in foreign markets, thus streamlining the clearing and settlement process and reducing the need for intermediaries across the value chain.

#### **4.1.1. “Regulated Market” Restrictions**

The principle of mutual recognition under the ISD has traditionally been limited to “regulated exchanges”. This means that only specific regulated markets in each national jurisdiction benefit from an automatic right to operate in all other jurisdictions covered by the ISD. Non-“regulated markets” are required to seek explicit authorisation to operate in each jurisdiction.

There are four key clauses of the ISD that relate to regulated markets:

- The listing requirement - this prohibits the trading of non-listed securities on a “regulated exchange”.
- The new markets provision - this allows a Member State to prevent the creation of a new market within its territories. It has been suggested that this article could be used to prevent the proliferation of screen based trading systems, but there are no concrete examples of this having occurred.<sup>33</sup>
- The concentration principle - this prevents a regulated market operating in another jurisdiction from operating in “new markets”, i.e. expanding its product base.

- The transparency rules – these require regulated exchanges to produce prices in some form at regular intervals.

The restriction of the ISD passport to markets defined as “regulated” imposed a limitation on the scope of mutual recognition within Europe. Steil notes an example where this rule has an effect on the provision of clearing services in the Italian Treasury market.<sup>34</sup> The Italian Treasury restricted the trading of Italian government securities to MTS (the incumbent exchange) by restricting central counterparty clearing services to official “regulated markets” in accordance with the ISD.

This restriction on the application of mutual recognition has recently been amended.<sup>35</sup> The new Directive recognizes the ‘new generation of organized trading systems’ increasing the scope of mutual recognition in Europe and improving the scope for competition in trading and associated clearing and settlement services.

In the US, the SEC expanded its definition of market participants by creating a new intermediate market participant category with eligibility criteria in between those applicable to broker dealers and those applicable to exchanges. This new category was designed to support the regulation of Alternative Trading Systems (ATs) or Electronic Communication Networks (ECNs). In this sense, the US is ahead of Europe in promoting competition among trading platforms. ECNs have been a key driver of competition in the US.

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<sup>33</sup> Steil B (2001)

<sup>34</sup> Steil B (2001)

<sup>35</sup> Directive 2004/39/EC on markets in financial instruments

#### **4.1.2. Other Regulatory Restrictions**

The second Giovannini report examines various regulatory issues resulting from the ISD, which the commission has recommended be reviewed. The restrictions are considered below with reference to the US case. It should be noted that all restrictions refer to an impact on non-domestic rather than domestic transactions and that the topics covered here are limited to those relevant to the scope of the current study.

*Settlement and Securities Location:* one of the key issues is the need for firms to be able to designate the settlement venue of their choice, rather than being forced to use the default system used by the market on which the trade is made. If firms were allowed to specify their own default settlement location, there would no longer be national restrictions on the location of settlement. This could result in a change to the current restrictions on the location of securities. These developments could result in an increase in competition between CSDs and ICSDs and a corresponding fall in average direct costs as investors, faced with a choice, shift to lower cost settlement locations. The scope for competition to result in lower costs is, however, limited by the existence of economies of scale and other network benefits. For a number of reasons, firms are still likely to choose their home country as default settlement location.

*Treatment of Interests in Securities:* Giovannini identifies the lack of an EU-wide legal interpretation of the ownership of securities held as collateral as the key legal constraint on the integration of the European securities market. Securities can be held as collateral either with a full transfer of ownership, or by pledge. Where they are transferred by pledge, differences between national laws on ownership may result in an insecure or invalid transfer of ownership. This gives rise to legal uncertainty associated with collateralised trades, which hinders cross-border movement of securities. In contrast, the US has created a global type of security interest under Chapter 8 of the Uniform Commercial Code that establishes a common treatment of security interest.

*National Differences in Legal Treatment of Netting*: national jurisdictions within Europe have conflicting laws on the legal netting of securities, resulting in a barrier to the creation of multilateral netting schemes. A higher proportion of trades are currently netted in the US relative to Europe as many European markets have yet to offer a netting service (also markets such as the UK offer a non-compulsory netting service). The potential savings to the industry of netting a higher volume of transactions may be considerable. Higher netting would result in a decrease in the number of payments and movements in securities between systems, as well as a fall in margin requirements.

#### **4.2. Market Structures**

In the US, the DTC and NSCC provide all post-trade processing, including risk management and settlement. By contrast, the European structure is relatively fragmented. Post-trade services are provided by a variety of market participants including exchanges, independent clearing houses, securities depositories and agent banks. Furthermore, there are competing market models in Europe. Some exchanges are aiming towards full horizontal integration (for example Euronext), while others are aiming for full vertical integration (for example Deutsche Börse).

A key trend over the last year has been the expansion of European listed exchanges to include the provision of clearing and settlement services. The Revenue and Cost Survey by the World Federation of Exchanges shows that the importance of revenue from clearing and settlement has increased relative to total income.<sup>36</sup> Most of this increase came from listed exchanges, with other groups experiencing marginal increases from this form of revenue. This change in the structure of clearing and settlement provision means that the trend towards the development of multiple CSD-to-CSD links is likely to continue, rather than there being a move towards one integrated clearing and settlement platform, as in the US. The two competing models in Europe – horizontal integration and vertical integration – produce different forms of cost bundling in the tariffs charged by service providers, and promote cost efficiencies in different segments of the value chain.

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<sup>36</sup> Gallai, L (2003)

The different structures of the US and European markets also have cost implications in other areas:

- Transparency – the consolidated nature of the US market increases transparency in service provision. The European model includes high levels of product bundling and varying service provision, decreasing the availability of transparent price information.
- Netting capability – The consolidated nature of the US market increases opportunities for cross-product netting and the level of netting overall. This greatly reduces the number of settlements and associated indirect cost, as well as significantly reducing risk for market participants.
- The US model aims to avoid credit risk taking by infrastructure organisations by concentrating the provision of clearing and settlement services in two dedicated organisations. Europe, on the other hand, has a variety of country-specific organisation types, with many organisations (especially ICSDs) providing both banking and CSD services.

## 5. THE BOTTOM-UP APPROACH

Our analysis looks at the *direct costs* of clearing and settlement in Europe and the US. Direct costs are defined in line with the analysis conducted in the Giovannini report:<sup>37</sup>

- i. Direct costs represent the fees associated with clearing and settlement services provided.<sup>38</sup>
- ii. Indirect costs represent back-office facilities required to manage the clearing and settlement process by the intermediary.
- iii. Opportunity costs represent the costs of the inefficient use of collateral, a higher incidence of failed trades, and foregone business opportunities due to the complexity and cost of processing.

Previous research has produced estimates of the direct costs of clearing and settlement using a “top-down” approach based on the operating income per transaction of CSDs and clearinghouses.<sup>39</sup> Our study aims to augment the existing literature by approaching the analysis of direct clearing and settlement costs from a “bottom-up” perspective based on the tariffs charged by clearing and settlement service providers.

Many clearinghouses, CSDs and ICSDs publish data on their tariffs. This has allowed us to estimate the costs of clearing and settling an equity trade in a number of jurisdictions using publicly available data. We also conducted a survey of four users of varying size and product mix and talked to five clearinghouses and CSDs to ensure that we interpreted the data correctly and to support the qualitative aspects of our analysis.

In this section we highlight some of the difficulties with top-down analysis and explain how a bottom-up approach based on tariff data can be used to overcome a number of these. We also explain the limitations of bottom-up analysis and the nature of the conclusions that can be drawn.

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<sup>37</sup> The Giovannini Group (2001)

<sup>38</sup> Direct costs do not include fees for the use of intermediaries such as agent banks of clearing members.

<sup>39</sup> Lannoo and Levin (2001) and London Stock Exchange (2002)

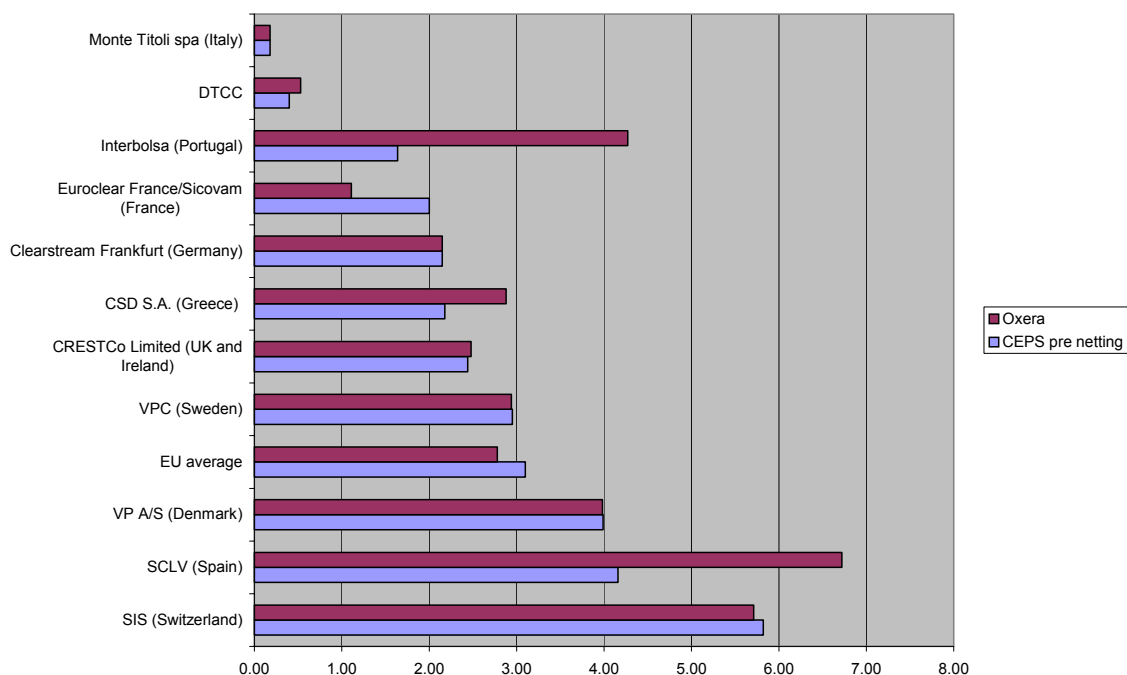
## 5.1. Uncertainties in Top-Down Estimates

There are a number of issues with the methodological approach taken in previous studies, the most significant of which are discussed below. The scope for uncertainty in using a measure based on operating costs per transaction is illustrated by the existence of significant discrepancies between the estimates from previous studies.

Figure 5.1 shows that there are significant discrepancies between the existing estimates for Portugal, Spain, Greece and France and a small discrepancy in the US estimates.

**Figure 5.1**

### **Discrepancies in the Results of Top-Down Studies**



Discrepancies could be due to the year of data used, including exchange rate fluctuations. In addition, differences in accounting standards between jurisdictions can affect the comparability of results and introduce an element of subjectivity into the analysis. There are, however, two more fundamental issues with the top-down approach: the high level of aggregation of the data; and the treatment of netting. We discuss these in turn below, showing how bottom-up analysis can be used to overcome these problems.

## **5.2. Aggregation**

The main problem with comparing operating income per transaction is that the bundle of services offered differs across clearing and settlement infrastructure providers. Unless accounts are segregated by activity (which is rare), operating income figures may include revenues not directly attributable to clearing and settlement activities, for example banking, information provision, or corporate actions services.

Bottom-up analysis can yield a more detailed breakdown of costs. Where separate tariffs are given for each service, it is possible to compare the direct costs of each service separately, and exclude services from the scope of the study as appropriate. The scope for disaggregating the costs of different services is limited where tariffs are bundled. This creates problems with comparability as alternative providers structure and bundle their tariffs differently (discussed below). Nonetheless, using tariff data allows a more accurate analysis of specific costs than using operating income figures.

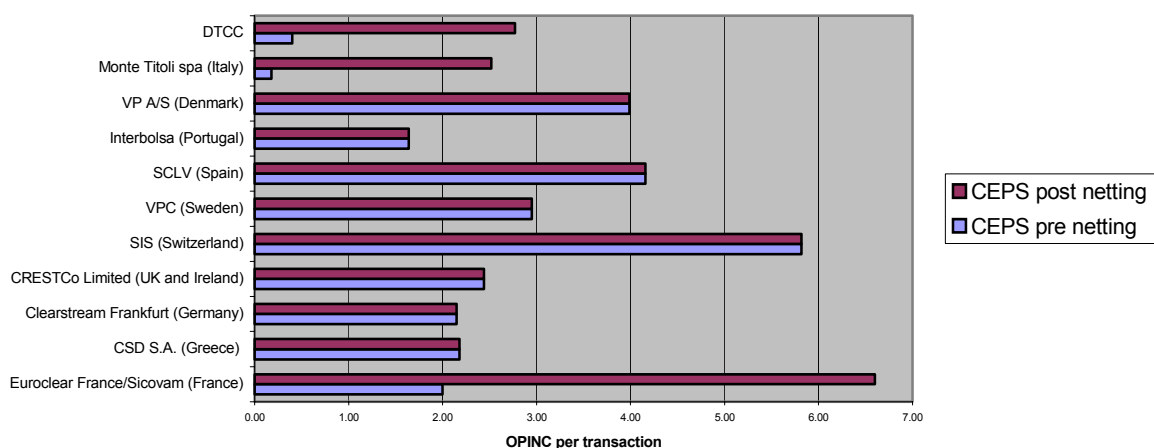
A related point is that, due to the level of aggregation in a top down analysis, it is difficult to consider in detail qualitative factors that could explain some of the variation in costs between providers. Bottom-up analysis is more easily augmented by qualitative information and by the use of survey data. This approach is helpful in both establishing robust cost estimates and explaining the variation in costs between providers. Relevant qualitative information includes the level of bundling of costs, the extent that value added services are provided and their impact on total costs, the costs of other services such as information provision, and the quality of service as measured by settlement efficiency.

## **5.3. Netting**

Both the OXERA and CEPS studies emphasise the importance of the netting issue (whether pre- or post-netting figures for the number of transactions are used) and the likely impact on the results. OXERA considers only pre-netting figures in its report, while the CEPS report shows both pre- and post-netting figures. The CEPS figures

are shown in Figure 5.2 on both a pre- and post-netting basis.<sup>40</sup> This illustrates the importance of the approach to netting on the results in a top-down analysis - for the markets where netting is available, the difference in costs resulting from the diverging methodologies is significant.

**Figure 5.2**  
**Operating Income per Transaction – Pre- and Post-Netting**



Under a top-down approach, using post-netting figures effectively penalises markets with a high netting efficiency through the denominator in the operating income per transaction calculation. This is important because netting efficiency varies significantly between markets – netting percentages in the DTCC are at least 97%, while several European exchanges do not net transactions at all.

Using pre-netting figures, on the other hand, ignores variation in netting efficiency between systems. The main drawback of this is that the benefits of netting are not considered – these may include lower indirect and opportunity costs and lower counterparty risk. Furthermore, the additional costs of netting to the system are considered.

The bottom-up approach avoids these complications. This is because it enables an estimate of the costs to the end user of clearing and settling a net transaction. This

<sup>40</sup> It should be noted that these figures were calculated before the availability of netting for equity transactions on the German and UK markets.

cost will depend on (i) whether netting is available on the market, (ii) whether there is a separate tariff for the settlement of a net transaction, and (iii) whether tariffs are based on pre- or post-netting settlement volumes. By considering these issues in formulating our cost estimates our figures should reflect both the increased cost and the increased efficiency resulting from netting of transactions.

Even with a bottom up approach the issue of netting still impacts the results we are able to obtain. This is because in order to arrive at a cost per transaction where tariffs are based on post netting settlement volumes it is necessary to make an assumption about the average level of netting efficiency. For example, we have assumed specific levels of netting efficiency for our model clients. These assumed levels of netting efficiency allow us to arrive at conclusions about the average cost of clearing and settling a transaction. An alternative approach would be to consider the marginal cost of clearing and settling a transaction.<sup>41</sup> The argument for this approach would be that an intermediary is most likely to consider the marginal cost of each transaction when assessing the cost of executing an additional trade and in calculating costs to be passed on to clients. Our study focuses on the average cost as opposed to the marginal cost; this is based on the assumption that firms consider primarily the average cost when considering the cost of clearing and settlement per market.

#### **5.4. Assumptions Needed**

Bottom-up analysis requires a number of assumptions to generate results that are comparable across institutions, notably about the model client characteristics and transaction type. We have modelled a number of alternative clients and equity transactions and are satisfied that our overall conclusions are not particularly sensitive to the choice of model client or transaction. It is important to note that we have focussed throughout on equity trades only. We have produced robust estimates of the direct costs of clearing and settling an equity trade but we have not attempted to generalise or extend our conclusions to other markets. Appendix A outlines our methodological approach in detail, including all relevant assumptions.

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<sup>41</sup> This marginal cost of settlement would be zero for markets where settlement is charged per net settlement.

## **5.5. Data Availability**

Of the organisations we reviewed in Europe, less than half made their tariff schedule publicly available on their website, and in some cases tariffs are not publicly available on request. Nonetheless, we were able to obtain tariff information for eight jurisdictions and three ICSDs.

We found that several cost components are often bundled together in a single tariff component. This creates comparability difficulties because bundling is not consistent across organisations, with different institutions publishing different cost bundles. This bundling reflects the fact that clearinghouses and securities depositories have very high fixed costs and relatively low variable costs. This means it is not feasible to charge users the marginal cost of each service they use. Instead, tariff design is mainly about allocating fixed costs between users, and different providers take different approaches to this task.

A related difficulty is that clearing and settlement services can be provided by a range of different organisations. For example, in Sweden the exchange provides clearing, netting and CCP services, while in the UK the CSD provides netting and settlement services and an independent clearing house provides CCP services. Each market may have a variety of tariff schedules covering the relevant services. This means that, in some cases, clearing or CCP costs are bundled with trading costs.

## 6. DOMESTIC COSTS

In this section we present our analysis of the tariff schedules published by clearinghouses and CSDs in a number of jurisdictions. Table 6.1 shows the organisations, which provide clearing and settlement services in each market we have considered. The analysis shown in this section is based on the published tariff schedules of these organisations.

**Table 6.1**  
**The Organisation Structure of European Markets is Highly Varied**

	CCP	Netting	Clearing	Settlement
<b>Denmark</b>	None	VP	VP	VP
<b>Germany</b>	Eurex	Eurex	Eurex	Clearstream FFT
<b>France</b>	Clearnet	Clearnet	Clearnet	Euroclear France
<b>Netherlands</b>	Clearnet	Clearnet	Clearnet	Necigef
<b>Italy</b>	CC&G	Monte Titoli	CC&G	Monte Titoli
<b>Switzerland</b>	SIS x-clear	-	SIS x-clear	SIS Sega InterSettle
<b>UK</b>	LCH	CREST	LCH	CREST
<b>US</b>	NSCC	NSCC	NSCC	DTC

In section 6.1, we present our estimates of the total cost of clearing and settling an equity trade. In section 6.2, we discuss particular aspects of the tariffs in more detail.

### 6.1. Comparing Domestic Costs<sup>42</sup>

As explained in the previous chapter, we have derived our estimates of the total costs of clearing and settling an equity trade from tariff schedules published by clearinghouses and CSDs. The terms used to describe processes within the activity chain (matching, clearing, netting, etc) are not necessarily used in the tariff schedules, since different providers use different terminology, but all tariffs relate to a service broadly comparable to our definition.

Costs are calculated using a model client and model transaction type. Showing costs from the perspective of a model client illustrates the comparative cost of clearing and settling a specific transaction across the range of jurisdictions. Section A.2 outlines in

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<sup>42</sup> All data are reported in euros. The conversion rate is 1.44615 to the pound and 0.8854 to the dollar. Rates for the full set of currencies are available on request.

detail the methodology used to create a model client and transaction type. In brief, model 1 is a moderately large sized user, whilst model 2 represents a very large user (this approximate a lower bound on costs for most markets) and model 3 represents a very low volume user (this should approximate an upper bound on costs).

**Figure 6.1**  
**Clearing and Settlement Costs Model User 1 (Euros)**

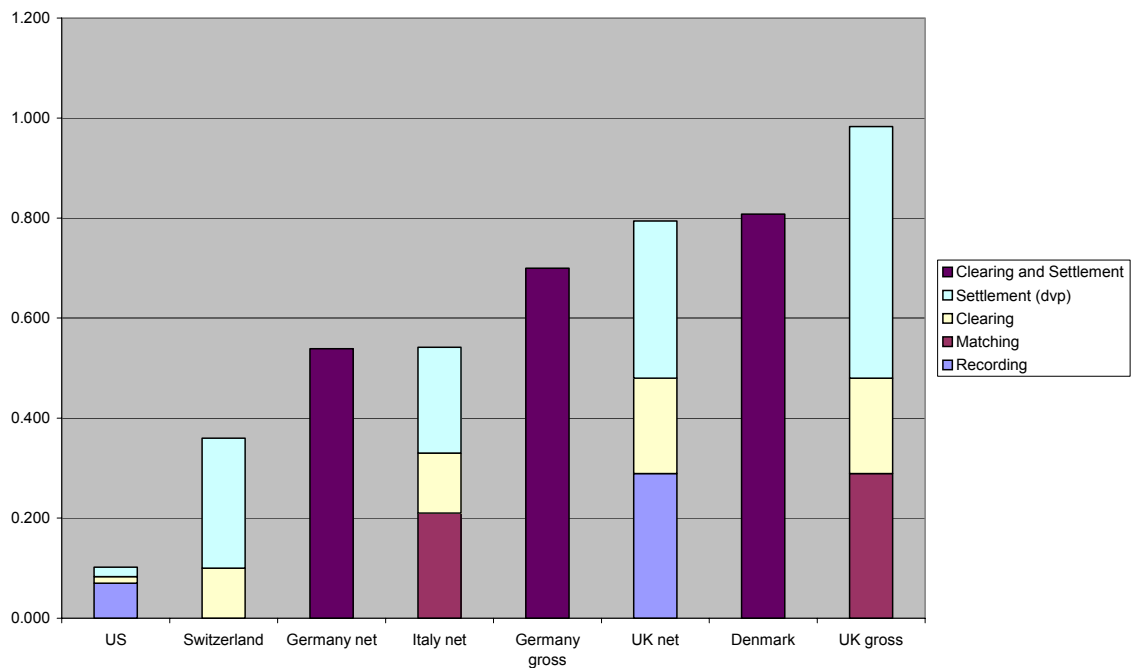


Figure 6.1 shows the total costs of clearing and settlement for markets with a CCP where sufficient tariff information was available to produce an estimate.

**These results are consistent with the finding of previous studies that it is more expensive to clear and settle a trade in Europe than the US.**

The results are shown in both gross and net form. It should be noted, however, that on some markets it is common to settle either on a gross or net basis, whilst on others (e.g. Germany) the great majority of trades are settled on a net basis. There are a number of points to note with respect to these figures:

- All of the European markets shown in Figure 6.1 charge for settlement on a gross basis (per transaction executed), whilst the US charges on a net basis (per transaction settled). This means that for a large user the cost of settlement appears high in Europe. Figure 6.4 shows a larger range of European markets including the Euronext markets, where settlement is charged on the same basis as in the US and is correspondingly cheaper.
- In the UK, CREST bundles custody costs in settlement fees, the other countries shown show settlement tariffs only.<sup>43</sup>
- In Switzerland, there is an additional risk management fee charged by the SIS x-clear. This is not included as it is based on the counterparties credit rating which is outside the scope of our model.
- In the US the majority of trades are pre-matched, whilst some European markets, for example Italy, charge an explicit matching fee.
- In the US, the recording fee is based on an assumed 3,000 shares per transaction reflecting the large size of our model user. The DTCC estimate the actual average shares per trade was 836 in 2003.
- The German tariff is a bundled figure that applies to all transactions cleared by the Central Counterparty Eurex, this represents the majority of trades. For trades not cleared by the CCP (this is an optional service) an unbundled fee of 0.55 Euros for settlement only is charged.

Figure 6.2 and Figure 6.3 show estimates of clearing and settlement costs for alternative model users. Model user 2 is very high volume user and model user 3 is a very low volume user. The main effect of introducing a high volume user into our analysis is to increase our estimates of costs in the US relative to Europe. This is because the DTCC does not apply a volume discount based tariff, while the majority

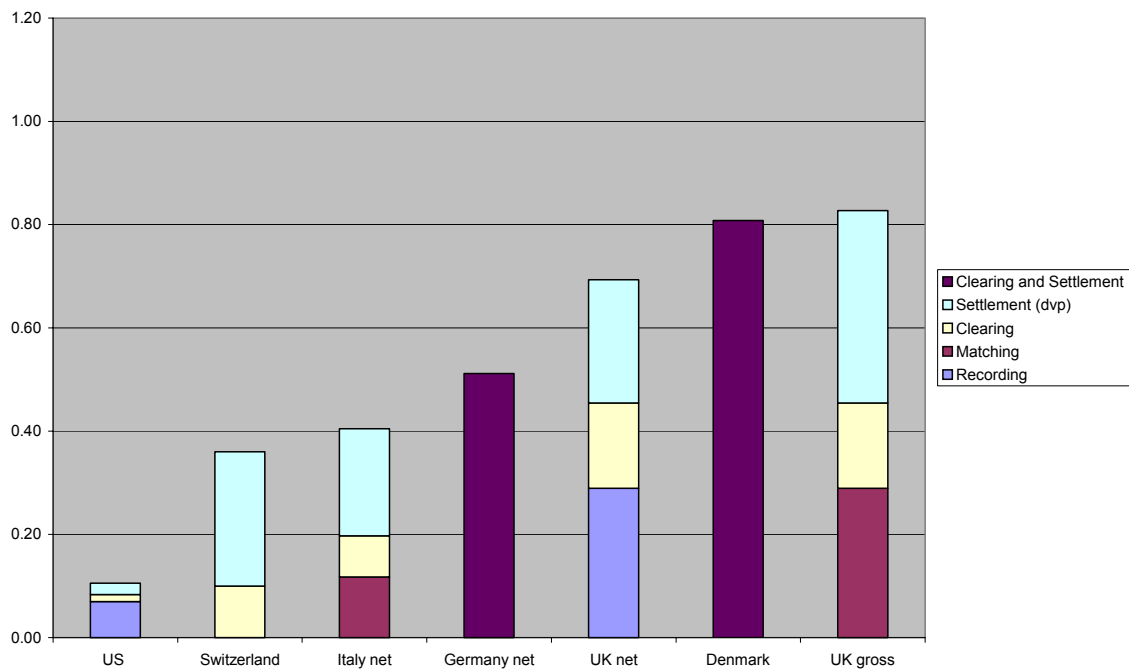
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<sup>43</sup> Including custody in our analysis on a per transaction basis would be difficult as custody costs vary with the volume of assets rather than the number of transaction. For example, Clearstream charges between 0.2 and 0.02 basis points for safekeeping charges, depending on the volume of assets held in custody (one hundred basis points equals one percentage points). If we were to assume the model client held on average 1 billion euros in assets, the custody charge per annum based on a transaction with a consideration of 10,000 euros would be €12.5. However, as we assume the number of transactions per stock per year is 3,500 the custody charge per transaction falls to €0.003. The number of assumptions required to come to this estimate means that such an estimate would not be robust.

of European countries do. It should be noted that the DTCC does apply a volume-based rebate (an ex-post volume discount). Although the rebate is not considered in these graphs it would bring down the ex post costs of a high volume user in the US.<sup>44</sup> The use of rebates is discussed further in section 6.2.3.

**Figure 6.2<sup>45</sup>**

**Clearing and Settlement Costs Euros Model User 2 (High Volume)**



The effect of introducing a very low volume user is to increase our estimates of the cost for all markets, including the US. In the European markets, this simply reflects the volume discount structure. (Volume discounts are discussed further in section 6.2.3.) In the US, the increased cost is due to fall in the ratio of gross to net transactions which increases the settlement cost per gross transaction.

<sup>44</sup> We do not build in the effect of a rebate into our tariff estimates as it is not known ex-ante by users and is not published in their tariff schedules. A number of European markets also apply rebates.

<sup>45</sup> This figure excludes the estimates for gross settlement in Italy and Germany as the clear majority of trades is settled on a net basis on these markets.

**Figure 6.3**

**Clearing and Settlement Costs Euros Model User 3 (Low Volume)<sup>46</sup>**

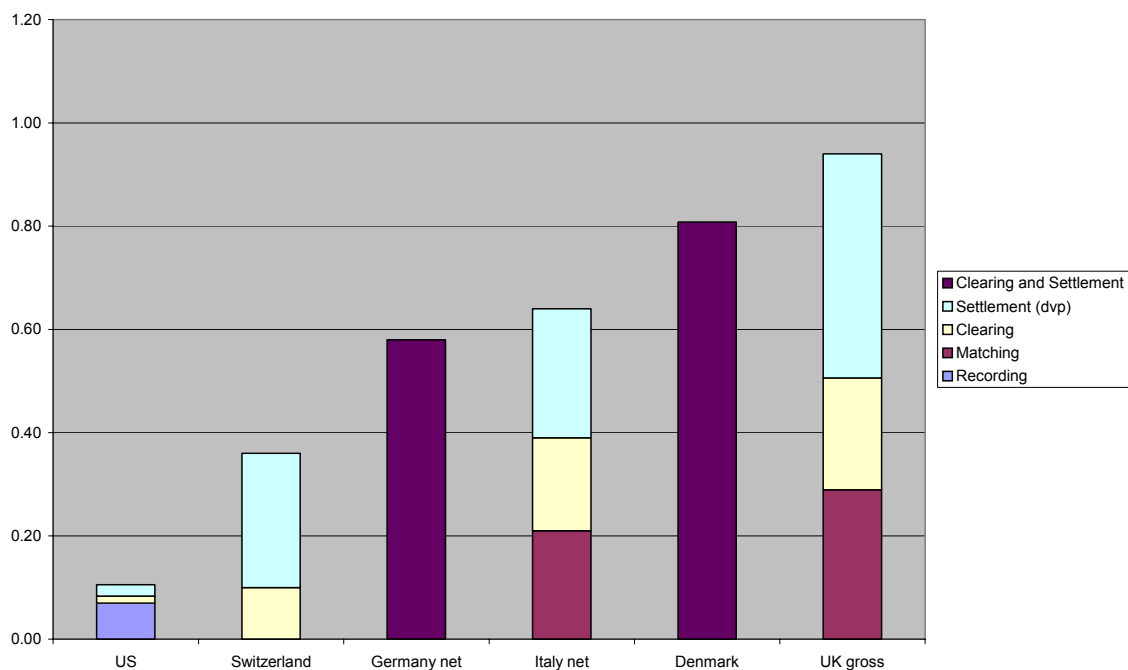
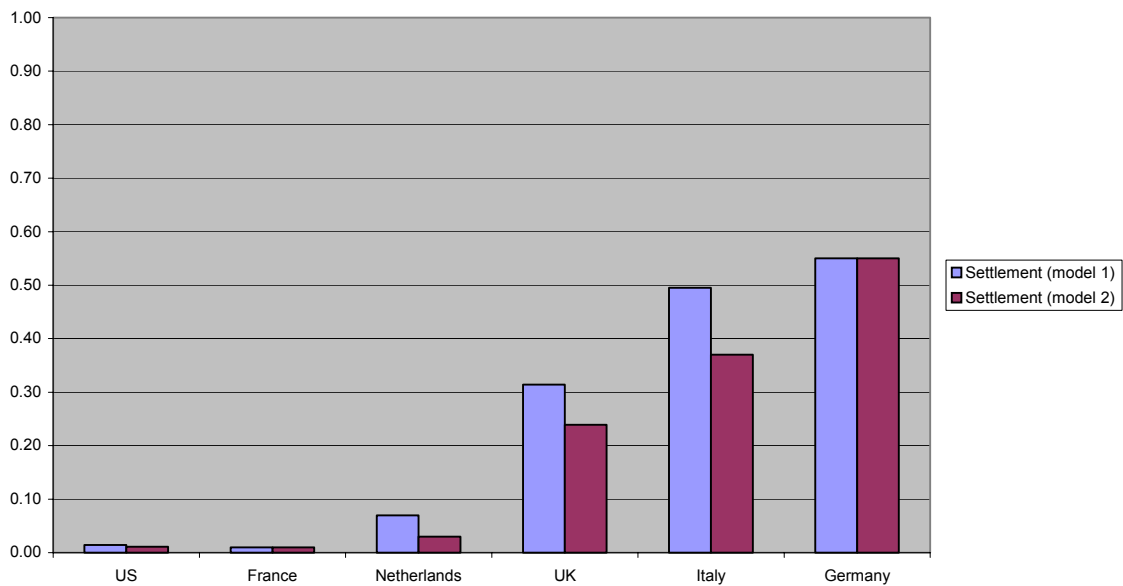


Figure 6.4 breaks down the total clearing and settlement costs to show the settlement only cost associated with a DVP transaction settled on a net basis in five European markets and the US. The figures show that under model user 1 and model 2 the US, France and the Netherlands have the lowest costs. This reflects the effect of charging fees based on net settlement volumes. Our model user transacts a significant volume per stock per day and is therefore able to achieve a very low cost per transaction. The actual settlement cost per net transaction in France is €0.45 and €0.4 for model users 1 and 2 respectively. In the US and the Netherlands the cost is a flat fee of €0.48 (the price of a receive is lower at €0.32) and €1.35 respectively.

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<sup>46</sup> As this is a low volume user we show the UK cost for gross settlement only, this is based on the assumption that a user of that size would be expected to settle on a gross basis.

**Figure 6.4**  
**Net Settlement Costs (Euros)**



Costs in the other European markets are significantly higher per transaction; this is because these markets all charge for settlement per gross transaction basis. This penalises a high volumes user relative to the Euronext and US markets. In Italy, the UK and Germany, however, there is an offsetting volume discount that awards high volume users with lower tariffs.

There are, however, a number of difficulties with direct comparisons across tariff schedules given (i) differences in service provision and (ii) the impact of the assumptions made in specifying a model user:

- Some European providers charge per transaction rather than per settlement, whereas the DTC and Euronext markets charge per settlement. Our result is, therefore, dependent on the assumptions outlined in Appendix A: if the number of settlements per settlement unit was reduced to 1, the US would have a per delivery cost of €0.43.
- The DTC charges a higher rate for a deliver than a receive. The fee per settlement is €0.39 for the seller and €0.23 to the buyer, making the average fee €0.31.

- The German figure is the cost of settlement only. The majority of transactions are charged a bundled rate of clearing and settlement costs; this rate is illustrated in Figure 6.1, Figure 6.2 and Figure 6.3.
- As noted earlier, CREST includes custody costs in settlement fees.

Figure 6.5 shows the cost of gross settlement in the European countries where gross settlement is either optional or the only available settlement mechanism. The US figures are presented for comparative purposes but it should be noted that all US transactions are settled net.

The key points to note with respect to these figures are:

- SIS (the Swiss CSD) charges a significantly higher rate for off-exchange transactions whereas other CSDs charge one rate only for all business.<sup>47</sup>
- Only a small proportion of trades in Germany and Italy are settled on a gross basis.
- The Danish charge is based on the use of the Real Time Gross Settlement (RTGS system).

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<sup>47</sup> The lower SIS rates reflects the fact that trades are locked in when executed on exchange and downloaded directly to SIS for settlement. This is in turn reflected in the relatively high standing costs charged by SIS.

**Figure 6.5**  
**Gross Settlement Costs (Euros)**

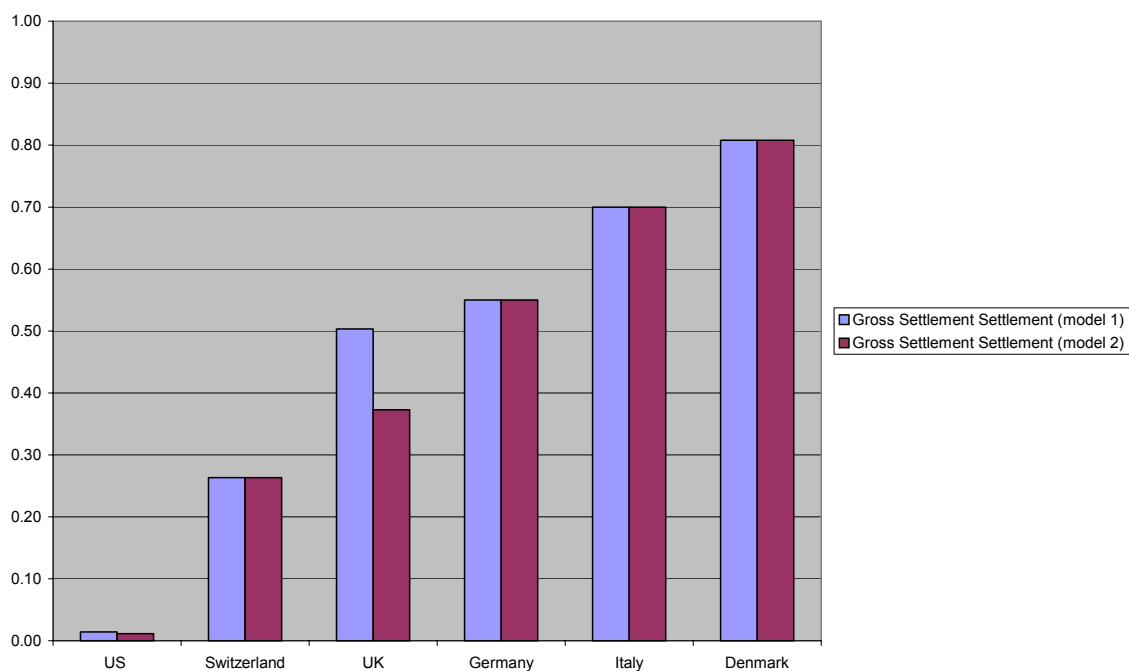
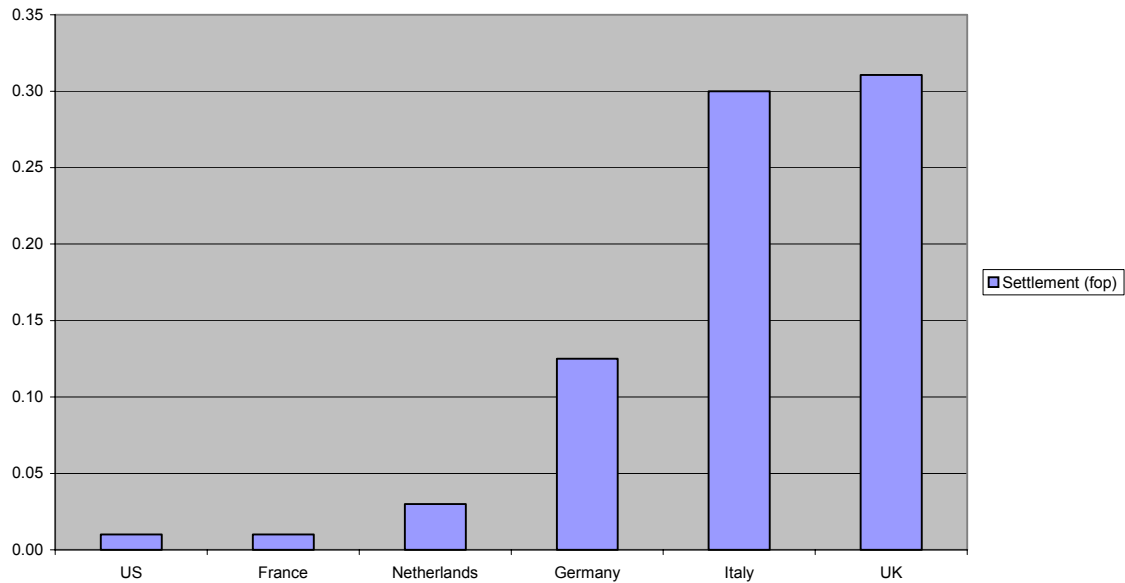


Figure 6.6 shows the cost per market of settling a transaction Free of Payment (FOP). CSDs either charge a specific rate for FOP transactions or the costs are imputed from the fee for stock only settlement (e.g. DTC and CREST). FOP settlement is universally charged at a discount to CVP settlement reflecting the cost associated with the transfer of cash in the DVP rate and the DVP requirement that both sides of the transaction are executed simultaneously.

**Figure 6.6**  
**Free of Payment Settlement Costs (Euros)<sup>48</sup>**



The comparison of settlement costs only is interesting on two counts. First, it is a more direct comparison - there is virtually no variation in the level of service provision for the settlement of a transaction (in the case of clearing there are variations in the provision of CCP services, matching services and netting services). Second, this illustrates clearly the differential in costs between the US and some parts of Europe for the settlement of a transaction.

## 6.2. Tariff Structure

In this section we discuss aspects of the tariffs structure that we considered in developing our cost estimates. This discussion does not represent an exhaustive treatment of the factors affecting the price to the end user - further elements are discussed in chapter 8. It does, however, cover all the factors we took into account in developing our quantitative estimates. The factors considered are: netting availability and charging structure; standing charges; and discounting structures.

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<sup>48</sup> Monte Titoli is unique in charging a zero fee for FOP transactions to the selling counterparty, the ordering participant pays a fee of €0.6 equating to an average fee per side of €0.3. This average rate is not reflected in the above graph because the model trade characteristics specify a sale.

### 6.2.1. Settlement Netting

In comparing fees the costs of clearing and settling a gross or net trade, it is important to remember that different markets have a wide variety of netting services. This is important because in the US settlement tariffs are charged on the basis of the number of net settlements rather than the number of transactions, while in Europe settlement is normally charged based on the number of transactions. This means the netting efficiency of the DTC has a significant impact on charges for clearing and settlement in the US.

To consider the effect of netting on per transaction costs, where settlement charges are per net transaction, we have re-calculated settlement costs for the US based on a number of different netting efficiencies. Table 6.2 presents the results.

**Table 6.2**  
**Effect of Netting on Clearing and Settlement Costs (Euros)**

<b>Netting Efficiency</b>	<b>US Total Clearing And Settlement Costs</b>
0% Netting	0.70
30% Netting	0.51
90% Netting	0.12
99% Netting	0.08

This shows that a high level of netting efficiency can dramatically reduce costs. This is because where settlement is per delivery and the number of transactions per settlement line is high the average cost per settlement becomes low. The largest benefits from netting on the US market will therefore accrue to participants who transact high volumes of business.

### 6.2.2. Standing Charges

CSDs normally charge a fixed fee for use of infrastructure combined with a per account fee covering a variety of services, including:

- account opening/maintenance
- announcements and market information
- access to securities information and databases
- credit and collateral services

These charges reflect the fixed costs associated with operating a CSD. Thus we might expect a higher level of standing charges for small CSDs, where the fixed costs must be spread between fewer members. We might also expect high standing charges to be associated with a high level of technological development - there may be a relationship between standing charges and the level of straight through processing achieved by the CSD. There may also be a trade off between standing charges and the direct charges a CSD makes for information provision services, as in some cases information provision is bundled in an account management fee (this is discussed further in chapter 8).

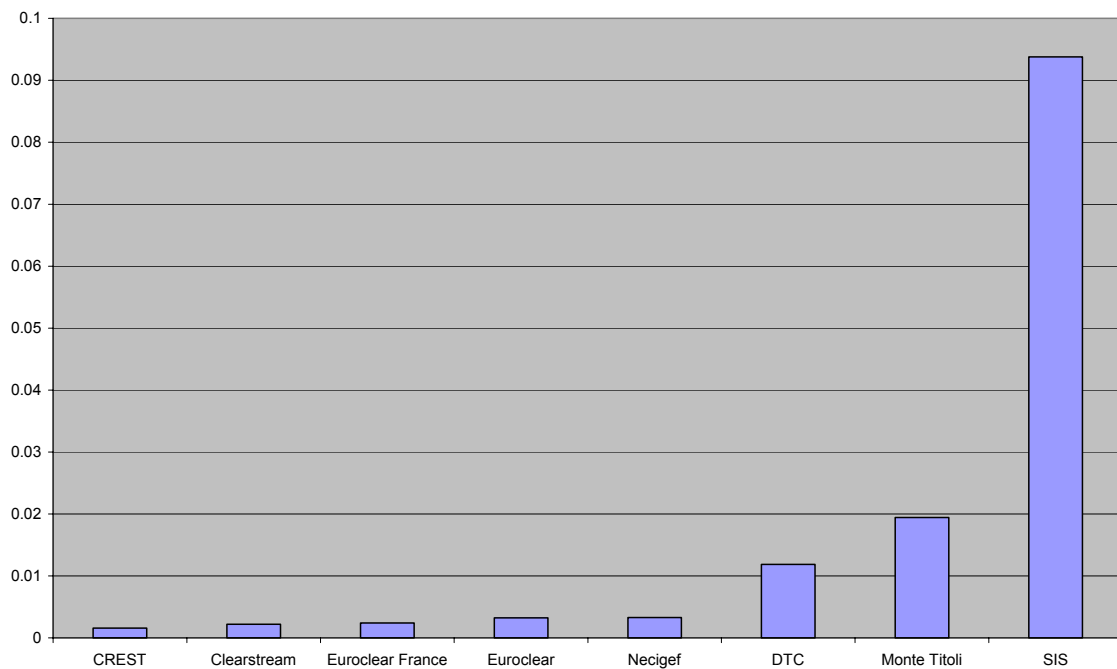
Table 6.3 shows some of the standing charges levied by key European CSDs and the DTC, based on our specification of model client 1.

**Table 6.3**  
**Standing Charges (Euros)**

	CREST	Euroclear France	Necigef	Euroclear	Clearstre am	DTC	Monte Titoli	SIS
Annual Charge	5000	3600	11200				66000	318900
Gateway Charge	285							
Account Charge (5 accounts)	36	4600		11000	7500	40374		
Other	28					0		
<b>Total standing charges</b>	<b>5349</b>	<b>8200</b>	<b>11200</b>	<b>11000</b>	<b>7500</b>	<b>40374</b>	<b>66000</b>	<b>318900</b>
<b>Total per transaction cents</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.02</b>	<b>0.09</b>

Figure 6.7 illustrates the average standing charge per transaction based on model user 1. This shows that there is low variation in the standing charge per transaction with most European countries charging a low rate at a comparable level to the US. Monte Titoli and SIS are the exception, which reflects a low cost of settlement per transaction and high levels of straight through processing resulting in high fixed technology costs for these providers.

**Figure 6.7**  
**Total Standing Charges per Transaction (Model User 1)**



Clearing Houses do not normally charge an annual fixed fee. It is common, however, for clearing houses to charge a significant one-off membership fee. Given the difficulties associated with translating a membership fee into a cost per transaction, we have not attempted to include the charges associated with membership of a clearing house in our cost estimates.<sup>49</sup>

Nonetheless, we believe the costs of membership of a clearing house may be an important element of total costs. By way of example, the fixed fees charged by the

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<sup>49</sup> Calculation of a per transaction fee based on a one-off fee would require limiting assumptions on the term of membership. Furthermore, a substantial proportion of fees is, in many cases, in the form of a deposit rather than a cost as such.

LCH.Clearnet are as follows: The London Clearing House members have the option to purchase an LCH.Clearnet Limited 'A' share at a cost of approximately three hundred thousand pounds on joining. In addition members must contribute to LCH.Clearnet Limited's Default Fund. The minimum contribution for EquityClear is one million pounds and the total contribution is dependent on clearing activity. LCH.Clearnet Limited pays interest on Default Fund contributions of three month LIBOR plus one hundred basis points.

### **6.2.3. Discounting Structures**

It is common to discount fees for clearing and settlement services according to a volume or revenue discount structure. These discounts reflect the increased bargaining power available to intermediaries conducting high volumes of business. They also reflect the cost structure of the clearing houses and CSDs: given the high fixed costs of providing these types of services, there are significant economies of scale associated with high volume business.

In deriving our cost estimates, we have taken account of the volume discounts that would be available for our model client and transaction. We have not, however, attempted to model rebates on the grounds that rebates are not known at the point of sale and they are highly variable across time. Our discussions with market participants confirmed the view that expectations of rebates were not a significant factor in assessing their costs in each market. The possible exception to this is the US where rebates are more significant than on European markets. Another factor differentiating rebates in the US is that they are paid on a monthly basis and are directly related to the business volumes of each participant. Rebates paid in the US were on average €108 million from 1999 – 2003. In 2002 the rebate totalled €220 million, equivalent to a 30 per cent reduction in the per transaction cost of clearing and settlement.

**Table 6.4**  
**Volume Discount Type and Structure**

Organisation	Type of Discount						
<b>EUREX</b>	Number of transactions per settlement netting unit/per Day	Minimum Discountable Volume	1001	2501	5001	10001	20000
		% Discount	4	8	11	14	19
		% Increase in volume required for discount		60	50	50	50
		Ratio		0.06	0.08	0.08	0.08
<b>Clearstream FFT</b>	Number of book entries/month	Minimum Discountable Volume	5000	10000	20000	50000	
		% Discount	5	10	12.5	15	
		% Increase in volume required for discount		100	100	100	
		Increase ratio		0.05	0.03	0.03	
<b>CREST</b>	Gross discountable revenue	Minimum Discountable Revenue (£000's)	412.5	837.5	2337.5	4337.5	
		% Discount	20	40	60	80	
		% Increase in volume required for discount		20	20	20	
		Ratio		1.00	2.00	3.00	
<b>Monte Titoli - Express II settlement</b>	Number of instructions per year	Minimum Discountable Volume (000's)	50	300	750	3000	7500
		% Discount	2	6	15	30	50
		% Increase in volume required for discount		83	60	75	60
		Ratio		0.02	0.10	0.20	0.47

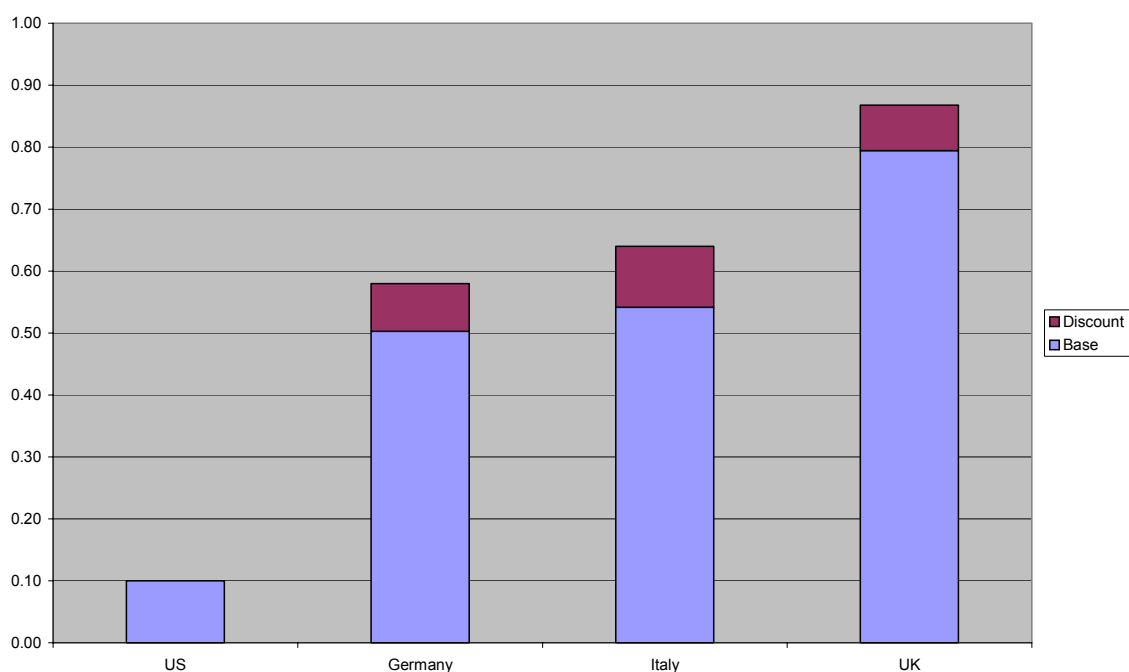
Table 6.4 shows the discount structure for a number of the European markets surveyed. All volume discount structures except for CREST are based on the volume of transactions. CREST uses the net revenue from the client to calculate discounts. This means that the CREST discount structure takes into account payment for ancillary services such as custody and corporate actions (on international securities), while other organisations do not.

Table 6.4 also shows the ratio of the percentage increase in the discount to the required percentage increase in volume/revenue. The ratios show that, among the CSDs, CREST has the most aggressive volume discount whilst Clearstream Frankfurt

offers very low volume discounts (this is for book entry transactions only).<sup>50</sup> However, the discounts have different starting levels. CREST has a much higher threshold for the application of discounts than Clearstream FFT, so for a low volume user higher discounts may be achievable through Clearstream.

Another method of comparison is to look at the discounts that would be available on the fees per transaction. This comparison is shown in Figure 6.8 for Model User 1. The impact of the volume discounts is evident. In fact, our model client is at the lower end of the volume discount structure - high volume users may achieve even higher discounts. It should be noted that this figure does not consider rebates, which are widely acknowledged to be more significant in the US than in Europe.

**Figure 6.8**  
**Base and Discounted Fees – Clearing and Settlement (Euros)**



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<sup>50</sup> Eurex is the only clearinghouse shown; the rest are CSDs.

The importance of volume discounts in Europe is striking. This is an additional issue for the comparability of results as the discount structures are highly variable within Europe. Because of this variability our choice of model client has impacted our results. Assuming a lower volume user would make those countries with smaller volume discounts appear cheaper, and vice versa.

Like standing charges, volume discounts are a mechanism for allocating fixed costs among users. However, there does not appear to be any significant correlation between the two measures. For example, CREST gives a high volume discount and charges a fairly low standing charge, while SIS has a very high standing charge and also gives significant volume discount.

## 7. NON-DOMESTIC COSTS

There are a number of options for the settlement of non-domestic transactions. These include: (i) direct access to the local CSD; (ii) employing a local agent or global custodian; (iii) employing an ICSD; or (iv) using a bilateral link between CSDs.

The costs for option (i) were considered in chapter 6. Of the other options, by far the most commonly used for equity transactions is option (ii), settlement via an agent bank.<sup>51</sup> We have not attempted to estimate agent banks costs as part of this study, however, for two reasons. First, agent banks do not publish tariff schedules so data availability would be a problem. Second, even if it were possible to establish what agent banks were charging (for example, by surveying users), agent banks provide a bespoke service, including value added services (for example, custody, corporate actions). Although ICSDs also provide some additional services, they do less of this than agent banks, while CSDs focus on the provision of basic clearing and settlement services. This means that it would not be possible to compare the direct costs of comparable services.

Based on our conversations with market participants (and the fact that so many transactions are settled this way), our view is that that a full comparison between the options for settling a non-domestic transaction comparison would show that the indirect and opportunity costs are, in many cases, lower for settlement by an agent bank. We discuss this option further in qualitative terms in section 7.4.

The costs for options (iii) and (iv) are outlined below – for these options we have been able to compare broadly similar types of service using publicly available data. Despite a number of difficulties with the interpretation of this data (discussed below) we have been able to reach some high level conclusions. The analysis that follows is based on Model User 1, and a variety of transactions according to the options for settlement being considered.

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<sup>51</sup> Euroclear estimate that 90% of cross border equity transactions are settled through a local agent.

## **7.1. Direct Costs of Employing an ICSD**

In this section we consider settlement through an ICSD. ICSDs are primarily used for settling fixed income, as opposed to equity, transactions. As noted above, most non-domestic equity transactions are settled through an agent bank or global custodian (option (ii)).

One difficulty with comparing ICSD tariffs with national CSDs is that ICSDs include banking services in their tariffs, while CSDs do not. This means that the ICSD tariff covers a wider range of services than the CSD tariff. It would be preferable to compare ICSD tariffs with CSD tariffs plus any associated banking costs. Responses from our survey indicate that banking costs associated with transacting business through a CSD, which does not hold a banking licence, can vary significantly. Furthermore, these costs are difficult to measure on a per transaction basis as it is common for banks to apply a soft charge (where fees are related to the total volume of business rather than a per transaction fee).

Table 7.1 shows the direct costs for two types of transaction – internal and external – for a model client (defined in Appendix A). An internal transaction is where a non-domestic transaction is settled between two internal accounts, i.e. book entry settlement. This scenario is relatively common as ICSD users often hold a number of accounts denominated in different currencies and jurisdictions. An external transaction is where Clearstream transfers securities through its network of sub-custodians.

There is a further transaction type – internal bridge transaction – which is used where settlement is between two ICSDs. However, there are very low volumes of this transaction type so we have not covered it here.

**Table 7.1**  
**Direct Costs of Option (iii) (Euros)**

	Clearstream international					Euroclear international					SIS international				
Settlement Location	DB	UK	US	France	Italy	DB	UK	US	France	Italy	DB	UK	US	France	Italy
Internal settlement	1.32					0.57	0.75	0.75	0.75	1.27	0.59				
External settlement	5	11	5	17	26	5	7	5	27	27	10	7	11	24	21

Comparing the ICSD charges for an internal transaction with an external charge illustrates the importance of sub-custodian charges in the composition of fees. There are a number of reasons for the higher costs of external transactions. One reason is that only relatively low volumes are transacted in this manner, which means low benefits in terms of economies of scale. Also, in markets where volumes are lower settlement risk is often higher for the ICSD (due to greater need for manual processes) requiring a higher tariff. Another reason for higher tariffs is that there may be country-specific regulations that prevent the adoption of a uniform process for the settlement of non-domestic securities.

Again, our estimates are to some extent sensitive to the choice of model client, since fees are normally calculated on a sliding scale depending on volumes. Table 7.2 shows the volume discounts applied for Euroclear and Clearstream ICSD business. For the ICSDs, the ratios show that discounts are much more significant for external instructions than for internal instructions. It also shows that there is variation between ICSDs in the level of discount given. This variation in the level of discount implies that a comparison on the gross published fees alone is potentially misleading.

**Table 7.2**  
**ICSD Volume Discounts**

Clearstream	Number of Internal Instructions	Minimum Discountable Volume	500	1500	2500	5000	10000	20000
		% Discount	57	60	66	70	75	83
		% Increase in volume required for discount		67	40	50	50	50
		Ratio		0.85	0.18	0.30	0.27	0.31
	Number of External Instructions	Minimum Discountable Volume	15	60	120	280	550	2500
		% Discount	2	3	4	8	35	38
		% Increase in volume required for discount		73	49	57	49	78
		Ratio		0.02	0.02	0.02	0.07	0.37
Euroclear	Number of Internal Instructions	Minimum Discountable Volume	101	251	1001	5001		
		% Discount	70	72	75	82		
		% Increase		60	75	80		
		Ratio discount/increase		1.16	0.12	0.15		
	Number of External Instructions	Minimum Discountable Volume	11	51	101	251	500	
		% Discount	15	18	22	26	30	
		% Increase		78	49	60	50	
		Ratio discount/increase		0.19	0.07	0.06	0.07	

## 7.2. Direct Costs of Using a CSD-CSD Link

Again, it is important to note that this form of settlement makes up a small proportion of non-domestic equity settlements. However, the data for those transactions that settled on this basis does illustrate the tariffs that are potentially achievable through improving interoperability between European systems. Settlement between domestic CSDs is normally completed FOP. Estimates of the direct cost of settling an equity trade in this way are shown in section 6.1.

**Table 7.3**  
**Direct Costs of Option (iv) (Euros)**

	CREST				CLEARSTREAM FFT	SIS
	Euroclear	Netherlands, Sweden, USA and Canada	Germany	Rest of Europe	France, Spain, Italy, Netherlands, Austria & Switzerland	UK
FOP Settlement	8.15	2.15	8.15	17.15	5	7.8

In cases where there is a direct link between CSDs, DVP settlement is feasible. This is applicable in the case of CREST’s link with SIS, and Clearstream’s link with OeKB (Austria) and SIS. These transactions are not directly comparable to those shown in Table 7.1. A direct link transaction is similar in nature to a bridge settlement by Clearstream or Euroclear, while a FOP CSD-CSD settlement is not directly comparable to an external DVP settlement provided by Clearstream or Euroclear. There are two additional costs in the case of a FOP transaction. First, the requirement to physically handle the trade increases back office costs. Second, there is normally a requirement to finance the transfer where clients withhold payment until the transfer of securities has been registered. There is also an additional direct cost for the transfer of cash between counterparties, which, in the case of a DVP settlement, would be bundled into the settlement cost. Therefore the costs provided in Table 7.1 are not necessarily representative of the average cost of settling a non-domestic transaction using a CSD-CSD link.

When considering the importance of CSD-CSD links, it is worth bearing in mind the potential for growth in cross-border exchanges and the likely impact on the availability of this type of settlement option. For example, the growth of Virt-x (the pan-European exchange) is, in part, based on the provision of low cost post-execution services for non-domestic settlement. Virt-x settlement is discussed further below.

### **7.3. Virt-x – A CSD-CSD Link**

Virt-x is a pan-European exchange, which consolidates trading of pan-European blue chip stocks on one platform. The following indices are available for trading on Virt-x: AEX, DAX 30, DJ Stoxx 50, FTSE 100, SMI, CAC 40, MIB30, DJ Euro Stoxx 50 and FTSE Eurotop 100.

The Virt-x model includes both a trading platform and an innovative clearing and settlement infrastructure. The success of Virt-x, in terms of both volumes and revenue, depends on its performance both as a trading platform and as a provider of clearing and settlement services. It is, therefore, difficult to assess the reasons for the success or failure of the Virt-x model for clearing and settlement: low levels of liquidity in European stocks are likely to lead to low trading volumes regardless of the efficiency of the clearing and settlement process. Despite the relatively low non-domestic trading volumes on Virt-x, we have included it here as an example of the potential levels of costs achievable for pan-European trading.

The Virt-x clearing and settlement model provides the first pan European CCP and has the ability to net trades pre-settlement. The settlement process for Virt-x employs a combination of different options for non-domestic settlement. Trades are all cleared by either the London Clearing House or SIS x-clear depending on the clearing membership held by the intermediary. Settlement is by direct link to Euroclear, CREST or SIS. Virt-x aims, by providing competing settlement links, to encourage settlement providers to minimise the costs of settlement.

Table 7.4 shows our estimates of the cost of settling an equity transaction on Virt-x, for CREST and SIS members, based on our model client and a range of transaction sizes. Where a trade is settled through one of Virt-x's CSD-CSD links there may be an additional charge for moving stock between CSDs.

**Table 7.4**  
**Clearing and Settlement for Virt-x Executions (Euros)<sup>52</sup>**

<b>Per Month Volumes</b>	<b>Virt-X Fee</b>	<b>LCH Fee</b>	<b>CREST Fee</b>	<b>Total CREST/ LCH Member</b>	<b>X-Clear Fee</b>	<b>SIS Fee</b>	<b>Total SIS /x-clear Member</b>
100,000	0.26	0.36	0.43	<b>1.05</b>	0.07	0.36	<b>0.69</b>
200,000	0.26	0.21	0.16	<b>0.63</b>	0.06	0.32	<b>0.64</b>

As shown above, there is an additional fee charged by the exchange itself that goes towards the costs of maintaining the settlement infrastructure. This fee differentiates the cost structure of a Virt-x trade from other non-domestic trades, and provides an indication of the additional costs associated with the high degree of straight through processing on Virt-x and the intra CSD links which it supports. However the intra CSD links allow the participating CSDs to offer low cost non-domestic settlement. For example, the settlement fee charged by SIS is applicable for all trades settled in the Virt-x system including Swiss securities as well as all 15 pan-European blue chips. The settlement fee is standard regardless of the counterparty's custodian (i.e. CREST or Euroclear).

The cost advantages of Virt-x are due to the links between the three member CSDs (Euroclear, SIS and CREST). A settlement where stock is held within a member CSD is significantly cheaper than a settlement that involves transfer from or to a national CSD. Virt-x provides an illustration of the ability of the European securities industry to provide low cost clearing and settlement.

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<sup>52</sup> The CREST total is the sum of the Virt-x fee, the LCH fee and the CREST fee, the SIS fee is the sum of the Virt-x fee, x-clear fee, and the SIS fee.

#### 7.4. Costs of Settling via an Agent Bank

As noted above, the most common form of non-domestic settlement for equity trades is settling via an agent bank or global custodian. ICSDs are primarily engaged in settling fixed income transactions, while the use of CSD links is not widespread. Although agent bank charges are outside the scope of this study, their importance in volume terms is such that we discuss these transactions in qualitative terms in this section.

Agent banks typically provide a full service including clearing and settlement, custody, corporate actions, cash management, and representation.<sup>53</sup> They also typically provide services across a range of markets: given the use of volume discounts, it is common for an agent bank to provide an intermediary with settlement services in all non-domestic markets. Reflecting the bespoke nature of agent bank services, there is typically a high degree of bundling of transaction costs. For example, one survey participant told us:

*"our agent bank prices settlement on all Euronext markets according to a flat rate fee for on-exchange trading"*

There may also be bundling between value added services (for example custody) and per transaction settlement costs. Agents may charge a flat fee for all services relating to a particular market based on assets held or transaction volumes. Survey respondents indicated that agent bank fees are generally negotiable, with tariff structures aimed at suiting the client's needs. CSDs, by contrast, tend to charge according to a set tariff schedule. The result of this is that many agent banks provide tariffs based on assets held rather than transactions, which results in more stable costs for the client.

This degree of bundling would make it difficult to analyse the direct costs of agent bank services from a bottom up perspective. It would also make it difficult to compare costs of clearing and settlement in the US with Europe if agent bank fees

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<sup>53</sup> This refers to the costs of inputting to market discussions and consultations that are generally associated with direct membership of a CSD.

were to be included. Responses from survey participants highlighted this issue, with one respondent pointing out that:

*"The indirect (back office) costs of clearing and settlement in Europe are probably low relative to the US as a high proportion of work is effectively outsourced to agent banks. For example, it is common for an agent bank to guarantee transactions for clients and provide financing where required. This service would result in significant additional costs and risks to an agent bank for clearing and settling the same transaction."*

This highlights the difficulties that arise from differentiating between direct and indirect costs and attempting to compare direct costs in Europe with direct costs in the US. A full comparison of the service provision in each jurisdiction would cover direct, indirect and opportunity costs, as well as the benefits of the services provided.

#### **7.5. Non-Domestic Clearing and Settlement in the US**

So far we have considered clearing and settlement costs for non-domestic transactions within Europe compared to transaction costs within the US. The broader context for this comparison is an assessment of the extent to which Europe can be regarded as a single capital market, compared to the US. There are a number of issues with this comparison, notably that the US has a unified language, legal system, tax authority and regulatory system.

While we have not produced a single set of estimates for costs of clearing and settlement of non-domestic transactions in Europe to an average user, the range of figures presented in the previous sections of this chapter clearly indicates that non-domestic clearing and settlement in Europe is significantly more expensive than domestic clearing and settlement in the US.

For completeness, in this section we also provide a brief discussion of the costs of non-domestic clearing and settlement in the US. In practice, however, the prevalence of American Depositary Receipts (ADRs) means that there is minimal trading in non-US securities by organisations based in the US.<sup>54</sup>

### 7.5.1. Foreign Securities Comparison and Netting Service

The clearing of non-domestic transaction in the US can take place through the Foreign Securities Comparison and Netting Service (FSCN). The FSCN automates the comparison and netting of non-US equity transactions executed by members of the NSCC. Table 7.5 shows the direct cost of clearing a non-domestic transaction in this way.

**Table 7.5**  
**Direct Costs of Clearing Non-Domestic Transactions (Euros)**

	<b>Costs</b>
<b>Matching</b>	0.66
<b>Recording (pre-matched)</b>	0.66
<b>Netting</b>	0.44
<b>Send Instructions</b>	0.35
<b>Receive Instructions</b>	1.78
<b>Settlement</b>	FOP in local market for net trade, fees are per agreement with link service participants

It is worth noting that trades executed on the NYSE will not incur the matching charge as they are compared in the Automated Confirmation Transaction (ACT) service of the Nasdaq Stock Market. The cost associated with this service is not identified here.

The FSCN service provides locked-in settlement and netting of transactions in foreign securities. Cash settlement takes place within the DTC system. Securities transfer is by FOP delivery in the local market.

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<sup>54</sup> An ADR is a negotiable certificate issued by a US bank representing a specific number of shares of a foreign stock traded on a US stock exchange. This financial instrument was created to give US investors access to foreign securities where securities are not listed on a US exchange and would otherwise settle outside the US.

The FSCN process is as follows:

- Trades executed on the NYSE are routed to NSCC's OTC clearance system as locked-in trades. Trades executed elsewhere must be submitted directly to NSCC for comparison in its OTC comparison system.
- On trade date plus one (assuming matching takes place on trade date) the NSCC reports all matched trades to participants.
- NSCC nets settlement obligations on trade date plus one for both securities and cash, and distributes receive and deliver instructions.
- On settlement date, NSCC totals clearance cash adjustments for each participant and includes this amount on FSCN netting members' final settlement statements.
- Participants then settle the trades on a FOP basis in the local market, with the underlying cash being transferred in the US.

A comparison of the clearing costs of FSCN and Virt-x shows the costs are broadly similar. For an on-exchange transaction, the clearing cost for FSCN is €1.28, while the clearing cost of Virt-x (where LCH.Clearnet is the clearer) is set between €1.21 and €1.36 depending on volumes executed.

For off-exchange transactions, the cost of a clearing through the FSCN is €1.87-88. There is no comparable figure for Virt-x, which has no facility for settling non-Virt-x trades.

In addition to the clearing costs incurred through the FSCN, a US intermediary conducting an off-exchange transaction would be subject to the costs associated with a FOP settlement in the domestic CSD.<sup>55</sup> The costs of this transaction would be similar to those of a European entity, depending on the method used. However, due to the number of links the DTC has with local depositories in other jurisdictions, the

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<sup>55</sup> The DTCC is planning the introduction of a facility allowing the settlement of net positions in foreign stocks on the books of the DTCC. This venture has been approved by the SEC. See *Crossing Borders in a Global Bear Market*, a presentation by the DTCC from the SIA's Operations Update (2002).

use of a CSD-CSD link is more likely.<sup>56</sup> In this case, the participant will be charged the DTC fee for settlement via its link.

There is no consolidated source outlining settlement costs for depositories with which the DTCC has links. The cost for settling via the Deutsch Börse link to the German CSD is €5.2 to the delivering party and €6.2 to the receiver. Although this appears to be quite a high figure, given the availability of a netting mechanism the average cost of settlement per gross transaction is likely to be much lower.

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<sup>56</sup> The DTCC has links with the following depositories: Argentina, Canada, Peru, Brazil, Israel, Germany, UK, Netherlands, Switzerland, Italy, Hong Kong, Japan and Singapore.

## **8. VALUE CHAIN AND QUALITATIVE ASPECTS**

In this section we present a more detailed description of the tariffs offered by different service providers, including a breakdown of tariffs across the value chain and a qualitative description of other aspects of service provision.

### **8.1. Tariffs Across the Value Chain**

Figure 8.1 shows our estimates of the costs of clearing and settlement broken down by four segments of the value chain for six jurisdictions. We have broken the process into three parts for the purposes of this comparison: matching, clearing (novation and netting) and settlement (transfer of cash and securities). Matching includes a variety of services but essentially covers data capture where the trade data is received directly from an exchange and matching trade details between counterparties. Novation refers to the substitution of one party to a contract by another, with the consent of the other contracting party – in this context, it refers to the role of a CCP. Netting refers to the calculation of a net position based on the underlying gross transactions and the reporting to each party of the calculated net position. This facilitates settlement according to net settlement instructions and can be carried out on either a bilateral basis or via a CCP. The transfer of cash and securities refers in this case to the simultaneous transfer of cash and securities between two participants of the same settlement system (i.e. DVP settlement).

This comparison is based on a segment of the total activity chain. A full comparison would look at the full back-to-front processing cost, include trading costs and custody costs. Due to the limited scope of this analysis, our estimates only comprise clearing and settlement costs but it is important to note that, from the perspective of the investor, it is the total back to front cost that matters. In addition to any differences in the direct cost of clearing and settlement, there may be significant variation in the relevant numbers for trading and custody costs.

Our analysis of the breakdown of tariffs across the value chain suggests the following:

- Within Europe there is high variation in the tariffs assigned to different sections of the value chain and a high variation in the level of cost bundling.

- The US charges a comparable fee for transfer of cash and securities to that charged in European markets. The difference in costs to the investor reflects the fact that the US charge is a fee per net settlement not per gross transaction.
- Net settlement is charged at a lower rate than gross settlement where the settlement method is optional, this is illustrated in the case of the UK.
- Bundling of costs is a common element of transaction charging structures.

**Figure 8.1**

**Clearing and Settlement Costs Across the Value Chain (Euros)**

	Recording	Matching	Clearing	Netting	Settlement
US	0.070	0.27	0.013	-	0.019
Switzerland	-	-	0.10	-	0.26
Germany	0.53				
Italy	-	0.21	0.12	-	0.212
Denmark	0.81				
UK	0.29		0.19	0.31	0.5

For completeness, we have shown here the fee for matching in the US but it is important to note that nearly all trades in the US are pre-matched so this fee is incurred only for a very small proportion of transactions. Also for the UK we have shown both the net settlement fee (the fee that is charged for each transaction added to a running net settlement) and the gross settlement fee. In practice only one of these fees is applied depending on the form of settlement for which the member has opted.

## **8.2. Other Aspects of Clearing and Settlement**

There are a number of factors that affect the total cost of clearing and settlement but which are not included in our analysis of direct costs, either because they are difficult to quantify on a per transaction basis or because there is no quantitative data available. In this section we discuss these non-quantifiable costs in relation to the US and a number of jurisdictions in Europe. The additional costs we consider here relate to collateral management, failed trades, and information provision.

### **8.2.1. Collateral**

The four markets we considered in terms of total clearing and settlement costs all have an independent CCP operating in the equity market. These markets provide the best direct comparison as they all include a CCP service. As noted earlier, it is less instructive to compare markets with and without a CCP since this is an important aspect of service provision.

To further compare the costs in these markets it is important to recognise differences in the risk management service provided. A key area of differentiation is the level of collateral required. Variation in collateral requirements covers the acceptance of specified securities, the application of a “haircut” to the valuation of a security lodged as collateral, and the interest paid on cash deposits lodged as collateral.<sup>57</sup>

Between the four markets with a CCP, there is wide variation in the type of collateral accepted. There are three factors affecting the total cost to a user of collateral provision: range of instruments accepted as collateral; interest payments on cash deposited; and haircuts applied to securities deposited. It is difficult to compare the overall costs of collateral in each jurisdiction but the following examples illustrate the variation that exists.

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<sup>57</sup> A haircut is the margin or difference between the actual market value of a security and the value assessed by the lending side of a transaction (i.e. the CCP).

**i. UK**

LCH.Clearnet accepts the following forms of collateral:

- Sterling, Euros, US Dollars, Swiss Francs and Japanese Yen
- Limited range of bank guarantees
- UK Treasury Bills at a haircut of 8 per cent
- US and European Treasury Bills at a haircut of 5-7 per cent
- UK equities at a haircut of thirty five to fifty per cent
- Government bonds (haircut depending on the maturity)

Interest is paid on cash deposits at the London Deposit Rate.

**ii. Germany**

In Germany the clearing member can satisfy all margin requirements by depositing the appropriate amount of cash in various currencies. Cash deposited does not attract interest payments. Eurex also allows the use of securities as collateral, although for total margin only and not variation margin or margin calls.

**iii. Italy**

CC&G accepts cash and Italian government securities as collateral for initial margin, and cash and sureties (up to a maximum of forty per cent of the requested contribution) for deposit in the default fund. Interest is paid on cash deposited at the Euribor rate.

**iv. US**

The NSCC has a minimum collateral requirement of \$10,000 (the “minimum contribution”). Except with respect to a mutual fund or insurance services member, the first 40 per cent (but no less than \$10,000) of a member's required deposit must be in cash and, with respect to the remaining amount, no more than 25 per cent of the

required deposit may be collateralised with a letter of credit. The NSCC pays interest on cash deposited as collateral.

Qualifying bonds pledged to secure clearing fund deposits are permitted as collateral and haircuts are applied. US Treasury and agency securities, including Government zero coupon bonds, are haircut at 2-5 per cent.

The Securities and Exchange Commission (SEC) has published a proposed rule amendment allowing for the expansion of the categories of collateral that broker/dealers may pledge when borrowing securities from customers. The amendment would allow them also to pledge such other collateral as the SEC, by order, designates.

### **8.2.2. Cost of a Fail<sup>58</sup>**

The costs of a fail are an important part of the total costs of clearing and settlement. They mainly represent indirect costs associated with processing and funding a failed trade. These costs are significant and mean that settlement efficiency is a key consideration when measuring the costs to the investor of clearing and settlement.

Our survey respondents indicated that there were no significant direct costs imposed by CSDs for failed trades but that there were a number of indirect costs associated with failed trades. These include funding costs, SWIFT costs, resource costs associated with fail resolution, and the increased counterparty risk associated with a failed trade.

Table 8.1 shows a ranking of European markets by settlement efficiency. This table illustrates the high level of variation between different markets in terms of settlement efficiency. The most efficient market has a benchmark approximately 15 points higher than the least efficient market. The variation in benchmark represents a cost impact on the user, primarily in terms of indirect costs.

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<sup>58</sup> A fail is defined as a counterparty's failure to deliver securities or cash by the agreed settlement date. Fails caused by a service provider are not considered.

**Table 8.1**  
**GSCS Benchmarks<sup>59</sup>**

<b>Country</b>	<b>Settling on Same Day (%)</b>	<b>Settlement Benchmark (Q4 03)<sup>60</sup></b>	<b>Rank</b>
<b>Belgium</b>	99.36	99.57	1
<b>Denmark</b>	98.66	99.10	2
<b>Spain</b>	96.83	98.34	3
<b>Netherlands</b>	96.85	97.90	4
<b>UK</b>	98.21	97.88	5
<b>France</b>	96.77	97.43	6
<b>Switzerland</b>	94.99	96.58	7
<b>Italy</b>	94.46	89.74	8
<b>Germany</b>	92.86	89.01	9
<b>ICSDs</b>	89.31	85.15	10

The only direct costs associated with a failed trade in most cases are fines. In the US, there are other direct costs as settlement fees are levied per delivery not per transaction, which means a failed trade results in additional delivery costs. The DTCC also charges for a mandatory RECAP and re-pricing service on all failed transactions.

Table 8.2 shows a number of examples of fines applied by CSDs to the failing party.<sup>61</sup> In the US, a flat fee is charged for failure to settle. This fee depends on both the consideration of the failed trade and the number of times a participant has failed during that period. In the UK, the cost of a fail is either a flat fee of £5 per transaction or a fee calculated as 0.05 per cent of the consideration. Both fees are applied per unit to all fails above a ceiling of allowed fails. In Switzerland, there is a minimum fee to be charged per day and per settlement for failed trades.

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<sup>59</sup> GCSC Benchmarks, Volume 11, Issue 7

<sup>60</sup> The benchmark is a function of average trade size, local interest rates, fail rate, and length of time of fail. The benchmark therefore aims to measure the cost to the market of fails. The higher the score, the lower the cost.

<sup>61</sup> For the purposes of comparison it is assumed that this is the first fail for the participant, the consideration for the trade is set at €200,000 for all three examples.

**Table 8.2<sup>62</sup>****Fines Applied to Failing Party (Euros)**

	<b>US</b>	<b>UK</b>	<b>SWITZERLAND</b>
<b>Flat fee</b>	237	178	95

The failing counterparty will also be liable for funding costs on the transaction which are in some cases administered by the CSD. In the US, the DTC sets out the interest charged on failed positions in its tariff schedules. In the French market, there are costs associated with “buy ins” where a counterparty fails to settle within six days of settlement date.<sup>63</sup> These fees amount to a premium on the funding cost of the open position and an administrative cost of €150.

The combined costs of a fail (indirect and direct costs) introduces a significant impact on the relative costs of clearing and settlement in different markets and is an important factor in an overall comparison of clearing and settlement services in different markets.

**8.2.3. Information Provision**

Data and information services are a critical factor in achieving the industry-wide objective of reducing indirect costs by improving levels of straight through processing. Real time settlement information can improve the ability of firms to prevent fails as well as managing collateral more effectively. To illustrate the variation in both service level and costs, the main tariffs for data provision services are shown for the UK, Germany, Italy and the US.

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<sup>62</sup> The fines are in some cases volume dependent, a comparable transaction size has been used to estimate each fine.

<sup>63</sup> A buy-in is where the counterparty is subject to a mandatory funding of an open stock position at a premium on the open market price.

**i. UK**

CREST delivers real time information on transactions and stock availability in a variety of flexible formats. CREST has not historically charged for this service although it has recently begun to do so. Inbound or request message charges are charges levied on messages passing from users to CREST, and response message charges are charges levied on messages passing from CREST to its users.

Message tariffs range from €0.49 for peak inbound messages to €0.0158 for off-peak inbound messages. Message responses are charged at €0.004.

CREST also makes a charge based on the method by which it receives the trade data (data processing charges). File charges are charges levied on files sent to CREST by its users for processing. Direct input charges are applied to transactions that are created centrally from a stock exchange, clearing house or virtual matching utility direct feed. Data processing charges range from €0.06-0.08.

**ii. Germany**

Data requests in excess of a specific ceiling, which depends on the number of transactions executed on the Frankfurt Stock Exchange, and the use of gross delivery management functions are chargeable. Fees are charged according to the number of data packages sent to participants (each package may include up to 12 transactions) and the fee per package is €0.05. In addition, Clearstream charges a fee of €2.00 for remote data transfer and €0.10 for query information and information messages.

**iii. Italy**

Monte Titoli provides the full range of pre-settlement information including pre-settlement batch information, pre settlement on-line information, settlement batch information, on-line information regarding the daytime settlement cycle, and management of collateral profiles. There is no separate charge for these services as they are incorporated into the annual fee. This is reflected in the relatively high standing charges applied to Monte Titoli users (see Figure 6.7).

**iv. US**

The NSCC charges a flat fee for account enquiries of €5.5 per transmission. Enquiries are based on either daily participant account activity or daily participant closing balances/cash settlement.

## **9. CONCLUSIONS**

This study has investigated the direct costs of clearing and settling an equity transaction in Europe and in the US. Compared with previous “top-down” studies, the “bottom-up” methodology we used meant that our study was restricted in scope, but allowed us to make more accurate comparisons of the costs studied. In this section we recap the main findings from our analysis.

### **9.1. Domestic Transactions**

Our results indicate that there is a significant gap between the costs of clearing and settlement in the US and Europe. This is consistent with the findings of previous research on this subject.

For an exchange-traded equity transaction settled on a net basis, the cost in the US is around €0.10, in the UK, Italy and Germany the cost is in the range of €0.35 to €0.85.

With respect to these findings, it is worth noting that on-exchange transactions are highly automated, implying significant cost advantages for the US due to economies of scale. It is therefore possible that, for other transaction types, the cost differential would be smaller. It is also worth noting that the services included are not strictly comparable between the US and European providers. For example, almost all trades in the US are pre-matched, so the US figure does not include a matching fee, whereas the European figures do.

### **9.2. Non-Domestic Transactions**

Overall, we found that cost differentials between the US and Europe are higher for non-domestic than for domestic transactions.

We also found that these costs differ very significantly within Europe. For example, an internal settlement within an ICSD can cost as little as €0.57, whereas a standard cross border trade settled through an ICSD can cost €35 or more. Thus low cost, non-domestic settlement is available for some transactions in Europe but the majority of transactions are still settled at a high cost.

The main reason for the variation in cost observed within Europe is the differing degree of interoperability between systems. Where a direct link exists or transactions can be settled internally to one system, the costs of non-domestic settlement are generally low.

There may be scope for reducing costs by improving interoperability. This could, in theory, be achieved by horizontal integration (i.e. moving towards the Euronext model). Given the fragmentation in the European industry at present, however, this appears unlikely. Alternatively, interoperability could be improved by investment in links between existing systems.

However, many non-domestic settlements are still settled externally through an ICSD or through an agent bank at a relatively high cost. These high costs are, in our view, a product of the legal and regulatory barriers to cross border settlement. Therefore, we do not think that average costs will fall significantly until some of these barriers are reduced, allowing intermediaries to access non-domestic systems directly, or through a CSD-CSD link (without the use of an agent) at a low cost.

### **9.3. Reasons for Higher Clearing and Settlement Costs in Europe**

In our view, the main reasons for higher clearing and settlement costs in Europe are:

- *Lower volumes* – since clearing and settlement involves high fixed costs (particularly associated with automated facilities), the higher the volumes, the lower the cost per transaction. The US has significantly greater volumes than most European markets and thus benefits from economies of scale. In particular, volumes of non-domestic trade in Europe are very low compared to volumes traded within the US. It is not clear to what extent this is a result of (as well as a cause of) high tariffs for non-domestic transactions.

- *Legal, regulatory and technical barriers to non-domestic clearing and settlement in Europe* – the European Commission is now consulting on ways to reduce legal and regulatory barriers, and progress is being made on improving interoperability. Nonetheless, in our view Europe cannot expect to achieve a single market comparable to the US over the short to medium term. Without a consolidated model for clearing and settlement provision, there will almost inevitably be a gap between service provision in Europe and in the US. This reflects the benefits the US market gains from consolidation of transaction flows through a single platform. Nonetheless, sections of the European market are now approaching a par with the US system in terms of providing a comparable service for some transaction types.
- *Market structure* – the DTCC is user-owned, while European clearing and settlement providers are mostly now in private hands, operating on a for-profit basis. European operators may, therefore, be making higher margins than US operators, with a corresponding impact on costs. This raises the question of whether clearing and settlement providers have a natural monopoly over some or all of their activities, which in turn leads on to the issue of regulation. We expect this issue will become a significant topic for discussion in the industry in the near term.

#### **9.4. Pricing Behaviour**

We found significant differences in the pricing policies adopted by different clearing and settlement providers, particularly with respect to the way in which the fixed costs of the system are allocated between system users. For example, European providers use both volume discounts and standing charges to reward large volume users, whereas the US applies an ex-post rebate based on volumes. Although we did manage to draw comparisons, we found that pricing information was complex and not readily comparable between providers.

## **9.5. Other Factors**

We have produced reasonably robust estimates of the direct cost of clearing and settling an equity trade in Europe and the US. We would emphasise, however, that direct costs are only one dimension in an overall comparison of clearing and settlement services. Other important factors include indirect costs (the amount of processing required in users' own back offices), opportunity costs (notably the cost of collateral), and the quality of service offered (notably netting efficiency and the number of failed trades). A clearing and settlement provider with high direct costs might still offer good value if it had low associated indirect and opportunity costs, and a good quality of service. A wider comparison would also consider the value of the full range of services offered by agent banks and custodians as well as clearinghouses and CSDs, particularly for non-domestic transactions.

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## **APPENDIX A. METHODOLOGY**

The methodology employed to derive the cost estimates in this study comprised two parts. The first part involved an in-depth analysis of publicly available tariff schedules and corresponding information on service provision. This stage of the approach is discussed in detail in sections A.2 to A.3 below.

The second part of our analysis was aimed at: (i) validating the results obtained from publicly available data; (ii) enhancing data on qualitative aspects of service provision; and (iii) identifying issues that affect the comparability of results. This part of the research involved a survey and series of interviews with users and service providers. This is discussed further in section A.4.

### **A.1. Data Availability<sup>64</sup>**

Many CSDs and ICSDs publish data on their tariffs. This has allowed us to make a comparison based on a “bottom-up” approach. There are two main difficulties with this approach. First, costs are often bundled up and bundling is not consistent across organisations, with different institutions publishing different cost bundles. This reflects the fact that clearinghouses and securities depositories have very high fixed costs and relatively low variable costs, which means it is not feasible simply to charge users the marginal cost of each service they use. Instead, a method must be chosen for allocating the fixed costs of the service among users, and different providers take different approaches to doing this.

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<sup>64</sup> All data are reported in euros. The conversion rate is 1.4461 to the pound and 0.8854 to the dollar. Rates for the full set of currencies are available on request.

A second problem is that clearing and settlement services can be provided by a range of different organisations. For example, in Sweden, the exchange provides clearing, netting and CCP services, while in the UK the CSD provides netting and settlement services and an independent clearing house provides CCP services. This means that each market may have a variety of tariff schedules covering the relevant services. It also means that, in some cases, clearing or CCP costs are bundled with trading costs.

Table A.1 shows the organisational structure of the clearing and settlement market in a number of European countries. The table shows, for each country, which organisation provides each service in the clearing and settlement chain. The majority of countries have an independent clearing house providing clearing and CCP services and a separate CSD providing settlement services. Sweden is the exception, in that the exchange provides the services usually provided by an independent clearinghouse. There are also cases where the CSD provides all clearing and settlement services, notably VP – the national CSD in Denmark – which clears and settles all trades.

**Table A.1**  
**The Organisation Structure of European Markets is Highly Varied**

	<b>CCP</b>	<b>NETTING</b>	<b>CLEARING</b>	<b>SETTLEMENT</b>
<b>Belgium</b>	Clearnet	Clearnet	Clearnet	BXS-CIK
<b>Denmark</b>	None	VP	VP	VP
<b>Germany</b>	Eurex	Eurex	Eurex	Clearstream FFT
<b>Greece</b>	None	None	CSD SA	CSD SA
<b>Spain</b>	None	Iberclear	Iberclear	Iberclear
<b>France</b>	Clearnet	Clearnet	Clearnet	Euroclear France
<b>Italy</b>	CC&G	Monte Titoli	Monte Titoli	Monte Titoli
<b>Luxembourg</b>	None	None	Clearstream Bank Luxembourg	Clearstream Bank Luxembourg
<b>Netherlands</b>	Clearnet	Clearnet	Clearnet	Euroclear
<b>Austria</b>	Wiener Bourse	None	OeKB	OeKB
<b>Finland</b>	None	None	APK	APK
<b>Sweden</b>	OM	OM	OM	VPC
<b>UK</b>	LCH	CREST	LCH	CREST

There are markets where a CCP is not available. In these cases, the comparison of costs with the US (and with other European markets which do have a CCP) is difficult. There are two reasons for this. First, the costs of clearing in the US (and European markets with a CCP) will reflect the additional costs of providing a CCP and will therefore be inflated relative to the figures for non-CCP countries. Second, the benefits of a CCP in terms of counterparty risk may entail a lower level of indirect costs for users. An overall comparison of services would have to take account of the benefits of a CCP service, as well as the costs.

Despite these difficulties, tariff schedules from CSDs and clearinghouses provide a good basis for a study of direct costs because they are transparent and clearly outline volume discount structures. The main difficulty with looking at fees of other organisations providing similar services (agent banks or custodians) is that tariffs are not public or transparent. Survey responses indicated that, when dealing with agent banks, bespoke tariffs were often negotiated with volume discounts being applied on a per-customer basis. In contrast, survey respondents indicated that it is rarely possible to negotiate fees with CSDs or clearing houses.

## A.2. Creating a Model Client

The analysis of domestic transaction costs set out in chapter 6 is based on the model users shown in Table A.2.

**Table A.2**  
**Model User Characteristics – Domestic Transactions**

<b>Transactions per annum</b>	<b>Model user 1</b>	<b>Model user 2</b>	<b>Model user 3<sup>65</sup></b>
Exchange membership	Direct member	Direct member	Direct member
Deliveries	1,875,500	4,250,000	50,000
Net Settlements	100,000	100,000	1,500/50,000 (UK)

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<sup>65</sup> In the UK we assume that a user of this size would not choose to settle on a net basis, therefore the number of net settlements is equal to the number of gross settlements.

The specification of a model client is important because most European CSDs and clearinghouses charge tariffs based on a sliding scale, with lower charges for high-volume users. The type of client can, therefore, have an impact on the resulting cost per transaction.

Our analysis considers the case where the client has membership of both the clearinghouse and the CSD. This scenario is used because we are considering only the direct costs of clearing and settlement (as charged by the depository and clearinghouse). A user with no direct membership would incur agent bank costs as well as direct costs, which, in many cases, would be bundled together.

The analysis of non-domestic transaction costs set out in chapter 7 is based on the model users defined in Table A.3.

**Table A.3**  
**Model User Characteristics – Non-Domestic Transactions**

<b>Assumptions</b>	<b>Transactions per annum</b>
Internal transactions	20,000
External transactions	30,000
<b>Total</b>	<b>50,000</b>

### A.3. Creating a Model Transaction

Our analysis is based on the model transactions shown in Table A.4.

**Table A.4**  
**Model Transaction**

<b>SCENARIO</b>	<b>1</b>	<b>2</b>	<b>3</b>
Side	Sell	Sell	Sell
Settlement Timing	Overnight delivery	Overnight delivery	Overnight delivery
No of shares per transaction	3,000	3,000	3,000
Trade type	On exchange	On exchange	Off exchange
	Delivery Versus Payment	Delivery Versus Payment	Free of Payment
Consideration (Euros)	10,000	10,000	10,000
Events	Settlement netting	Gross Settlement	Gross Settlement

It is necessary to define the model transaction to be considered because tariffs vary for different types of transaction. For example, the DTC charges variable tariffs based on whether the trade is a buy or a sell (delivery is charged at a premium to receipt) and the NSCC charge a matching fee dependent on the number of shares per transaction. A number of CSDs, including SIS, charge a discounted rate for transactions executed on-exchange and locked-in for settlement. Lastly, most CSDs charge a differential rate for trades that settle DVP versus FOP. It is important to consider both scenarios to gain a full understanding of the relative costs.

### A.4. Survey and Interviews

The results obtained through our model client/trade analysis were augmented by a series of interviews and a written survey. The survey and interviews were conducted with both users and providers – in all we had responses from 3 users and 4 providers. The objectives of the survey were to validate the results collated from publicly available data, enhance data on qualitative aspects of service provision, and identify issues that affect the comparability of results.

#### **A.4.1. Validating Quantitative Results**

We wanted to validate our quantitative results by talking to users and providers, to ensure that our interpretation of tariff schedules was consistent and correct, and to identify cases where the published tariff schedules might not in fact reflect the real price to the end user.

Our survey included a detailed questionnaire on the costs of clearing and settlement by segment of the value chain across a number of markets. Securities houses operating in the range of European jurisdictions and the US completed the survey – where written responses were not available, interviews were conducted to discuss areas of interest. Responses to the questionnaire were compared with the publicly available data. Comparisons of data were made for all key European markets. In addition we interviewed two major European ICSDs and the DTCC to gain additional insights into tariff schedules and to ensure our costs analysis reflected the charges to a typical user.

We concluded that the public tariff schedules did represent the direct costs to users fairly accurately – there appeared to be little, if any, scope for users to negotiate private rates. The only aspect not captured in the tariff schedules was rebates. Users indicated, however, that the likelihood of rebates was not an important consideration in comparing the service offered across providers.

#### **A.4.2. Other Aspects of Service Provision**

Our written survey focused on the direct costs of clearing and settlement payable by end users. To supplement and help us interpret this information, we used follow up interviews with survey recipients to discuss qualitative aspects of service provision and other factors that could affect the comparability of results between markets.

We also conducted interviews with service providers with the aim of gaining feedback on aspects of their service that differentiated them from their competitors. The responses we received did not reveal any serious problems with our approach. The qualitative feedback is reflected in the commentary throughout this report.

## APPENDIX B. GLOSSARY<sup>66</sup>

**Access:** the right of or opportunity for an institution to use the services of a particular payment or securities settlement system to settle payments/transactions on its own account or for customers.

**Alternative Trading Systems (ATS):** an entity which, without being necessarily regulated as an exchange, operates an automated system that brings together buying and selling interests – in a system and according to rules set by the system’s operator – in a way that forms, or results in, an irrevocable contract.

**Batch Processing:** the transmission or processing of a group of payment orders and/or securities transfer instructions in batches at discrete intervals of time.

**Book-Entry System:** an accounting system, which permits the transfer of claims without the physical movement of paper documents or certificates (e.g. electronic transfer of securities).

**Broker-Dealer:** a person or firm sometimes acting as broker and sometimes as principal intermediary in securities transactions.

**Central Counterparty (CCP):** an entity that is the buyer to every seller and seller to every buyer of a specified set of contracts, e.g. those executed on a particular exchange or exchanges.

**Central Securities Depository (CSD):** a facility (or an institution) for holding securities, which enables securities transactions to be processed by book entry. Physical securities may be immobilised by the depository or securities may be dematerialised (i.e. so that they exist only as electronic records). In addition to safekeeping, a central securities depository may incorporate comparison, clearing and settlement functions.

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<sup>66</sup> Definitions are taken mainly from ECB publication “Payments and Securities Settlement Systems in the European Union” (Blue Book), June 2001 and a Bank for International Settlements publication, “A glossary of terms used in payments and settlement systems”, March 2003.

**Clearing:** the process of transmitting, reconciling and confirming payment orders (or security transfer instructions) prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement. Sometimes the term is used (imprecisely) to include settlement.

**Clearinghouse:** a central location or central processing mechanism through which financial institutions agree to exchange payment instructions or other financial obligations (e.g. securities). The institutions settle for items exchanged at a designated time based on the rules and procedures of the clearing house. In some cases, the clearing house may assume significant counterparty, financial or risk management responsibilities for the clearing system.

**Collateral:** is an asset that is delivered by the collateral provider to secure an obligation to the collateral taker. Collateral arrangements may take different legal forms; collateral may be obtained using the method of title transfer or pledge.

**Counterparty:** the opposite party in a financial transaction (e.g. the other party in any transaction with the central bank).

**Cross-Border Settlement:** a settlement which takes place in a country other than the country or countries in which one or both of the parties to the trade are located.

**Custodian:** an entity, often a bank, which safe keeps and administers securities and other financial assets on behalf of others and which may also provide various other services, including clearance and settlement, cash management, foreign exchange and securities lending.

**Custody:** the safekeeping and administration of securities and financial instruments on behalf of others.

**Delivery Versus Payment (DVP):** a system that ensures that the delivery of the securities occurs if, and only if, payment occurs. Such a link increases settlement efficiency of financial market transactions.

**Depository Trust and Clearing Corporation (DTCC):** established in September 1999, the DTCC is a US holding company that oversees two principal subsidiaries, the Depository Trust Company (DTC) and the National Securities Clearing Corporation (NSCC). These two firms provide the primary infrastructure for the clearance, settlement and custody of the vast majority of equity, corporate debt and municipal bond transactions in the United States.

**Depository Trust Company (DTC):** one of the two principal subsidiaries of the US Depository Trust and Clearing Corporation (DTCC).

**(Delivery) Free of Payment (FoP):** delivery of securities with no corresponding payment of funds.

**Domestic Settlement:** a settlement, which takes place in the country in which both parties to the trade are located.

**Fail:** a failure to settle a securities transaction on the contractual settlement date, usually because of technical or temporary difficulties. Fail is usually distinguished from “default”. Also called failed transaction.

**Giovannini Group:** a team of financial market participants who, under the chairmanship of Alberto Giovannini (Chairman of Unifortune Asset Management SGR), advise the European Commission on financial market issues. Established in 1996, the group has focused its work on identifying inefficiencies in EU financial markets and proposing practical solutions to improve market integration.

**Haircut:** the margin or difference between the actual market value of a security and the value assessed by the lending side of a transaction (i.e. the CCP).

**International Central Securities Depository (ICSD):** a central securities depository that settles trades in international securities and in various domestic securities, usually through direct or indirect (through local agents) links to local CSDs.

**Interoperability:** a situation in which payment instruments belonging to a given scheme may be used in other countries and in systems installed by other schemes. Interoperability requires technical compatibility between systems, but can only take effect where commercial agreements have been concluded between the schemes concerned.

**Investment Services Directive (ISD):** EU legislation that introduced the single licence and remote access for exchanges and non-banking investment firms.

**Margin:** a term generally referring to the collateral used to secure an obligation, either realised or potential.

**Matching:** the process used for comparing the trade or settlement details provided by parties in order to ensure that they agree on the terms of the transaction. Also called comparison checking.

**National Securities Clearing Corporation (NSCC):** one of the two principal subsidiaries of the US Depository Trust and Clearing Corporation (DTCC).

**Netting:** an agreed offsetting of mutual obligations by trading partners or participants in a system, including the netting of trade obligations, for example through a central counterparty, and also agreements to settle securities or funds transfer instructions on a net basis.

**Novation:** satisfaction and discharge of existing contractual obligations by means of their replacement by new obligations (whose effect, for example, is to replace gross with net payment obligations). The parties to the new obligations may be the same as to the existing obligations or, in the context of some clearinghouse arrangements, there may additionally be substitution of parties.

**Settlement:** the completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller. A settlement may be final or provisional.

**Straight through processing:** the automated end-to-end processing of trades/payment transfers including the automated completion of confirmation, generation, clearing and settlement of instructions.

**SWIFT:** the Society for Worldwide Interbank Financial Telecommunication (S.W.I.F.T. s.c.r.l.): a co-operative organisation created and owned by banks which operates a network to facilitate the exchange of payment and other financial messages between financial institutions (including broker-dealers and securities companies) throughout the world. A SWIFT payment message is an instruction to transfer funds; the exchange of funds (settlement) subsequently takes place via a payment system or through correspondent banking relationships.



The City of London is exceptional in many ways, not least in that it has a dedicated local authority committed to enhancing its status on the world stage. The smooth running of the City's business relies on the web of high quality services that the Corporation of London provides.

Older than Parliament itself, the Corporation has centuries of proven success in protecting the City's interests, whether it be policing and cleaning its streets or in identifying international opportunities for economic growth. It is also able to promote the City in a unique and powerful way through the Lord Mayor of London, a respected ambassador for financial services who takes the City's credentials to a remarkably wide and influential audience.

Alongside its promotion of the business community, the Corporation has a host of responsibilities which extend far beyond the City boundaries. It runs the internationally renowned Barbican Arts Centre; it is the port health authority for the whole of the Thames estuary; it manages a portfolio of property throughout the capital, and it owns and protects 10,000 acres of open space in and around it.

The Corporation, however, never loses sight of its primary role – the sustained and expert promotion of the 'City', a byword for strength and stability, innovation and flexibility – and it seeks to perpetuate the City's position as a global business leader into the new century.

