THE EUROPEAN EQUITIES POST-TRADING INDUSTRY: ASSESSING THE IMPACT OF MARKET AND REGULATORY CHANGES

NERA Economic Consulting
FEBRUARY 2007
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Foreword

Michael Snyder
Chairman, Policy and Resources Committee
City of London

The City of London Corporation has long been supportive of the European Commission’s aim to cut down cross border barriers restricting Europe’s wholesale financial services business. As a global financial centre, London operates to the benefit of the EU as a whole – providing capital and new financial products for all European businesses. The City, at the heart of Europe, believes in greater market liberalisation as a means of enhancing the EU’s international competitiveness, prosperity and growth in employment.

It is widely recognised that clearing and settlement, the post trading industry which provides the infrastructure for financial markets, has yet to maximise the full benefits of the single market. Two earlier reports in our City Research Series have shown that Europe lags behind the US in cost terms, and have suggested industry-led means by which this gap could be closed. We have therefore been extremely heartened by Commissioner McCreevy’s approach, and have welcomed the launch of the Code of Conduct and the ongoing work on its implementation. We share the view that regulation in the form of a Directive should only be introduced if there is clear cut evidence of continuous market failure, and the industry itself cannot produce the necessary efficiency gains through market-driven solutions.

Last year, the Commission took a valuable first step towards quantifying the potential benefits by publishing a Working Document pulling together existing analysis on the economic impact of removing the remaining barriers to cross-border trading. As its title implies, the Document is very much work in progress, and there is still much to be done to generate the detailed assessment necessary to support the drive towards a cohesive European post-trading industry. We recognised the enormous difficulties involved in such an endeavour and commissioned NERA Economic Consulting to undertake an evaluation of the Document itself with a view to making constructive suggestions as to how it might be refined and developed.

NERA’s report suggests that in drawing together often quite disparate pieces of prior analysis, relying on different data sets, the Working Document might not have made all of the adjustments necessary to compensate for these differences. The report goes on to make some suggestions on how such adjustments might be undertaken. The authors, however, make it clear that the underlying problem is not one of methodology, but of the paucity of data. Their key conclusion is simply that as the Commission embarks on the next stage of its quest to produce a more precise estimate of the economic impact of changes in the post-trading industry, it should seek to employ country- and market-specific data wherever possible.

We trust that this report will assist both the Commission and the industry in moving towards the shared goal of more efficient and cost-effective infrastructure provision by highlighting the central importance of the availability of accurate information to achieve this objective. The industry should do all it can to ensure that Commission has access to all the price, cost and volume data it requires to complete its work.

Michael Snyder
London
February 2007
Executive Summary

We have been asked by the City of London to examine the European Commission’s recent statements on the post-trading industry as it relates to equity markets, and to analyse the potential strengths and weaknesses of their approach. We focus our attention on the quantitative analysis of the gains from “integration” of the European post-trading industry presented by the Commission in its Working Document on the post-trading industry.

While post-trading is clearly a distinct set of functions, which can be priced separately, it is nonetheless part of the overall financial markets value chain: if there is no trading there will be no need for post-trading services. Consequently, the economic impact of any regulatory or other structural change to this part of the value chain cannot be examined in isolation. Furthermore, there exist other ways of achieving the same end result (namely ownership of shares in a foreign company) that we feel have not been considered fully by the Commission or the authors of other studies. These, and second order effects, may mean the magnitude of economic gains from removing the remaining barriers to cross-border trading (in terms purely of post-trading) may not be as large as some studies suggest.

Clearing and settlement services have been the focus of numerous studies and media reports since the Commission first announced its goal of removing the barriers to cross-border trading. This culminated in the Working Document produced by the Commission in May 2006, which we were asked to examine. The Working Document tries to consolidate the various previous studies and to take them forward. We look at the implications of the Commission’s approach for the industry.

In this report we note some of the problems in the Commission’s analysis stemming from problems with the underlying data as much as the analysis itself, and where possible attempt to quantify the impact of correcting these problems or how these issues impact the reported results. We also highlight some relevant issues which the Commission’s analysis currently does not address.

One of our findings is that in drawing together disparate studies that rely on often quite different data sets the Commission has not always made adjustments for those differences in data. This can lead to erroneous and misleading conclusions when comparing studies that rely on different sources or types of data. As we document in Section 3, a lack of direct comparability of data and reported statistics in two key studies relied on by the Commission leads to overstatement of the expected cost savings from integration of the post-trading services industry.

In reviewing both the Commission’s Working Document and the key studies on which it relies, we note that there are pronounced country- and size-effects in terms of estimating the impact of changes in the industry structure on the costs of post-trading services. Given the heterogeneous nature of Europe’s equities markets, this is not surprising. It is not clear from the Working Document whether the Commission has fully examined this issue. Its very existence implies that to use a simple average across all countries and markets, regardless of market structure or size of typical trade, may lead to inaccurate and invalid estimates of the overall economic impact of changes in the market for post-trading services. We would therefore encourage the Commission, as it embarks upon the next phase of its efforts, to seek a more precise estimate of the economic impact of changes in the post-trading industry by using country- and market-specific data wherever possible.
Finally we note with interest the Commission’s recent announcement that it will be undertaking a major study into the prices, costs and volumes of post-trading services in Europe, and highlight some issues that the Commission should consider in its further research. This is a welcome development, due to the lack of available data on post-trading services in Europe: at present there is no way to compare clearing and settlement activities or costs across the member states, since data is either unavailable or not available in a standard form or format. This has impeded the ability to make reliable analysis of the economics of the industry. Without reliable data it is not possible to make policy decisions that will be assured of achieving the stated economic goals.

True financial market integration involves all parts of the value chain, and it is therefore crucial to consider the question of post-trading in the larger context of integration of all parts of the financial market infrastructure and how changes and consolidation in other parts of the value chain can and have affected the post-trading industry cross-border trading. Consequently, removing the barriers to cross-border trading may not lead to the higher levels of trading anticipated by the Commission. For example, the different roles of institutional and individual investors and their likely participation in international investing should be considered. Moreover, factors other than transactions costs may have an impact on investors’ decisions as to whether or not to trade cross-border. These include: the home-country bias; the structure of trading markets and the impact on trading costs; cross-listing; cross-border exchange consolidation; and the increased importance of intermediated products (such as ETFs and UCITs).

We recognise the enormous difficulties involved in a study of such scope as that undertaken by the Commission, particularly when there is a paucity of appropriate data which then requires using less than ideal proxies, and when dealing with the many types and varying sized markets of the European Union. We hope that this report will be taken in the appropriate spirit, as suggestions for improvement rather than as criticisms.
1. Introduction

We have been asked by the City of London to examine the Commission’s recent statements on the post-trading industry as it relates to equity markets, and to analyse the potential strengths and weaknesses of their approach.\(^1\) Originally, we had intended to undertake a full and rigorous analysis of the Regulatory Impact Assessment (“RIA”) that was to have accompanied a proposed Directive that was widely expected to have been issued by the spring of 2006. However, the Commission found that instead of proposing a Directive, an industry-led initiative was instead preferred, and called for an industry Code of Conduct to be put in place.\(^2\) The Commission did not issue a draft Directive and there was no corresponding RIA, thus leaving our intended approach bereft of purpose. Instead, the Commission issued in May of 2006 a document entitled simply “Draft Working Document on Post-Trading” (“the Working Document”),\(^3\) with three associated annexes that contain analyses of three different economic aspects of the issues.

Since a proposed directive and RIA have not been issued, some might be of the opinion that no study or analysis is warranted. However, we feel it is important to discuss the documents that have been issued, since they clearly represent the Commission’s thinking on the important issues surrounding post-trading activities for cross-border trades in the financial markets of Europe, and might therefore be used as the basis for any policy decision that is implemented at a later date.

We recognize the enormous difficulties involved in a study of such scope as that undertaken by the Commission, particularly when the there is a paucity of appropriate data which then requires using less than ideal proxies, and when dealing with the many types and varying sized markets of the European Union. We trust that our comments will be taken in the appropriate spirit, as suggestions for improvement rather than as criticisms.

We focus our attention on the quantitative analysis of the gains from “integration” of the European post-trading industry presented by the Commission. Clearing and settlement are both parts of the post-trading infrastructure of securities markets that have been narrowly defined by the European Commission and in numerous studies by academics, consultants, and market participants in recent years.\(^4\) The Commission’s measure of integration of the post-trade market focuses on reducing the costs of cross-border post-trading activities to the costs of domestic post-trading activities. To avoid confusion, we define the term “cross-border trade” as a securities transaction which involves a financial instrument which is listed in a country other

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1 “Post-trading” refers to the various clearing, settlement and custody activities, traditionally referred to as “clearing and settlement”. We use the terms “clearing and settlement” and “post-trading” interchangeably.


than that in which the transaction takes place.\(^5\) In keeping with the Commission’s approach, we confine our attention to the market for equities securities.

The Commission states in the Working Document that its goal is “financial market integration”. True financial market integration involves all parts of the value chain, and it is therefore crucial to consider the question of post-trading in the larger context of integration of all parts of the financial market infrastructure and how changes and consolidation in other parts of the value chain can and have affected the post-trading industry in respect of cross-border trading.

While post-trading is clearly a distinct set of functions, which as obvious as it may seem, can be priced separately, it is nonetheless part of the overall financial markets value chain: if there is no trading there will be no need for post-trading services. Consequently, the economic impact of any regulatory or other structural change to this part of the value chain cannot be examined in isolation. Furthermore, there exist other ways of achieving the same end result (namely ownership of shares in a foreign company) that we feel have not been considered fully by the Commission. This may mean that the magnitude of economic gains from removing the remaining barriers to cross-border trading (in terms purely of post-trading) may not be as large as some studies suggest.

Similarly, in the Commission’s Working Document, there is no direct consideration of the mechanisms by which the hoped for increased integration will take place. This is important, because it is those market mechanisms that will ultimately determine the costs and benefits that will accrue to investors and to the European economy as a whole.

Our scope is, as implied by the foregoing, quite narrow. It is therefore important to understand that there are some aspects of the issues surrounding the post-trading industry that we do not address in the present study. In particular, we do not discuss what may be the optimal structure and/or size of the post-trading industry once the process of integration of the financial markets has been completed. Similarly, while we discuss some of the means by which integration may take place, our analysis is neither exhaustive nor complete.

We first consider the role of post-trading within the financial markets value chain, and recent developments in the overall value chain that may have affected post-trading (Section 2). We then review the Commission’s Working Document, and discuss the strengths and weaknesses of their approach: Section 3 reviews Annex I of the working document, which discusses the extra costs of cross-border clearing and settlement; Section 4 considers the econometric analysis in Annex II then considers whether there are any aspects of the financial markets value chain that could materially affect the cross-border post-trading industry that the Commission has not considered in its Working Document. Finally, Section 6 concludes and sets out some suggested areas for further study.

\(^5\) Thus a cross-border transaction requires access to settlement systems in different countries.
2. The Financial Markets Value Chain: A Brief Overview and the Impact of Recent Developments

While all the recent studies of the post-trading services industry, including the Commission’s Working Document, include detailed descriptions of this industry, we include a brief summary here as a reminder for those who have read these studies and an introduction for those who have not. The interested reader is referred to the original studies for more detailed descriptions and information.

2.1. The Financial Markets Value Chain

The financial markets are the mechanism by which economic agents with needs for capital may obtain that capital from agents who have a surplus (primary markets), and provide assets that enable end users to assume or manage risks associated with their business or other activities. Finally, they also fulfil the important role of being a source of liquidity, where owners of financial assets who want or need to sell them can meet those seeking to buy financial assets. It is this latter function, known as the secondary market(s), which is the focus of this report.

The financial markets value chain includes all services involved in investors choosing investments, making investments, and monitoring those investments. While in the following we will be focusing on the post-trading portion of the value chain, it is important to remember that while these functions are operationally distinct from the other parts of the value chain they are not separable in economic terms: as obvious as it may seem, post-trading functions only occur when trades have occurred, which in turn only take place after pre-trade functions have taken place.

The value chain in the financial markets can be grouped into three separate areas: pre-trading services, trading services, and post-trading services. Pre-trading services include such activities as economic and securities research, pre-trade analysis for large and/or complex transactions, portfolio analysis, and so on. Trading services include providing a platform for trading, trade matching, and trade execution. Post-trading services includes services such as custody in addition to clearing and settlement.

Most trading of shares in Europe takes place on national stock exchanges. Exchanges have regulatory obligations to ensure that trades are completed in a secure and safe manner, and consequently often designate the way in which trades are to be settled and cleared, and to which institutions these functions are to be assigned. There are often arrangements between exchange and clearing and settlement institutions that determine the location of post-trading operations. In other words, it is often the exchange that has the ability to allow or prevent competition in post-trading services, which in turn has an impact on the cost structure of the post-trading services. The LSE provides an example of an exchange allowing competition

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6 Trading services tend to compete on the basis of factors such as market quality, trading costs, and (in some cases) order flow. They also tend to exhibit significant economies of scale and scope, and to display strong network effects. The access to trading services by investors is predominantly through intermediaries in the form of brokers; in turn, brokers’ access to trading facilities (such as exchanges) may be direct, remote, or indirect. Remote access for trading is possible, and tends to be used where volumes are sufficient; some investors (e.g. banks) will have direct access to the exchanges and clearing houses. There is also an important distinction between trading by investors, and trading by banks and dealers: the latter is frequently undertaken to provide liquidity to investors, and is not subject to the same costs as trading by investors.
in post trading services; earlier this year the LSE signed a letter of intent with SIS x-clear to provide member firms with a choice of clearing provider.\textsuperscript{7}

The post-trading process is the set of activities that follow the execution of a trade and culminates with the final and irrevocable exchange of cash and assets between counterparts to the trade, ensuring that the securities are paid for and delivered to the buyer. Post-trading includes:\textsuperscript{8}

- **Clearing**: the link between trading and settlement in which the obligations of each party to a transaction are finalised, that is, 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.

- **Settlement**: the process by which ownership of the securities is passed from seller to buyer and funds to pay for them from buyer to seller.

- **Custody**: the safekeeping and administration of securities and financial instruments on behalf of others. Custodians are entities, often banks, which provides custody services, and which may also provide various other services, including clearance and settlement, cash management, foreign exchange and securities lending.

The post-trading function is discussed in more detail in Appendix A.

The need for these services arises regardless of whether the trade has taken place on an exchange or over-the-counter (“OTC”), and whether the trade involves domestic or foreign securities.

For a cross-border trade investors rarely access a foreign system directly, but instead typically rely on intermediaries for this purpose. A cross-border transaction typically involves one of three basic models: using a link between two Central Securities Depositories (“CSDs”) (the domestic and the foreign); using a network of local brokers (who would typically be a member of the foreign CSD); or using an International Central Securities Depository (“ICSD”) or global custodian (who are either members of the national CSDs or who have access to a network of local sub-custodians).\textsuperscript{9} Where a cross-border trade increases the number of clearing and settlement intermediaries that have to be accessed to complete the trade this is likely to increase the costs of a cross-border trade vis-à-vis a domestic trade.

\textsuperscript{7} LSE Press Release, London Stock Exchange agrees terms with SIS x-clear to offer customers choice of clearing provider, 24 May 2006.


\textsuperscript{9} See NERA (2004) \textit{ibid.}, for further discussion.
2.1.1. Post-trading Costs

The costs incurred during the post-trading process can be summarised as follows:\textsuperscript{10}

- **Direct costs**: charges paid by intermediaries to clearing and settlement service providers for processing transactions, i.e. commissions, fees, taxes, etc. specifically associated with these services. Cross-border trades may incur higher direct costs than domestic trades due to higher fees.

- **Indirect costs**: costs incurred indirectly by intermediaries in dealing specifically with post-trading activities, for example, brokers' own back office costs. Cross-border trades may incur higher indirect costs than domestic trades, e.g. where the former leads to an increase in back office costs associated with cross-border trades, such as additional staff to deal with regulatory and language differences across countries.

- **Opportunity costs**: opportunity costs associated with the costs of post-trading, such as the cost of collateral, incidence of failed trades and trades that are foregone. Cross-border trades may incur higher opportunity costs than domestic trades for example where cross-order trades leads to a higher incidence of trades foregone.

Numerous studies have examined how the costs of cross-border post-trading compare with the costs of domestic post-trading ("the extra costs of cross-border post-trading") in the EU, most recently summarized in Annex I of the Working Document.\textsuperscript{11} Many studies which have examined the extra-costs of cross-border clearing and settlement have focused on the additional direct costs. However, cost estimates from Euroclear and Clearstream presented by the Giovannini Group suggest that direct costs may represent only a small fraction of the overall cross-border cost.\textsuperscript{12}

The total transactions costs associated with a cross-border trade incurred by an investor will reflect both the costs of trading and post-trading. The transactions costs can be decomposed into:\textsuperscript{13} (i) explicit (or direct) costs of trading representing the charges paid by investors to intermediaries, such as broker commission and fee costs, taxes, etc., including costs associated with clearing and settlement; and (ii) implicit (or indirect or unobservable) costs of trading, which will depend on market liquidity, the main one being the price impact of a trade. While the price impact of a trade is sometimes proxied by one-half the bid-ask spread, this measure fails to capture the fact that large trades can move the price beyond the quoted bid or ask.

\textsuperscript{10} These cost classifications are based on the classifications relied on by the Giovannini Group in discussing the extra costs of cross-border post-trading vs. domestic post-trading (The Giovannini Group 2001, "Cross-Border Clearing and Settlement Arrangements in the European Union").


\textsuperscript{12} Giovannini Group (2001), op. cit.

As pointed out by the Competition DG of the EC in its May 2006 Issues Paper, the costs of post-trading are frequently difficult to measure accurately and in detail. Settlement fees may not be broken out separately from custody fees, for example. Another common problem is that typically a major component of post-trading costs is represented by a fixed annual fee, and there is no simple or consistent way to attribute this amount to individual trades. Similarly, sometimes fees are quoted or published on an “all-in” basis, which combines fees for both trading and post-trading services. The distribution of the component fees between trading, clearing, and settlement varies considerably by trading venue and by service provider. The bundling of services for retail transactions by intermediaries means that retail investors frequently do not know how much they are paying and for what.

In November 2006, following the Commission’s call for an industry code of conduct, the three main industry associations providing trading and/or post trading services published a voluntary Code of Conduct setting out intended principles of conduct that they will adhere to in providing post-trading services for cash equities. The Code of Conduct will initially only apply to cash equities, but is intended to be extended in time to apply to other instruments as well. The implementation of the Code of Conduct will be through a series of phases, the first phase being the implementation of a series of measures to achieve price transparency between services and between providers, to be in place by 31 December 2006. The other two areas of commitment are to establish access and interoperability conditions (by 30 June 2007), and achieving unbundling of services and implementation of accounting separation (1 January 2008).

The code of conduct is, as its name implies, a voluntary set of rules adopted by members of the industry rather than imposed by regulators. The chief goal is to create links between exchanges to make it easier for users to clear and settle their equities transactions in the country of their choice. Some commentators feel a voluntary code will allow flexibility to deal with such events as continued consolidation in exchanges and post-trading services companies. Others, however, question how regulators will be able to enforce such a code without specific regulations or legislation.

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18 See, for example, David Walker “Exchange mergers must benefit users”, Financial Times, 7 November 2006.
2.2. Recent Trends in the European Post-trading Industry

It is well documented that over the last few years the European post-trading industry has experienced noticeable consolidation.\(^{19}\) In general, two trends have emerged:

- **Horizontal integration:** integration amongst entities providing similar services at the same point in the post-trading value chain but in different jurisdictions or markets, so-called “horizontal silos”. For example, the consolidation of Euroclear into a "single settlement engine", a process that is expected to be completed in 2007 and that follows the consolidation of the multiple national components of Euroclear into a single entity in 2005.\(^{20}\) Similarly, Euronext has been consolidating its clearing and settlement operations under the Euroclear brand.

- **Vertical integration:** integration amongst entities providing different but integrated services along the post-trading value chain in the same jurisdictions or markets, so-called “vertical silos”. Deutsche Börse’s ownership of both the trading platform and the clearing and settlement functions is an example of a “vertical silo”. The recent merger of Borsa Italiana and Monte Titoli is another example of vertical consolidation taking place within the industry.

Between 1999 and 2004 the number of CSDs in the “Eurozone” reduced from 23 to 18; during the same period the number of Central Counterparties (“CCPs”) declined from 14 to 8.\(^{21}\) While the main consolidation has taken place within borders, a number of cross-border alliances have occurred including the merger of national CSDs into the Euroclear group, the merger of the Finnish and Swedish CSD’s, and the creation of the cross-border CCP LCH.Clearnet. Nevertheless, the European post-trading industry remains segmented along national lines. In analysing the benefits from integration of the European post-trading markets, these trends must be accounted for.

Changes in the structure of other parts of the financial value chain also have impacts on the post-trading industry. For example, since 2004 Euronext has had a single trading platform for all approximately 1,300 companies listed in the four countries whose stock exchanges form part of the consortium.\(^{22}\) Euronext has decided to pursue a “horizontal” business model in order to create a “genuinely cross-border exchange …by integrating local markets across Europe to provide users with a single market that is broad, highly liquid and extremely cost-effective.”\(^{23}\) One side effect of this aspect of financial markets integration is that Euronext has disposed of all its post-trading activities, which are handled by LCH.Clearnet and Euroclear. Deutsche Börse, meanwhile, in September applied to UK financial regulators for permission for its clearing subsidiary, Eurex, to operate in London; this is seen by many as opening

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\(^{19}\) For example, see discussion in Schmiedel and Schönenberger (July 2005), “Integration of Securities market Infrastructures in the Euro Area”, European Central Bank Occasional Paper No. 33.

\(^{20}\) See, for example, Deutsche-Börse Group, "The European Post-Trade Market: An Introduction", 2004 for an overview of some of the horizontal integration that has taken place.


\(^{22}\) This creates an effective cross-listing for stocks. We discuss this in more detail in Section 5.2.2.

\(^{23}\) Euronext website (www.euronext.com).
the door for competing clearers to link to the Borse's cash equities and derivatives trading platform as the price for recognition in London.24

Similar to the horizontal business strategy pursued by Euronext as described above, Euroclear is moving to provide a single settlement engine (“SSE”) for all trades that place on the Euronext trading platform. By 2007, there will be a single settlement platform to go with the single trading platform for all these shares that until recently traded and cleared in separate national markets.

Similarly, the NOREX exchange has consolidated the trading of eight Baltic region exchanges on to a single trading platform. Issuing companies are encouraged to list their securities on only one NOREX exchange, while member firms are encouraged to join all the NOREX exchanges.25 The aim of NOREX is to achieve a single platform for listing, trading and settlement, for all companies in the Baltic region. Like Euronext and Euroclear, however, while trading is now taking place on a consolidated basis clearing and settlement are not yet on a single platform, but this move is expected in 2007. Until that time, exchange members can either settle cross-border trades directly by becoming a clearing member at the CSD concerned, or indirectly by using a local settlement agent (e.g., a bank) for that purpose.

Finally, in July 2006 the European Central Bank (“ECB”) proposed establishing its own proprietary clearing and settlement service, to be known as T2S.26 The proposal was for an integrated model of cash and securities settlement on a single platform using central bank money, with no “outsourcing” to other settlement providers. Reaction was at first positive, but concern has grown on a number of aspects of the proposal. First, the proposal is only for Euro-zone settlements, and thus effectively excludes the largest capital market in Europe, namely London. Euroclear, in particular, argued that this would lead to more fragmentation in European markets, rather than less.27

Second, there is concern that removing the core settlement function for Euro-denominated securities from Eurozone CSDs would increase the latter’s risk profile and would generate greater cost complexity. Existing CSDs, including Euroclear and Nordic CSD, would no longer be able to provide multiple currency settlements.

We stress that the examples discussed in this section are by no means exhaustive, and is illustrative for explanatory purposes. Furthermore, the pace of developments in the industry means that the list of examples is constantly expanding.

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26 See European Central Bank, “The Eurosystem is evaluating opportunities to provide settlement services for securities transactions”, press release, 7 July, 2006.

In this section and the following we discuss the quantitative analysis presented in the Working Document, focusing on Annex I and II. In summary, Annex I of the Working Document focuses on estimating the potential cost savings from integration, measured as the “incremental costs” of cross-border trading vis-à-vis domestic trading. These potential cost reductions (static gains) are estimated to be equivalent to 7%-18% of total transactions (trading and post-trading) costs. Annex II of the Working Document discusses the “dynamic gains” from integration, that is, the total economic gains estimated to result from a reduction in the “incremental costs”. These potential gains are estimated to be in the order of 0.2%-0.6% of EU GDP, or €23-63bn. We summarise these results in Table 1 below. This section discusses the derivation of the estimated static gains. Section 4 discusses the derivation of the estimated dynamic gains.

<table>
<thead>
<tr>
<th>&quot;Static gains&quot;</th>
<th>Unit</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate &quot;excess&quot; post-trading costs arising from lack of integration</td>
<td>€ billion</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Aggregate total investor spending on trading and post-trading (on all securities)</td>
<td>€ billion, p.a.</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Reduction in total transactions (trading plus post-trading) costs</td>
<td>%</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>&quot;Dynamic gains&quot; (including static gains)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in long-term level of EU GDP</td>
<td>%</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Change in long-term level of EU GDP</td>
<td>€ billion</td>
<td>23</td>
<td>63</td>
</tr>
</tbody>
</table>


3.1. Introduction

Annex I of the Working Document has two principle objectives. The first is to present a review of studies examining European post trading costs. The literature review covers both studies of the costs of domestic transactions relative to cross border transactions, which identify the potential cost savings from integration, as well as studies focusing on the differences in domestic costs of post-trading in the EU vs. the US, which identify the potential cost savings from consolidation. The main focus of the review is to provide an estimate of the “incremental costs” of cross-border post-trading within the EU relative to domestic post-trading. This concept of “incremental costs” is considered an indicator of the potential savings that would result from integration of the European post-trading industry, where integration means that “all obstacles to the use of different post-trading cross-border channels for C&S and custody are eliminated and, as a consequence, cross-border trading becomes equivalent to domestic trading”. In the following, we refer to this as the “incremental costs of post-trading”. The second objective is to translate this estimate of “extra costs” into an input into the analysis of Annex II of the Working Document, the economic impact study on clearing and settlement, which we discuss in Section 4.

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In the following we focus our attention on the estimates of the costs of cross-border transactions which are used in the subsequent analysis in Annex II. We refrain from commenting on other aspects of the literature review.29

3.2. Studies Used in the Commission’s Analysis and Key Results

Based on the literature review Annex I identifies two key studies of the extra costs of cross-border post-trading in the EU deemed appropriate for inclusion in the further analysis: Clearstream (2002)30 and Euroclear (2003).31

The analysis in Annex II relies on an estimate of the reduction in total transactions costs (total investor spending on trading and post-trading costs) that would result if the extra costs of cross-border trading were eliminated. The proportion of total transactions costs made up by the extra costs of cross-border post-trading costs is calculated as the extra costs of cross-border trading divided by the total transactions costs of securities trading in the EU. We replicate the Commission’s derivation of these numbers in Table 2 below.

Based on the two studies, Annex I derives an estimated range for reduction in total transactions costs, due to the integration of the European post-trading industry, of 7%-18% including custody.

The corresponding estimates excluding custody are 4%-9%. The Commission note it is appropriate to exclude custody costs on the basis that demand for custody services may not be influenced by changes in trading costs. However, whilst it is their preference to exclude custody costs in both numerator and denominator, the data do not enable them to do this in a consistent manner.32 In the subsequent analysis, the Commission relies on estimates which include custody costs.

| Table 2 |
| Replication of the Commission’s Range for Reduction in Total Transaction Costs |
| Total Costs | Clearstream | Euroclear |
| Total Costs | Extra X-Border Costs** | Extra X-Border Costs** |
| € Million | € Million | % of Total Costs | € Million | % of Total Costs |
| A | B | C = B/A | D | E = D/A |
| C&S* | 28,000 | 1,000 | 3.6% | 2,500 | 8.9% |
| Custody* | 28,000 | 1,000 | 3.6% | 2,500 | 8.9% |
| Total | 28,000 | 2,000 | 7.1% | 5,000 | 17.9% |

* For Euroclear (2003) trading is also included based on footnotes 27 and 30 of Annex 1.
** Extra costs are defined as (i) "incremental costs" and refer to equities (Clearstream, 2002) and (ii) "excess costs" and refer to securities (Euroclear, 2003).

Annex I notes that the numerator in this calculation ("Total Costs" in Table 2) refers to the costs of trading, clearing, settlement and custody of all securities but excludes

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29 Many of the studies summarised in the literature review have been reviewed elsewhere. See, for example, NERA (2004) op cit.,
31 Euroclear (2003) “Delivering Low-cost Cross-border Settlement”. Note that these estimates include the extra costs of custody.
“implicit” trading costs. This contrasts with the source of this estimate (Mercer Oliver Wyman and Morgan Stanley (2003)), which specifies that this total includes both trading commissions and spreads i.e. it includes “implicit trading costs”.

In Annex 1 the Commission identifies two estimates of “Total Costs” relating to both all securities (€28 billion) and equities only (€17 billion). We have recalculated the potential reduction in costs using the ‘Total Costs’ estimates for equities only as the denominator (A) in the calculation based on Clearstream’s estimate. This approach is more consistent with the Clearstream data which refers to the incremental costs of cross border equity transactions only. The result is an increase in the lower bound of cost savings from 4% to 6% (excluding custody) and 7% to 12% including custody, as shown in Table 3 below.

### Table 3: Recalculation of Clearstream Results

<table>
<thead>
<tr>
<th></th>
<th>Total Costs € Million</th>
<th>Extra X-Border Costs* € Million</th>
<th>% Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C = B/A</td>
</tr>
<tr>
<td>C&amp;S</td>
<td>17,000</td>
<td>1,000</td>
<td>5.9%</td>
</tr>
<tr>
<td>Custody</td>
<td>17,000</td>
<td>1,000</td>
<td>5.9%</td>
</tr>
<tr>
<td>Total</td>
<td>17,000</td>
<td>2,000</td>
<td>11.8%</td>
</tr>
</tbody>
</table>


* Extra costs are defined as “incremental costs” and refer to equities (Clearstream, 2002).

In the remainder of this section we analyse the results set out in Table 2, and revised in Table 3, setting out the sensitivity of the results to key assumptions and any inconsistencies in the derivation of the results.

### 3.3. Defining “Extra Costs” of Cross-border Post-trading

As noted above, Annex I is focused on defining the “extra cost” of European post trading services, defined as the difference between the costs of a cross-border trade vis-à-vis a domestic trade within Europe. The Commission thus appears to assume that domestic transactions and cross-border transactions in a fully integrated market would cost equal amounts. However, some element of “efficient extra costs” could be expected even in a fully integrated European post-trading industry reflecting “extra costs” that cannot be reduced to zero as a result of integration of European post-trading infrastructures. This is because, even in a fully integrated industry, the costs of cross-border post trading services may be higher than the same services for a domestic transaction, for example due to lower volumes of cross-border trading (home bias) or language barriers, or additional back-office work that must be undertaken.

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35 The assumption that all of the extra costs of cross border activity are a result of a lack of integration or inefficiency is also reflected in the EC’s regulation 2560, which stipulates that the price of credit transfers and card payments in Euro (under €12,500) must be identical throughout the European Union. (Regulation (EC) No 2560/2001 of the European Parliament and of the Council of 19 December 2001 on cross-border payments in euro, Official Journal L 344 , 28/12/2001 p.0013–0016.) This regulation prevents providers of payment services from recovering the extra costs (both efficiently and non-efficiently incurred) of certain cross border credit transfers and card payments through the tariffs for those services. The Regulation implies either the assumption that there are no efficiently extra costs or the requirement that they should not be recovered directly from users.
Clearstream (2002) defines its measure of extra costs as the “incremental costs” of cross border equity trading. Whilst this term is not defined we assume it equates to the definition of “extra costs” set out in Annex I.\textsuperscript{36} Clearstream also acknowledges the fact that “incremental costs” include some costs that cannot be reduced to zero (which Clearstream refer to as “non-influenceable factors”). In fact Clearstream goes further and identifies the range of costs that are influenceable by the EU and Member States and those that are not:

- **factors influenceable by the EU and member states**: different laws, taxes and regulatory environments, different corporate actions, different currencies (€, £), low degree of automation caused by need for regulatory translation;

- **factors influenceable by intermediaries, exchanges and CSDs**: different market practices, fragmented trading and the CSD industry; and

- **non-influenceable factors**: low volumes (home bias) and different languages.\textsuperscript{37}

Clearstream also provides an estimate of the proportion of “incremental costs” that are attributable to each cause. Table 4 below sets out these estimates:

<table>
<thead>
<tr>
<th>Who Can Influence Incremental Costs?</th>
<th>Post-Trading (%)</th>
<th>Custody (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU, Member States</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Intermediaries, Exchanges and CSDs</td>
<td>50%</td>
<td>10%</td>
</tr>
<tr>
<td>Non-influenceable</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Source: Clearstream (2003), Figure 6.

We note that whilst the focus on “extra costs” seems reasonable, if the Commission were at some point in the future to carry out an impact assessment of the possible introduction of measures by the Commission, this measure should only include the portion of “extra costs” that can be influenced by the EU or Member States. Clearstream (2002) estimate that this would be in the order of 30% of incremental post trading costs and 70% of incremental custody costs.

As an example, Table 5 amends the Commission’s derivation of extra costs (based on Clearstream’s estimate) to take account only of those costs that are influenceable by the EU or member states. The result is that the extra costs as a percentage of total costs fall from 5.9% for clearing and settlement and 5.9% for custody (relative to Table 3) to 1.8% and 4.1% respectively.

\textsuperscript{36} Defined as the extra cost of cross-border post-trading when compared to domestic post-trading (see European Commission (2006), p.1).

\textsuperscript{37} Clearstream International and Deutsche Börse (2002) “Cross-border Equity Trading, Clearing and Settlement in Europe”, White Paper, Figure 6.
Table 5
Potential Reduction in Costs Influenceable by the EU and Member States

<table>
<thead>
<tr>
<th></th>
<th>Total Costs</th>
<th>Extra X-Border Costs*</th>
<th>Extra X-Border Costs Influenceable by the EU and Member States*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>€ Million</td>
<td>€ Million</td>
<td>% Total Costs</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C = B/A</td>
</tr>
<tr>
<td>C&amp;S</td>
<td>17,000</td>
<td>1,000</td>
<td>5.9%</td>
</tr>
<tr>
<td>Custody</td>
<td>17,000</td>
<td>1,000</td>
<td>5.9%</td>
</tr>
<tr>
<td>Total</td>
<td>17,000</td>
<td>2,000</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

* Extra costs are defined as (i) "incremental costs" and refer to equities (Clearstream, 2002) and (ii) "excess costs" and refer to securities (Euroclear, 2003). Note this is a recalculation of the original estimate (see Table 3).

The Euroclear study estimates “excess costs” which are defined as costs generated by cross-border inefficiencies for market participants. Whilst the report does not explicitly identify these inefficiencies it is likely that they include at least some of those costs identified by Clearstream as non-influenceable by the EU. Therefore the potential reduction in costs based on the Euroclear estimates is an upper bound. If the Euroclear estimate is adjusted, according to the assumptions illustrated in Table 4, the extra costs as a percentage of total costs would fall from 17.9% to 8.9%.

3.4. Sensitivity to Turnover Assumptions

The Clearstream estimate provides some information on the method by which the estimates have been derived. We consider the sensitivity of the Clearstream estimate to the assumption on cross border turnover.

Clearstream estimate of the incremental cross border costs of clearing and settlement is based on an incremental cost of €25 per transaction and an estimate of the number of cross-border equity transactions. The latter is based on an assumption that 35% of total trading turnover is cross-border.

In Figure 1 we present data on the proportion of trading turnover attributable to cross border trading on a sample of securities exchanges in the EU-25 over January 2001 to October 2006. The figure shows that the proportion of total turnover attributable to trading of foreign stocks for the selected exchanges has declined steadily over the period. We recognise that this data does not represent the total equity trading turnover in the EU-25. However, it indicates that the proportion of cross border turnover may be lower than the 35% assumed by Clearstream.
Table 6 presents a sensitivity analysis to illustrate the impact of a revision of the cross border turnover assumption based on the FESE data shown in Figure 1 above. The table shows that the potential reduction in costs is sensitive to revisions in this estimate; for example, if the proportion of cross-border transactions was 20% instead of 35%, using the assumptions reported by Clearstream leads to a direct estimate of the incremental costs of cross-border clearing and settlement of €910 million, not €1 billion as reported by Clearstream. This in turn reduces the extra costs from 5.4% to 3.1% of total transactions costs.

Table 6

<table>
<thead>
<tr>
<th>Total Costs</th>
<th>Equity Trading Turnover</th>
<th>Proportion of Trading Turnover = X-Border</th>
<th>Average Transaction Size</th>
<th>Number of Cross Border Equity Transactions</th>
<th>Extra Cost of Cross Border Clearing and Settlement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ Million</td>
<td>€ Million</td>
<td>%</td>
<td>€</td>
<td>Million</td>
<td>€/transaction</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E = (B*C)/D</td>
<td>F</td>
</tr>
<tr>
<td>17,000</td>
<td>15,600,000</td>
<td>35%</td>
<td>150,000</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>17,000</td>
<td>15,600,000</td>
<td>20%</td>
<td>150,000</td>
<td>21</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Clearstream (2002); NERA analysis. Note: This table also amends a rounding error not amended in the preceding tables which set the incremental x-border costs to €1,000 million as opposed to €910 million.
3.5. Time Periods

The estimates of the impact on transactions costs from financial integration are derived directly from studies dated in 2002 and 2003, respectively. The European post-trading industry has experienced considerable change and consolidation since that time, and continued effort has been made to remove or reduce the Giovannini barriers. It is therefore very likely that the differentials between the cost for post-trading activities for cross-border and domestic transactions have reduced relative to the estimates presented in these studies. In section 5 we discuss recent developments in the European post-trading industry.

3.6. Scope of Estimates

Whilst both estimates utilise a similar measure (total incremental or excess costs) there are some key differences in scope that affect the comparability of the estimates and their relevance for the analysis presented in Annex II. Table 7 summarises the scope of each estimate according to three categories: instruments covered, value chain segment covered and costs covered. The table shows that the two estimates used are not comparable on all three counts. More importantly the Euroclear estimate is not compatible without appropriate adjustment with what the Commission is trying to achieve, which is to calculate the “extra costs” of post-trading and custody for equity transactions. We discuss each category in turn:

<table>
<thead>
<tr>
<th>Instruments covered</th>
<th>Value Chain Segment Covered</th>
<th>Costs Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities</td>
<td>Equities</td>
<td>Trading</td>
</tr>
<tr>
<td>Euroclear (Total)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Clearstream</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>


3.6.1. Instruments Covered

The Euroclear results appears to refer to all securities\(^\text{38}\) whilst the Commission’s analysis, and the Clearstream estimate, relate to equity markets only. In applying both the Euroclear and Clearstream estimates without adjustment, the Commission’s analysis makes the implicit assumption that all extra costs relate to equity transactions (i.e. the extra costs associated with bonds and investment funds included in the Euroclear estimate are zero); this assumption is unsupported. The “extra costs” attributable to non-equity securities are generally considered positive, although significantly less than for equities. As a result the Euroclear estimate will overestimate the extra costs of post-trading in the European equity market.

\(^{38}\) Euroclear defines “securities” as bonds, equities and investment funds (Euroclear, 2003, p.2).

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### 3.6.2. Value Chain Segment Covered

The Clearstream estimate includes the costs of cross-border settlement and custody fees. The Euroclear estimate also includes settlement and custody costs but further appears to include trading costs. The Commission acknowledges this fact in Annex 1 (footnotes 27 and 30).

However, the Commission does not account for this in its use of the Euroclear estimate (see Table 8 below). Annex I calculates Euroclear’s extra costs by making an assumption that extra custody costs make up 50% of total extra costs (see row C). This assumption is based on Clearstream’s estimate that custody costs make up 50% of total extra post-trading and custody costs. This calculation therefore assumes that Euroclear’s estimate of total extra costs refers to post-trading and custody costs; this contradicts footnotes 27 and 30.

#### Table 8
Replication of Derivation of Euroclear Excess Costs ‘Custody Only’ from Annex I

<table>
<thead>
<tr>
<th>Clearstream Estimate</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra Post-Trading Costs € Million</td>
<td>A</td>
<td>2,000</td>
</tr>
<tr>
<td>Extra Custody Costs € Million</td>
<td>B</td>
<td>1,000</td>
</tr>
<tr>
<td>Extra Custody Costs % Post Trading Costs</td>
<td>C = B/A</td>
<td>50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Euroclear Estimate</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra Costs € Million</td>
<td>D</td>
<td>5,000</td>
</tr>
<tr>
<td>Extra Custody Costs (Derived) € Million</td>
<td>E = D*C</td>
<td>2,500</td>
</tr>
</tbody>
</table>


Furthermore, in Annex 2 the Commission uses the results it derives from Euroclear’s estimates to estimate the benefits of the integration of clearing and settlement systems. This analysis should explicitly exclude cost savings associated with trading. The Commission’s analysis thus implicitly assumes that the total extra costs of trading are zero. This is clearly not appropriate. The result is that the Euroclear estimate will overestimate the extra costs of post-trading in the European equity market.

For example, Clearstream (2002) indicates that the extra costs of trading could be in the order of €2.3 billion, approximately €0.3 billion more than the total incremental costs of clearing, settlement and custody.

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3.6.3. Costs Covered

The Clearstream estimate appears to relate solely to fees incurred (i.e. direct costs) whilst the Euroclear estimate also includes the indirect costs incurred by market participants (i.e. back office costs).\textsuperscript{40, 41}

This indicates that there is an inconsistency in the scope of the costs included in the two figures. Furthermore, the Commission note in Annex 1 that they consider both direct and indirect costs to be relevant to the RIA.\textsuperscript{42} Therefore, the Clearstream estimate will underestimate the true extra costs.

3.7. Other Considerations

3.7.1. Costs of Integration

The studies present estimates of the difference in costs between cross-border and domestic post-trading, but do not provide any indication of whether these estimates take into account any additional costs that would have to be incurred to remove such cost differentials, i.e. costs associated with increased financial integration, such as additional infrastructure costs (including IT costs).

It is therefore not clear whether the two studies present estimates of the gross potential cost savings of financial integration or the net cost savings. While the benefits from financial integration can be expected to more than outweigh any costs, the costs could nonetheless be substantial if regulatory or legislative changes were made or where significant investment in infrastructure is required. Such costs can be significant, for example, recent research has indicated that the Markets in Financial Instruments Directive (“MiFID”) will costs UK companies around £1 billion in preparation costs, with ongoing yearly costs of around £100 million.\textsuperscript{43} Disregarding any costs which enter negatively in the calculation of benefits from integration would be a serious oversight.

3.7.2. Transparency of Assumptions

The authors of Annex I acknowledge a fundamental shortcoming of the Euroclear (2003) study, namely that the study lacks any details on the methodologies and assumptions used to derive the presented estimate of the incremental costs of cross-border post-trading.\textsuperscript{44} Despite this crucial shortcoming, the estimates from this study are used in the subsequent analysis. Furthermore, the Commission reports that some market participants have argued that one component of the estimate is likely to be overstated by at least €0.75bn.\textsuperscript{45}

\begin{footnotesize}
\textsuperscript{40} The Euroclear paper attributes their estimate of €5 billion of excess costs to: “high settlement fees and large internal costs in their own back offices required to deal with the very fragmented and heterogeneous markets in Europe” (Euroclear, 2003, p.2), whilst the Clearstream paper cites costs of: “€1 billion in cross-border settlement fees, and €1 billion in higher cross-border custody fees.” (Clearstream, 2002, p.15).
\textsuperscript{41} As far we can tell neither of the two papers take opportunity costs (such as cost of collateral) into account.
\textsuperscript{42} We assume that in this context direct costs relate to fees and charges and indirect costs relate to back office expenses (including agent bank fees and charges).
\textsuperscript{43} This compares with estimated ongoing benefits of £200 million per year. Financial Services Authority (2006) “The Overall Impact of MiFID”.
\textsuperscript{44} “...the study does not elaborate on where the presented figures are taken from.” Working Document, Annex I, p.19.
\end{footnotesize}
3.7.3. Generality of Analysis

Neither paper presents estimates of the costs on an individual country basis, nor do they provide a breakdown for the type of investor (institutional vs. retail). However, the Clearstream (2003) paper suggests that the differences in extra-costs of cross-border total trading costs are significantly higher for retail investors, than for institutional investors.

Furthermore, Annex III identifies significant variation in the cost of execution for retail trades between 15 EU countries. The Annex estimates the cost of the execution of a retail trade of three differing sizes (small, medium and large) for the EU-15 countries. The results show that costs vary in a range of €13-€135 for small trades, €33-€153 for medium trades and €61-€271 for large trades. This variation between countries indicates that the results may mask substantial differences between the extra costs in each country. The data, however also show that there is significant variation in costs within countries. Whether this is a reflection of differences in pricing structures per se, or reflects differences in investor preferences, is not clear.

This evidence of a strong country- and size-effect is important because it shows that the European capital markets are not homogeneous: the cost structures of retail trades reflect the marked differences in development and types of market found in the European Union. It is therefore wrong to assume that one can take an average across all countries and markets and use that statistic to forecast the impact of changes in the market structure for the EU as a whole.

3.7.4. Consolidation

Whilst Annex 1 focuses on the extra costs associated with integration (or lack of it) it also considers the costs associated with the degree of “consolidation” in the EU. “Consolidation” of the post-trading market, measured by the difference in costs between domestic CSDs in Europe and the US, is estimated to reduce transactions costs by an incremental amount of 2.5% (or 1.3% excluding custody).

It is not the Commission’s stated aim, however, to create a consolidated industry. For this reason, the impact of consolidation should be excluded from the analysis of the potential benefits of the proposals outlined.

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47 This also applies to the analysis of the impact of changes in clearing and settlement on the cost of capital of issuers, as we discuss in the next Section.
49 Whilst this estimate provides an insight into the potential gains from consolidation of the European post-trading industry, we note that it would have limited relevance for an economic impact assessment of the proposed changes outlined in the draft working document. The proposed changes include the following measures designed to promote integration of the European post-trading market: (i) set up an Advisory and Monitoring group; (ii) propose a Directive on Clearing and Settlement; (iii) address the fiscal and legal compliance issues; and (iv) ensure the effective implementation of competition law.
3.8. Conclusion

In this section we have reviewed the estimates presented in Annex I of the extra costs of European post trading and custody services as a percentage of the total costs of trading. We have identified a number of areas where the estimates are subject to uncertainty, the impact of which can be quantified: the application of an estimate for total costs which applies to all securities for the Clearstream estimate of extra costs which applies to equities, the inclusion of “non-influenceable factors” in the Clearstream estimate, and the sensitivity of the Clearstream estimate to assumptions on cross border equity trading turnover.

We have also identified a number of areas of uncertainty, the potential impact of which we cannot quantify but which we expect to have a material impact on the results: the data results apply to previous time periods; there is considerable variation in scope between the two estimates and between the estimates and the stated aims of Annex 1; and the costs of integration not taken into account explicitly.

Finally, we have identified a number of areas where the analysis could be extended (or contracted) to provide additional insights into the nature of the results: the transparency of assumptions for the Euroclear estimate is very limited, further clarification would improve its application in Annex II. Additionally, the generality of analysis could be improved by providing a breakdown by type of consumer (institutional or retail) and by country; and the data on the extra costs associated with a lack of consolidation would have limited relevance for a potential future impact assessment of the costs and benefits of integration in the post-trading market.

The following analysis has clearly shown that the Commission has used the two studies inconsistently and that the available data on differences in costs for domestic and cross-border post-trading services are not without issue. Furthermore, that data is now dated, and somewhat questionable. We note that the Commission has stated the intention to carry out further research to collect further data on post-trading prices and volumes of trade, and that Oxera has been granted a tender to undertake this study. We welcome this initiative and strongly recommend that the Commission complete this exercise before embarking on further analysis.

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The second part of the Commission’s quantitative analysis presented in Annex II of the Working Document sets out to estimate the “first-order dynamic” economic benefits of financial integration, by analysing the impact on European GDP from reducing equity transactions costs by the extra costs of cross-border post trading (the “static” cost reduction estimates derived in Annex I). In this section we briefly discuss the analysis and highlight some further areas for consideration.

4.1. **Empirical and Econometric Issues in Annex II**

The Commission’s analysis of the impact on GDP is set out in three main steps. The first step is to estimate a measure of the price elasticity of demand for equity transactions, by estimating the relationship between equity transactions costs and market liquidity. The second step is to estimate the elasticity of the cost of capital with respect to transactions costs and market liquidity. The outputs from the two first steps are then used to calculate the change in the cost of capital. The final step of the analysis is to estimate the change in the level of GDP resulting from the estimated change in the cost of capital. In the following we discuss each stage in turn in more detail.

Based on the estimated results and assumptions about key economic parameters, the authors find that a reduction in transactions costs in the range of 7% to 18%, as implied by Annex I, would lead to an increase in EU GDP of 0.2% and 0.6%, respectively. The 95% confidence intervals for these estimates are (0.1%, 0.4%) and (0.2%, 1.2%), respectively.

4.1.1. **The Dataset**

The dataset used in the econometric analysis contains monthly data for a 14-month period in 2000-2001 (the exact dates are not presented), on 14,902 traded shares from 21 OECD countries including the EU 15 countries (except Luxembourg). While seemingly extensive, the data are not as comprehensive as one would like, and in particular there are two areas of concern. First, there is a question as to whether the data are relevant for the purposes of the study in Annex II. Second, do the data contain sufficient detail to permit the desired analysis?

**Relevance of Data**

While the dataset is of considerable size, the data are dated. In particular, the significant structural changes that have taken place in the European post-trading industry in the last decade would caution against using data which may no longer represent current causal or economic relationships.

Firstly, the data covers a period which may have seen a regime change, namely the bursting of the internet and tech-stock bubble. Secondly, this share data is now five years old and in the meantime the European financial markets have seen significant changes, including the final stage of the Euro’s introduction, the inclusion of new

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51 The EU 15 countries comprise: Austria, Belgium, Denmark, Finland, France, Greece, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.
countries in the Euro-zone, numerous financial market regulatory initiatives (including the Investment Services Directive, the Collateral Directive, the UCITS Directive, the Market Abuse Directive, and the Markets in Financial Instruments Directive), as well as further consolidation in both trading and post-trading infrastructures and markets. Thirdly, the data covers a very short period in time. Relying on such a short period of time may not be sufficient to account for changes in any estimated statistical relationships over time, particularly as numerous studies have shown that the relationship between transactions costs and turnover, etc., is not constant.\textsuperscript{52} Fourthly, the dataset includes data from seven exchanges in non-EU countries.\textsuperscript{53}

Furthermore, there are likely to be substantial cross-sectional differences in the dataset, i.e. differences in the extent of financial market integration across the EU. For that reason, the inclusion of data on the remaining 11 countries in the EU (at the time of this analysis) would have been preferable, particularly since empirical studies have shown that transactions costs in the equities markets of Eastern Europe are considerably higher than those of the more developed Western European markets.\textsuperscript{54}

We note that the Commission has stated the intention to carry out further research and particularly collect further data in this area. We welcome this initiative and strongly recommend that the Commission complete this exercise before embarking on further analysis.

**Level of Detail in the Dataset**

The estimated relationship does not differentiate between domestic and cross-border trades. It is not clear what proportion of the share data relied upon represents cross-border trades, or whether the characteristics of the average cross-border trade are similar to those of the average domestic trade in terms of trade size, frequency of trades inside and outside the bid-ask spread. Furthermore, the authors do not appear to have tested whether the underlying economic relationships differ between domestic and cross-border trades; it is possible that the relationship between market liquidity and transactions cost would differ depending on the price of trades.

### 4.1.2. Estimating the Impact of Reduced Transactions Costs on Market Liquidity

The analysis first estimates a measure of the price elasticity of demand for equity transactions, by estimating the relationship between equity transactions costs and market liquidity. Transactions costs are proxied by the quoted percentage bid-ask spread and market liquidity is proxied by trading turnover. This estimated elasticity is combined with the estimates of the transactions costs reductions arising from financial integration (from Annex I) to estimate the resultant change in the market liquidity (turnover) from the elimination of the extra costs of cross-border post-trading.

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\textsuperscript{52} See, for example, Hans R. Stoll, “Friction”, *Journal of Finance*, Volume LV No. 4 (August 2000), pp.1479–1514. See Appendix B, below, for a review of the key findings of this paper as they pertain to the present study.

\textsuperscript{53} Australia, Canada, Japan, New Zealand, Switzerland and US (Nasdaq and NYSE). The authors note that they will present the results for the Euro-zone alone, however, such results do not appear to be presented in the report.

\textsuperscript{54} Domowitz, Glen and Madhavan (2001), op. cit.
The econometric relationship models market liquidity as a function of transactions costs and a number of other variables, where market liquidity is proxied by trading turnover ("turnover") and transactions costs are proxied by the quoted percentage bid-ask spread.\textsuperscript{55}

The authors model trading turnover as a function of the bid-ask spread, stock price volatility, market capitalisation and firm-specific and time dummies.\textsuperscript{56} The econometric model is estimated using five different estimators.

The initial relationship estimated by the authors of Annex II is as follows:

\[ tt_i = \beta_1 tc_i + \beta_2 \sigma^2_i + \beta_3 mcap_i + \theta_i + \alpha_i + \epsilon_i, \]  

Where \( tt_i \) is trading turnover (defined as dollar trading volume divided by market capitalisation), \( tc_i \) is the proxy for trading costs (the quoted bid-ask spread divided by the share price), \( \sigma^2_i \) is the stock's volatility, and \( mcap_i \) is the market capitalisation of the stock. Unlike Domowitz, Glenn and Madhavan (2001) or London Economics (2002), the authors of Annex II do not estimate equation (1) as part of a system. They claim that this is because their primary aim is to estimate the impact of trading costs on turnover; however, this overlooks the econometric issues involved with estimating a relationship where the causality runs in both directions, as we discuss below.

An important econometric issue, since this will determine which type of estimator is appropriate, is whether the unobserved firm-specific effect, \( \alpha_i \), is independent of the regressors. Tests reject the hypothesis of no correlation, and so the authors conclude that either the Fixed Effects ("FE") or the First Differences ("FD") model is best suited. Additionally, in order to correct for a potential dynamic misspecification, the authors add the lagged value of trading turnover to the model. Finally, they also estimate generalised method of moments ("GMM") models. The different models produce quite different results, as can be seen in Table 9, which reproduces the relevant tables in Annex II:

\textsuperscript{55} The authors also report that they present the estimation results using the effective spread, however, these results are not presented in the report.

\textsuperscript{56} All variables are in logarithms.
Table 9
Regression Estimations of the Impact of Trading Costs on Turnover

Static Specifications

$$tt_i = \beta_1 tc_i + \beta_2 \sigma_{ii}^2 + \beta_3 mcap_i + \theta_i + \alpha_i + \epsilon_i$$

<table>
<thead>
<tr>
<th>Between Effects</th>
<th>Fixed Effects</th>
<th>OLS</th>
<th>Random Effects</th>
<th>First Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\beta}_1$</td>
<td>-1.0063</td>
<td>-0.2789</td>
<td>-0.8049</td>
<td>-0.2890</td>
</tr>
<tr>
<td>$\hat{\beta}_2$</td>
<td>1.9495</td>
<td>0.4248</td>
<td>1.3105</td>
<td>0.4453</td>
</tr>
<tr>
<td>$\hat{\beta}_3$</td>
<td>-0.7019</td>
<td>-0.8304</td>
<td>-0.6981</td>
<td>-0.7411</td>
</tr>
</tbody>
</table>

Dynamic Specifications

$$tt_i = \gamma tt_{i-1} + \beta_1 tc_i + \beta_2 \sigma_{ii}^2 + \beta_3 mcap_i + \theta_i + \alpha_i + \epsilon_i$$

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\gamma}$</td>
<td>0.9129</td>
<td>0.5658</td>
<td>0.8773</td>
<td>0.4105</td>
<td>0.2219</td>
</tr>
<tr>
<td>$\hat{\beta}_1$</td>
<td>-0.0902</td>
<td>-0.3592</td>
<td>-0.1228</td>
<td>-0.3635</td>
<td>-0.2591</td>
</tr>
<tr>
<td>$\hat{\beta}_2$</td>
<td>0.2925</td>
<td>0.7064</td>
<td>0.3584</td>
<td>0.6552</td>
<td>0.4865</td>
</tr>
<tr>
<td>$\hat{\beta}_3$</td>
<td>-0.0573</td>
<td>-0.2942</td>
<td>-0.0834</td>
<td>-0.3983</td>
<td>-0.7025</td>
</tr>
</tbody>
</table>

Dynamic Specifications with GMM

$$tt_i = \gamma tt_{i-1} + \beta_1 tc_i + \beta_2 \sigma_{ii}^2 + \beta_3 mcap_i + \theta_i + \alpha_i + \epsilon_i$$

<table>
<thead>
<tr>
<th>Diff. GMM</th>
<th>Diff. GMM (tc endog.)</th>
<th>Syst. GMM</th>
<th>Syst. GMM (two step)</th>
<th>Syst. GMM (tc endog.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\gamma}$</td>
<td>0.1223</td>
<td>0.1157</td>
<td>0.4774</td>
<td>0.4249</td>
</tr>
<tr>
<td>$\hat{\beta}_1$</td>
<td>-0.2435</td>
<td>-0.3199</td>
<td>-0.4514</td>
<td>-0.4799</td>
</tr>
<tr>
<td>$\hat{\beta}_2$</td>
<td>0.4713</td>
<td>0.4775</td>
<td>0.6096</td>
<td>0.6195</td>
</tr>
<tr>
<td>$\hat{\beta}_3$</td>
<td>-0.7771</td>
<td>-0.7916</td>
<td>-0.3269</td>
<td>-0.3546</td>
</tr>
<tr>
<td>$\hat{\beta}_1/(1 - \hat{\gamma})$</td>
<td>-0.2774</td>
<td>-0.3618</td>
<td>-0.8638</td>
<td>-0.8345</td>
</tr>
</tbody>
</table>


The authors do not discuss the relative merits of the sixteen different estimations that they perform beyond stating that the results of Sargan tests for over-identification, which they do not reproduce, indicate possible misspecifications “in many cases.”

Neither do they explain which regression model they feel is best suited, for either statistical or economic reasons, for the use to which it will be put.

The authors then briefly compare their results to those of London Economics, who undertook a similar study and with similar aims. As our summary in Appendix B highlights, there are numerous differences between that study and the one undertaken in Annex II. The authors of Annex II mention only one: namely that the London Economics study used the logarithm of turnover but not of trading costs.

Additionally, there is one important difference between the specification in Equation (1) above, and the equivalent equation in the London Economics study. In the London Economics study the market capitalisation explanatory variable is that of the entire market of that country, whereas in Annex II it is the market capitalisation of company $i$. Since the dependent variable is turnover, which is defined as dollar trading volume divided by market capitalisation, this means that the dependent variable is a linear function of one of the explanatory variables; this means that the resulting estimation is subject to the problems with collinearity, primarily bias and inconsistency in the estimated coefficients.

Finally, the authors conclude that a 1% decrease in trading costs, ceteris paribus, leads on average to an estimated increase in trading turnover of 1% for all markets. An examination of the estimated $\beta_i$ coefficients in Table 9 reveals that the only model that produces an estimate close to that value is the Between Effects estimator. Notwithstanding the discussion of the problems arising from correlation of the firm-specific effect with the regressors and the potential dynamic misspecification, the authors appear to choose to adopt a model that is subject to both of those statistical problems.

Direct vs. Indirect Trading Costs

The econometric relationship attempts to estimate the impact of a change in trading costs on trading turnover (a commonly used proxy for liquidity). A common decomposition of trading costs distinguishes between explicit and implicit costs: explicit costs are direct costs of trading, such as brokerage commissions, taxes, etc.; implicit costs, also sometimes referred to as indirect costs, are costs borne by investors when trading securities for which there is no explicit accounting. The two largest sources of implicit costs are: (i) the bid-ask spread, since shares are purchased at the ask price and sold at the bid, with the difference paid as to the market maker as compensation for providing immediacy; and (ii) the price impact of large trades, since trades that exceed the number of shares the market maker is willing to trade at quoted bid and ask prices, can move prices in the direction of the trade.

The authors of Annex II define as their measure of trading costs, which is used in turn to estimate the impact of eliminating the barriers to cross-border trading, the quoted bid-ask spread. In other words, they use a measure of the implicit costs of trading as a proxy for the total trading costs associated with cross-border trades. There are several problems with this specification:

- First, Domowitz, Glen and Madhavan (2001) find that explicit costs and implicit costs "are not substitutes for each other."\(^{61}\)
- Secondly, implicit costs in the EU 15 and some Eastern European markets account for only approximately one third of total trading costs.\(^{62}\)
- Thirdly, the implicit assumption by the authors of Annex II that explicit costs are a constant proportion of total trading costs is refuted by the evidence in both Domowitz et al. (2001) and the Clearstream-Deutsche Börse (2002) study that explicit costs have constituted a declining fraction of total costs.

\(^{58}\) The Working Document, Annex II, p.4
\(^{60}\) See, for example, Domowitz, Glenn, and Madhavan (2001).
\(^{61}\) op. cit., p.228.
\(^{62}\) Domowitz et al. (2001). See also Table B.2 in Appendix B.
Fourthly, the study also fails to take into account that market structure (for example, dealer vs. automated limit order book) has a significant impact on both the bid-ask spread and market impact costs.63 The authors use the estimated reduction in total transactions costs derived from the estimates of the extra-costs of cross-border post-trading from the Clearstream and Euroclear studies as a proxy for the reduction in the bid-ask spread. As noted by the authors, however, the bid-ask spread provides a proxy for the implicit costs of trading only (although it does not capture market impacts), and does not capture explicit trading costs (such as commissions or direct fees).

Moreover, there is a crucial difference between the bid-ask spread and the total transactions costs that it is meant to proxy for: the bid-ask spread is a variable cost that increases with the size of the trade (and may be an increasing function of the trade size for large trades), whereas the incremental cross-border post-trading costs are primarily fixed (ceteris paribus) and therefore decreasing on a per share basis as the size of the trade increases. A given reduction in the overall transactions costs arising from elimination of cross-border barriers would not necessarily lead to a change in the bid-ask spread of the same magnitude due to the existence of fixed costs.

**Heterogeneity Across Countries**

The econometric model is estimated using five different regression techniques. The regression coefficients are reported for each of the individual countries (except Switzerland) as well as for all countries for the “between effects” and “fixed effects” model results only. In the subsequent analysis the authors rely on the between effects estimates.64 The results show relative heterogeneity between the EU countries, with the estimated elasticity for most EU-countries being in the range of -1.9 to -2.4, although there are a few significant outliers.

Based on the estimated elasticity for all of the 21 countries included in the dataset, the authors conclude that a 1% reduction in the bid-ask spread on average leads to a 1% increase in trading turnover.

The authors rely on the measure of elasticity calculated across all 21 countries in the dataset in the further analysis. Some averaging across countries may be advisable in certain circumstances, for example as here where there is limited information about the extent to which the impact of integration on the transactions costs may differ across countries. The disparate nature of the European post-trading industry, however, suggests that the modelling should allow for or at least attempt to extract as much information as possible on country (exchange) specific impacts. Table B.2 in Appendix B, reproduced from Stoll (2000), shows the degree of heterogeneity across EU countries as to the proportion of trading costs that are explicit and implicit. This, coupled with the considerable dispersion in the estimated coefficients from the trading cost regressions reported in Annex II, argues for careful calculation of the impact of trading turnover on trading costs, on a country-by-country basis.

63 For example, see Stoll (2000).
64 The elasticities estimated using the fixed effects model are significantly lower than those estimated with the between effects model (-0.28 vs. -1.00 for all countries), which suggests that the model specification has considerable impact on the estimated results.
To use the average measure of elasticity across all countries to estimate the economic impact of eliminating the barriers to cross-border trading is to assume that all countries’ equity markets will react in the same way and to the same degree. This is contradicted by empirical evidence that the relationship between trading turnover and bid-ask spreads is different for electronic markets than it is for physical exchanges, and for limit order books than it is for dealer markets. Given the wide variety of both types of markets and the degree of development of the equity markets in the various countries of the EU, this could mean that the results for each country could be vastly different than for the average across countries; this is especially relevant since the data used by the authors of Annex II do not include several emerging markets. Furthermore, this average measure of elasticity has been calculated using data on six non-EU countries.

This estimated elasticity for all countries (-1.006), used in the further analysis, is lower than all but two of the individual country parameters, which range from -0.67 (UK) to -3.3 (for Ireland). The estimated elasticities for the EU countries tend to be greater (more negative) than those of the non-EU countries, so this specification may have downwardly biased the estimated results, and could have been taken as a prudent measure, but the authors do not make any specific reference as to why this approach has been taken.

4.1.3. Estimating the Impact of Transactions Costs and Market Liquidity on the Cost of Capital

The authors of Annex II ascribe the relationship between the cost of capital on the one hand, and transaction costs and liquidity on the other, to the requirement by investors of higher expected returns as compensation for higher transaction costs. While true, this is only part of the story. As pointed out by London Economics, the benefits of the integration of financial markets include: lower liquidity risk (as turnover increases), and less uncertainty about an asset’s value as a result of more informative prices and improved price transparency (as the quality and amount of information reflected in prices increases). These all result in a lower return required by investors on a given equity security.

The second step of the analysis in Annex II sets out to estimate the elasticity of the cost of capital with respect to the bid-ask spread (as a proxy for transaction costs) and trading turnover (as a proxy for liquidity). This estimated elasticity is combined with the estimated relationship from the first stage (bid-ask spread and turnover) as well as the estimated reductions in transactions costs reductions arising from financial integration (from Annex I) to estimate the resultant change in the cost of capital from the elimination of the extra costs of cross-border post-trading.

Modelling Issues

The cost of capital is modelled as a function of transactions cost and market liquidity, where the cost of capital is approximated from the current year’s dividend yield and the transactions costs and market liquidity are approximated by the quoted bid-ask spread and the trading turnover, as before. The authors base their model on the work of Domowitz and Steil (2000), and use as a measure of investors’ required return on the equity shares of a company a simple constant growth dividend discount model:

\[ k_{Ei} = \frac{d_{i1}}{P_{i0}} + g_i, \]  

(2)
where $k_{Ei}$ is the cost of equity for company $i$, $d_{i1}$ is the dividend per share expected to be paid by company $i$, $p_{i0}$ is today’s price per share of company $i$’s shares, and $g_i$ is the expected long-term growth rate of dividends. However, the authors of Annex II appear to ignore the expected growth rate and use only the dividend yield as the measure of the cost of equity.

The choice of measure of the cost of capital used in Annex II has some important implications for the subsequent analysis and ensuing calculations of the economic impact. The constant growth dividend discount model in equation (2) is not suitable for all companies. In particular, it will lead to underestimating the required return for companies experiencing growth rates that are higher than the long-term growth rate. Secondly, the expected growth rate is an important component of required returns, and ignoring it will lead to understating the cost of capital even for those companies where equation (2) is the appropriate measure. Thirdly, not all companies pay a dividend to shareholders, particularly companies experiencing high growth; for such companies the dividend yield in (2) will be zero, and the cost of equity capital will again be understated.

The model of the relationship between the cost of capital and transactions costs and liquidity estimated in Annex II is:

$$c_{ci} = \sum_j \gamma_j c_{ci-j} + \beta tc_{t} + \beta tt_{t} + \theta_i + \alpha_i + \varepsilon_{it}, \quad (3)$$

where $c_{ci}$ is the cost of capital for company $i$, and the other variables are as defined above. In order to avoid mis-specified regressions, lagged values of the cost of capital are included; the sum of the estimated coefficients on the lagged dependent variables will give an estimate of the degree of persistence in the equation. The estimated coefficient for the trading costs (the quoted bid-ask spread) is statistically and economically significant; however, the coefficient for turnover is not.

Since the authors have previously found a statistically significant linear relationship between the trading costs and turnover, the estimated regression of the cost of capital is likely to suffer from a statistical problem known as multicollinearity – a linear relationship between two or more independent variables – which can lead to problems with the estimated coefficients and their standard errors. There exist multiple tests and statistical techniques which can be used to overcome the problems inflicted by multicollinearity, but the authors do not discuss any specific attempts to deal with this issue. Moreover, had the authors estimated the relationship between trading costs and turnover as a system of equations rather than as a univariate equation, this problem could have been avoided.

**Heterogeneity Across Countries**

The modelled relationships show a high degree of heterogeneity across countries; this can be seen in Table 10, which reproduces the dynamic specifications.65 This would suggest that reductions in transactions costs could have different impacts on the costs of capital – and ultimately the overall economic activity – in different countries in the EU.66 This result is not surprising given the differences in the post-

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65 The regression coefficients are not provided for the model specifications relied on in the further analysis.
66 The results for three countries – Belgium, Denmark and Greece – are problematic. “No reasonable results could be obtained” for Greece, and for Belgium and Denmark “the long-run effect cannot be computed”. Working Document, Annex II, p.12.
trading industry structures and in the cost of capital in different countries of the EU.\textsuperscript{67} However, the authors do not use these estimates to present country-specific analysis. In the further analysis the authors rely on the between effects estimated elasticity for the EU 14 countries of -0.19.\textsuperscript{68} It is not clear whether the inclusion of country specific data for all EU 25 countries would substantially change the results, however given the much higher level of transactions costs in the Eastern European markets it is likely. The authors do not provide enough information to allow us to re-estimate their results on a country-specific basis.

The analysis fails to take account of different market mechanisms in the different countries in the EU, by relying on the estimated elasticity for the 14 EU countries as a whole. This is particularly relevant in relation to the new accession countries, for which data is not included in this analysis. For example, Stoll (2000) and Domowitz et al. (2001), both cited in Annex II, have shown that the type of market (for example, dealer vs. limit order book) will affect the costs of trading.\textsuperscript{69}

The authors also claim that “the estimation of the price elasticity is of minor importance with respect to the impact on the cost of capital.”\textsuperscript{70} This is contradicted, however, by the results in Domowitz and Steil (2000), Stoll (2000), and Domowitz, Glenn and Madhavan (2001).


\textsuperscript{68} As for the relationship between turnover and transactions costs, the fixed effects estimated elasticity is significantly lower, while the dynamic specifications lead to significantly higher estimates.

\textsuperscript{69} See Appendix B herein for a more detailed review of these papers, as they apply to the analysis in Annex II.

\textsuperscript{70} Annex II, p.12.

### Table 10
Dynamic Specifications for the Cost of Capital

<table>
<thead>
<tr>
<th></th>
<th>Estimated Persistence</th>
<th>Estimated Coefficient of Trading Costs</th>
<th>Estimated Coefficient of Turnover</th>
<th>Estimated Long-Term Trading Cost Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>0.490</td>
<td>1.189</td>
<td>0.071</td>
<td>2.189</td>
</tr>
<tr>
<td>France</td>
<td>0.679</td>
<td>0.151</td>
<td>0.084</td>
<td>0.205</td>
</tr>
<tr>
<td>Germany</td>
<td>0.142</td>
<td>0.320</td>
<td>0.042</td>
<td>0.323</td>
</tr>
<tr>
<td>Italy</td>
<td>0.657</td>
<td>0.198</td>
<td>0.051</td>
<td>0.427</td>
</tr>
<tr>
<td>Spain</td>
<td>-0.241</td>
<td>0.225</td>
<td>0.034</td>
<td>0.153</td>
</tr>
<tr>
<td>Austria</td>
<td>-1.213</td>
<td>0.337</td>
<td>-0.128</td>
<td>0.211</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.057</td>
<td>0.097</td>
<td>0.036</td>
<td>n.a.</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.865</td>
<td>0.239</td>
<td>-0.067</td>
<td>2.272</td>
</tr>
<tr>
<td>Finland</td>
<td>0.818</td>
<td>0.105</td>
<td>-0.006</td>
<td>0.612</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.002</td>
<td>-0.011</td>
<td>-0.005</td>
<td>n.a.</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.155</td>
<td>0.244</td>
<td>0.084</td>
<td>0.188</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.462</td>
<td>0.168</td>
<td>-0.030</td>
<td>0.368</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.807</td>
<td>0.332</td>
<td>-0.009</td>
<td>1.768</td>
</tr>
<tr>
<td>Average</td>
<td>0.437</td>
<td>0.276</td>
<td>0.012</td>
<td>0.792</td>
</tr>
</tbody>
</table>

\[ cc_{it} = \sum_{j} \gamma_{j} cc_{it-j} + \beta_{1}tc_{it} + \beta_{2}tu_{it} + \theta_{t} + \alpha_{i} + \epsilon_{it} \]

Source: Annex II, Table 8.
4.1.4. Estimating the Impact of Changes in the Cost of Capital on GDP

In the final stage of the analysis estimates the impact of a change in the cost of capital on the level of GDP. The authors rely on a variant of the Cobb-Douglas model of GDP growth with estimates of key parameters, including the estimated change in the cost of capital, to calculate the change in GDP:

\[ \ln Y = \ln A + \alpha \ln L + (1-\alpha) \ln K, \]

where \( Y \) is GDP, \( A \) is a parameter for total factor productivity, and \( L \) and \( K \) are labour and capital with their share as \( \alpha \) and \( (1-\alpha) \) respectively. In this specification, the cost of capital is the equilibrium marginal product of capital, \( MPK \).

Heterogeneity Across Countries

Again, average values for the EU are applied for key parameters to estimate an overall impact of reductions in transactions costs on GDP. While this approach is consistent with the use of average parameters elsewhere in the analysis, as noted above the results indicate significant heterogeneity across countries. Taking an average approach may therefore hide substantial dispersion in potential gains across different regions of the EU. It would therefore have been informative to present the results for individual countries, to highlight any substantial differences across countries, and to confirm that an average approach does not lead to unduly large deviations from the country-specific results.

4.2. Key Uncertainties and Sensitivity of Econometric Results

While average estimates provide useful information, it is important to understand how robust they are to key assumptions, to identify key sensitivities and to understand the ranges of uncertainty. Analysing sources of uncertainty in econometric analysis may also help to identify gaps in information or understanding, and to assess both the potential value of new information and which new information should be collected. In this section we discuss a number of aspects of uncertainty around the Commission’s analysis, with particular focus on the sensitivity of the Commission’s results to key underlying assumptions.

The authors of Annex II present a number of sensitivity analyses around their central estimates. As discussed above, the econometric analysis exhibits a wide range of uncertainty around the central estimates. Undertaking single-factor sensitivity analysis with respect to trading costs, the authors estimate the relationship between reductions in the bid-ask spread\(^{71}\) and increases in GDP as depicted below, where the upper and lower bounds are based on deviation from mean values of 30\%. The authors do not provide any basis for their choice of confidence interval. Not surprisingly, the estimated transactions cost reductions shows a wide distribution of possible gains, as shown in Figure 7 of Annex II, which constitutes the extent of the Commission’s sensitivity analysis.

\(^{71}\) Where the estimated reduction in transactions costs are used as the reduction in the bid-ask spread.
Factors not Accounted for in the Analysis

There are a number of factors which have not been taken into account in the analysis, some which would likely increase the estimated benefit from integration and some which would likely reduce it.

A key uncertainty to consider is the extent and pace of future financial integration. As previously discussed, the extent of post-trading integration differs extensively across different national and regional market segments in the EU. The Commission’s quantitative analysis implicitly assumes “full integration”, i.e. removal of all barriers to cross-border trading. In reality what is likely to occur is an “intermediate case” where barriers to cross-border trading decrease in varying proportions across the EU. For example, it is likely that regional groupings may develop where cross-border trading is integrated, reflecting the predominance of market activity.

The econometric results indicate significant heterogeneity across different regional exchanges. Estimating an “average” reduction across the EU may therefore hide substantial dispersion in potential gains across different regions of the EU. It would therefore have been informative to present the results for individual countries, to highlight any substantial differences across countries, and to confirm that an average approach does not lead to unduly large deviations from the country-specific results. The authors do not provide enough information to enable us to produce such an analysis. We would therefore encourage the Commission to publish their dataset so that we and others can undertake additional work on this important topic. Any differences in potential gains would also help inform whether there are differences in the appropriateness of initiatives across countries.

Additionally, the authors note that because the estimated relationship assumes iso-elasticity, i.e. the elasticity is the same for every level of transactions costs (which may not hold in reality), differences in estimated parameters should not necessarily be interpreted as indicating differences in the magnitude of impact of reductions in transactions costs. Even with iso-elastic demand curves, however, the estimated relationship will hold at the mean. Thus the difference in estimated coefficients indicates differences in responsiveness to a reduction in trading costs at the mean.

The extent of market integration will have an impact on the reduction in unit costs that will be achieved. Likewise, the speed of adjustment will have an impact on the estimated benefits, particularly with reference to the evolution of the counterfactual. Furthermore, the behavioural relationships of market participants may change over time.

There are also a number of unaccounted for factors which would likely increase the estimated benefits from integration. The Commission highlights a number of areas of further possible benefits from integration of the post-trading industry which they have not accounted for in their analysis. It is unlikely to be possible to model or quantify the impact of such changes with a reasonable degree of certainty. It again highlights the uncertain nature of this type of analysis.
Conclusion

It is inherently difficult to quantify the economic effects of integration of European post-trading infrastructures, and any such estimates will inevitably be associated with a significant degree of uncertainty. A number of studies, however, have presented estimates which suggest that the possible benefits from achieving a more integrated EU post-trading infrastructure may be very significant. The Working Document prepared by the European Commission assesses that post-trading infrastructure integration could increase EU-wide GDP by as much as 0.2%-0.6%. We have noted a number of shortcomings in this study. However, even if such estimates were to be found to be overly optimistic, they indicate the potential for substantial gains are achievable from increased integration of these infrastructures, and this very important topic deserves continued attention.
5. **Post-trading Within the Overall Context of the Financial Markets**

The Commission and other studies have pointed out that one reason for the relative lack of cross-border trading is the higher and/or additional costs involved in the clearing and settling of such trades. However, that is not the only reason. As we discuss below, there are numerous factors that have been considered as possible explanations for the persistent fact that investors in all countries tend to invest less in foreign assets than is considered “optimal” or prudent.\(^{72}\)

True financial market integration involves all parts of the value chain, and it is therefore crucial to consider the question of post-trading in the larger context of integration of all parts of the financial market infrastructure and how changes and consolidation in other parts of the value chain can and have affected the post-trading industry cross-border trading. To that end, we discuss in this section:

- Whether the increase in cross-border trading envisioned by the Commission is likely to come from new trading, or from existing domestic investing.

- The various factors (other than transactions costs) that can cause investors to invest less internationally than financial theory suggests they should. This is known as the home country bias, and could act as a brake on the volume of cross-border trading if it persists even after the higher costs of cross-border trading are eliminated.\(^{73}\)

- The different role of institutional and individual investors and their likely participation in international investing; and

- Whether there are market mechanisms already in place that have allowed investors to make international investments without having to trade cross-border (this includes cross-border listing, consolidation of exchanges, exchange-traded funds (“ETFs”), and the marketing of international investment funds and UCITs).

Users of clearing and settlement services, both brokers and investors, are increasingly sensitive to the prices charged for those services. For many sophisticated institutional investors (for example, algorithmic traders), transactions costs can materially affect the attractiveness and profitability of a trade; therefore, any changes in market structure or regulatory policy that lead to reductions in one or more components of transactions costs can reasonably be expected to lead to an increase in trading activity.

The Commission has, in Annex II of the Working Document, attempted to estimate the expected impact of a reduction of transactions costs on trading, and through trading overall economic activity. However, the measure of transactions costs used in their analysis, the bid-ask spread, is not truly representative of the transactions costs associated with clearing and settlement (see more detailed discussion, above).

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\(^{72}\) The terms “optimal” and “prudent” are here used in the context of modern portfolio theory, and denote portfolio allocations that either maximise expected utility of wealth (optimal) or that minimise the expected volatility of the investor’s portfolio (prudent).

\(^{73}\) “Nevertheless, investors may be expected to rebalance their portfolio towards foreign securities due to the reduction of cross-border custody fees.” Annex I, p.25.
The Commission clearly envisions that the increased level of financial market integration that will be created by removing the remaining barriers to cross-border trading will lead to higher levels of trading.\textsuperscript{74} An important question that, so far, has not been addressed by the Commission is whether this increase in cross-border trading hypothesised by the Commission will be new, additional trading that otherwise would have not taken place, or will it be the result of investors reallocating their portfolios?

5.1. The Source and Nature of the Cross-Border Trading

Annex II of the Working Document contains the Commission’s quantitative assessment of the expected impact on trading (what the Annex uses as a proxy for market liquidity) of a reduction in transactions costs of the magnitude associated with the elimination of the extra costs of cross-border trading. Their analysis asserts that a decrease of 1\% in trading costs (\textit{ceteris paribus}) will lead to an increase in trading turnover of approximately 1\%.\textsuperscript{75} This suggests that the 7\% to 18\% range by which trading costs could be reduced by eliminating the extra post-trading costs associated with cross-border trades would lead to a 7\% to 18\% increase in total trading of shares in Europe.

Laying aside the econometric and data issues with the model that is the basis for this conclusion (discussed elsewhere in this report), there are questions that remain unanswered: for example, where will this large increase in trading come from; and will it be a one-time or a permanent increase.

The type of investor (individuals or institutions) who is likely to invest cross-border in the European Union will similarly have an impact on the extent and magnitude of the potential cost savings and economic impact. This is because of the large economies of scope and scale in financial markets, and the different trading cost structures for individuals and institutional investors.

A feature of recent years has been the increasing presence of institutional investors in share trading. This has occurred in several ways: first, the proportion of share trading done by institutions rather than individual investors has been steadily increasing. This has been due in large part to the fact that individual investors have been shifting away from direct investments in shares to indirect investments in assets such as investment funds and insurance policies.\textsuperscript{76}

The increasing tendency of individual investors to invest indirectly in company shares by buying intermediated products (such as investment funds) rather than by buying shares directly, means that retail trades of the type documented and analysed in Annex III of the Working Document will be increasingly rare and increasingly irrelevant as far as determining the economic impact of changes in cross-border post-trading. Given the large economies of scope and scale in the post-trading industry, a larger portion of trades will be done by institutional investors who tend to incur lower costs on a per share basis than retail investors, and for whom reductions in post-trading fees are likely to be smaller on a relative basis.

\textsuperscript{74} For example, see the Working Document, p.43, and Annex II of the Working Document, p.9.
\textsuperscript{75} Annex II of the Working Document, p.9.
\textsuperscript{76} See, for example, E. Philip Davis, “Pension Funds and European Financial Markets”, 2003.
For example, the implementation of the UCITS Directive which allows the marketing of funds issued by an intermediary in one EU country to investors in other countries, may lead to lower levels of cross-border trading by individuals, since this is an alternative and potentially cheaper way for an individual investor to achieve the same level of international asset allocation at potentially lower cost.\textsuperscript{77}

Recent trends in both the United States and Europe have been for institutional investors to account for an increasing proportion of trading in equity markets. For example, in the United States, institutional holdings increased from 34% of equity capitalisation to 54% during the period 1981 – 1996.\textsuperscript{78} According to another study, institutional investor holdings as a proportion of GDP increased from 42% in 1980 to 58% in 2000 in the United Kingdom, from 20% to 84% in Germany, and from 12% to 120% in France.\textsuperscript{79}

However, institutional investors are not homogeneous in their investment behaviour or cost structure. Pension funds tend to have different investment strategies than investment funds or insurance companies. Within the investment fund universe, there is a wide range of investment behaviours and strategies ranging from the passive approach of index funds to actively managed funds specialising in specific sectors or strategies (for example growth vs. value). Whether an institutional investor is an active or a passive investor will have quite distinct implications for the likelihood of cross-border trading. For example, many active managers use algorithmic trading strategies to locate the best price for a security in all markets in which it trades; such investors are more likely to take advantage of the elimination of the remaining barriers to cross-border trading which in turn means that they will gain from reducing the incremental costs associated with cross-border settlement.

Similarly, institutional investors may also face constraints on their ability to invest in other markets (e.g. as per specifications in their prospectuses) which may limit increases in cross-border trading from this source. If this trend of an increasing proportion of trading by institutional investors continues, we can expect that any increase in cross-border trading will be largely due to the activity of institutional investors. If that is so, then the expected marginal benefit that comes from the reduction in cross-border post-trading costs is likely to be smaller, since the extra costs are smaller for institutions on a per-share basis. However, that could be offset by the fact that institutional investors have considerable market power and therefore are more likely to be successful in negotiating reductions in these fees with CSDs and CCPs.

5.2. Other Factors the Commission Needs To Take Into Consideration

Removing the barriers to cross-border trading may not lead to the higher levels of trading anticipated by the Commission. Factors other than transactions costs may have an impact on investors’ decisions as to whether or not to trade cross-border. These include: the home-country bias; the structure of trading markets and the impact on trading costs; cross-listing; cross-border exchange consolidation; and the increased importance of intermediated products (such as ETFs and UCITs).

\textsuperscript{77} The role of UCITs as a potential means of circumventing the barriers to cross-border investing is discussed below, in Section 5.2.2.
\textsuperscript{79} Davis, E. Philip, 2002, “Pension Funds and European Financial Markets”, Brunel University.
5.2.1. The Impact of Home Country Bias

It has long been documented that investors do not allocate their portfolios across countries in the manner modern portfolio theory would suggest is optimal, and that “foreign” securities are underweighted in the portfolios of both individual and institutional investors. This phenomenon is known as the “home country bias”. For example, European investors overweight domestic equities by from 40 to 60%. In fact, the 2002 White Paper by Clearstream and Deutsche-Börse attribute the low level of cross-border trading volume to home country bias.

An assumption implicit to the Commission’s analysis and discussion of the impact of removing the Giovannini barriers is that they are the only factor preventing European investors from altering the pattern of their investment behaviour and rebalancing their portfolios to eliminate the home equity bias. The Commission implicitly assumes that the higher transactions costs imposed on investors by the barriers are responsible for the home equity bias.

There have been several reasons put forward for the home equity bias, of which transactions costs are only one: others include differences in expected returns across investors in different countries; the perception by investors that investments in foreign countries are “riskier”; investors are more comfortable investing in “familiar” domestic stocks than they are in “unfamiliar” foreign stocks; and “optimal inside ownership theory.”

The Commission’s view of the home bias is based on the transactions cost explanation. This is based on the view that because of incremental transactions costs not faced by domestic investors, one expects investors to hold more domestic stocks than predicted by financial theories, because these costs are effectively a barrier to investment that lessen the benefits of international diversification.

Recent research has shown that transactions costs alone are insufficient to explain the full extent of the home bias in investor portfolios around the world. For example, Glassman and Rodick (2001) develop a mean-variance model of portfolio choice including transactions costs; they show that transaction cost barriers to investment would have to be of an enormous magnitude to provide a reasonable explanation of the home bias effect. Similarly, Ahearne, Griever, and Warnock (2001) show that...
ownership restrictions and transactions costs are only second-order effects in explaining the cross-country holdings of foreign stocks.88

The expected returns explanation for the home bias is derived from mean-variance analysis where, in the absence of exchange rate risk, there is a linear relationship between expected returns and country weights in the optimal portfolio. French and Poterba (1991) introduce the concept of heterogeneous expectations, and show that to hold a portfolio biased towards the home market an investor would have to expect more (less) return from the home (foreign) market than equilibrium expected return. They conclude that “substantial differences in expected returns across countries are needed to rationalize observed portfolio holdings.” 89 Moreover, institutional differences between markets, such as differential taxes, transactions costs, management and custodial fees, cannot explain the observed differential.

A related line of explanation holds that foreign investments seem “riskier” to investors than domestic investments. This is a case of heterogeneous expectations, where it is the expected risk (measured by the variance-covariance matrix) of assets that differs rather than the expected returns. While it can explain some of the home bias effect, it is not sufficient to explain the degree of home bias that is observed in investor portfolios.

To explain the home bias phenomenon, recent research has suggested that behavioural models are required: in such a model, investors in one country consider investments in other countries to be riskier than they really are. This differential view of riskiness arises from a lack of familiarity with investments in other countries. As developed in the research of Huberman (2001) and Gehrig (1993), this is a type of asymmetric information approach, where the amount or quality of information about foreign investments is inferior to that about domestic investments.

Finally, the “optimal inside ownership” explanation of the home bias effect put forward by Kho, Stulz, and Warnock is based on corporate governance. Since foreign investors can only own shares not held by insiders there will be a large home bias in countries in which insiders own large stakes in companies. Therefore, for the home bias to be substantially reduced, insider ownership has to decrease in countries where it is high. Concentrated inside ownership is likely to occur in countries where corporate governance is poor, so that improvements in corporate governance make it possible for ownership of companies to become more disperse and for the home bias to decrease. They find that data on US investors and for Korean companies supports their theory.

There is also recent evidence that the home country bias in Europe is not likely to be eliminated, because of structural changes in the European economy and markets.90 The chief benefit of diversification, namely the reduction in risk by allocating investments across multiple assets and/or markets, depends on the assets in question being less than perfectly correlated. If the degree of correlation between two assets or markets increases, due to elimination of barriers, the reduction or elimination of currency risk, or changes in market structure, then there will be fewer

89 French and Poterba (1991), op. cit., p.223.
diversification opportunities. In other words, the “cost” of the home country bias is reduced.

Adjaoute and Danthine (op. cit.) show that this has in fact been the case within the Eurozone, and that “the increased conformity of stock returns implies that international diversification across the Euro-area on the basis of a pure country allocation model has increasingly smaller benefits.” They find that diversification opportunities are much better across industrial sector levels than across countries. Since it is possible to diversify across sectors without having to purchase “foreign” securities the home country bias may persist despite the removal of barriers to cross-border investing.

5.2.2. Circumventing Barriers to Cross-border Trading

5.2.2.1. Cross-Listing

One of the most enduring traits of the financial markets is their ability to find ways around barriers: many financial products that are now taken for granted came about because of a perceived need to overcome a problem or circumvent a barrier (physical, legal, or regulatory). It is entirely plausible that participants in the European financial markets might have developed products or other solutions to the problem of cross-border investing. The list of possible ways to circumvent the barriers to cross-border trading includes: the listing of equities in multiple countries and/or multiple exchanges; the consolidation of exchanges and trading platforms which can lead to effectively the same result; and the development of new products by regulators and financial institutions.

As pointed out by Deutsche-Börse and Clearstream International in their 2002 White Paper, there are different implications for total trading costs for trades in dual-listed shares than there are for cross-border trades. Dual-listed shares typically have lower direct costs than buying the same shares in a cross-border transaction, since the trade is a domestic transaction for the investor. However, the trading volume is typically much lower than in the home market for the same shares, and thus the indirect trading costs, mostly market impact, are likely to be much higher for large trades in the dual-listed market than in the home market.

Since liquidity costs, mainly comprised of the bid-ask spread and market impact, have been shown to be the dominant cost factor for institutional investors, we can reasonably expect this group to trade in the market which has the highest liquidity, usually the issuing company’s home market. Because liquidity costs are a function of trade size, the savings in these costs will most likely be larger than the higher absolute direct cost of a cross-border trade. An exception to this is the case of companies whose home market is relatively small and whose shares are heavily traded on the major exchanges (for example, Nokia in London and Frankfurt).

On the other hand, since most retail investors do not trade in order sizes where market impact costs come into play, the liquidity cost differential between the foreign market and the investor’s home market where the shares are dual-listed are not relevant. Instead, the higher direct cost of the cross-border trade is likely to lead

91 For example, interest rate swaps, index funds, exchange traded funds, mortgage backed securities.
these smaller investors to trade the dual-listed shares rather than undertake a more expensive cross-border transaction.

This discussion naturally raises the question of the extent to which trading in cross-listed securities takes place. One of the largest exchanges in Europe, in terms of the number of companies listed and the trading turnover is the London Stock Exchange. As Figure 2 shows, there has been substantial trading turnover of European companies that have cross-listed on the London Stock Exchange, particularly those from France, Germany, Italy, and Spain.93

**Figure 2**
Trading Turnover of European Cross-Listed Companies on the London Stock Exchange

![Trading Turnover of European Cross-Listed Companies on the London Stock Exchange](chart)

Source: London Stock Exchange.

Similar to cross-listing, in terms of the effect for investors, is the consolidation in the market for stock exchanges in Europe: we discussed some of these trends in Section 2.2. Of particular note in this regard is Euronext, which since 2004 has had a single trading platform for all approximately 1,200 companies listed in the four countries whose stock exchanges form part of the consortium (see Table 11). One side effect of this aspect of financial markets integration is that Euronext has disposed of all its post-trading activities, which are handled by LCH.Clearnet and Euroclear. The single trading platform means that shares traded are effectively cross-listed, without needing to be in practice. Table 11 shows the number of companies (and their market capitalizations) effectively cross-listed in this manner; while the total number of companies and shares traded may not have increased, it is important to realize that the consolidation of the national exchanges into a single trading platform has led to an effective cross-listing.

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93 We attempted to determine the extent of dual-listing on other European exchanges, but were unable to ascertain a breakdown by country of origin of the dual-listed companies.
Table 11
Effective Cross-Listing by Exchange Consolidation: Euronext

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Listed Companies</td>
<td>1,484</td>
<td>1,392</td>
<td>1,333</td>
<td>1,259</td>
<td>1,210</td>
</tr>
<tr>
<td>Market Cap of Listed Companies (€ million)</td>
<td>1,477,137</td>
<td>1,646,178</td>
<td>1,796,036</td>
<td>2,294,828</td>
<td>2,812,000</td>
</tr>
<tr>
<td>Total Turnover (€ million)</td>
<td>1,570,395</td>
<td>1,359,595</td>
<td>1,542,967</td>
<td>1,783,446</td>
<td>2,375,474</td>
</tr>
</tbody>
</table>

Source: Euronext website (www.euronext.com).

As discussed above, NOREX is an association of eight stock exchanges in northern Europe and the Baltic. Table 12 shows the number of companies listed, the market cap of the listed companies and the number of shares transactions on the NOREX exchange.

Table 12
Effective Cross-Listing by Exchange Consolidation: NOREX

<table>
<thead>
<tr>
<th>Stock Exchange</th>
<th>December 2003</th>
<th>June 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Listed Companies</td>
<td>Market Cap of Listed Companies (€ million)</td>
</tr>
<tr>
<td>Iceland</td>
<td>48</td>
<td>7,361</td>
</tr>
<tr>
<td>OMX Copenhagen</td>
<td>195</td>
<td>96,438</td>
</tr>
<tr>
<td>OMX Helsinki</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>OMX Riga</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>OMX Stockholm</td>
<td>282</td>
<td>255,536</td>
</tr>
<tr>
<td>OMX Tallinn</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>OMX Vilnius</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Oslo Børs</td>
<td>180</td>
<td>81,907</td>
</tr>
<tr>
<td>Norex(1)</td>
<td>705</td>
<td>441,242</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Number of Listed Companies</th>
<th>Market Cap of Listed Companies (€ million)</th>
<th>Number of Transactions Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iceland</td>
<td>21</td>
<td>19,562</td>
<td>80,644</td>
</tr>
<tr>
<td>OMX Copenhagen</td>
<td>181</td>
<td>150,054</td>
<td>2,673,702</td>
</tr>
<tr>
<td>OMX Helsinki</td>
<td>137</td>
<td>206,698</td>
<td>3,995,263</td>
</tr>
<tr>
<td>OMX Riga</td>
<td>41</td>
<td>1,770</td>
<td>20,573</td>
</tr>
<tr>
<td>OMX Stockholm</td>
<td>271</td>
<td>383,263</td>
<td>8,907,227</td>
</tr>
<tr>
<td>OMX Tallinn</td>
<td>16</td>
<td>2,717</td>
<td>23,779</td>
</tr>
<tr>
<td>OMX Vilnius</td>
<td>43</td>
<td>5,898</td>
<td>59,640</td>
</tr>
<tr>
<td>Oslo Børs</td>
<td>206</td>
<td>206,201</td>
<td>4,647,424</td>
</tr>
<tr>
<td>Norex(1)</td>
<td>905</td>
<td>976,162</td>
<td>20,408,252</td>
</tr>
</tbody>
</table>

Notes: (1) Excludes multiple listings of the same companies within NOREX. (2) Not yet a member of NOREX.
Source: NOREX Exchange website (www.norex.com).

The key implication of both Table 11 and Table 12 is not the change in the number of listed companies or the number of shares traded (both of which are primarily affected by factors other than cross-border barriers). Rather, it is that each and every one of those listed companies could have their shares purchased or sold by any investor in any of the other associated markets, without the usual cross-border restrictions or impediments.

Therefore, the Commission’s goal of integrated securities markets where investors can and do invest across national boundaries at the same (or similar) cost as a domestic transaction is to a large extent closer to being achieved. While clearing and settlement have not kept pace with the developments in cross-border trading, the necessary steps to achieve a similar degree of consolidation are in process.

In terms of consolidated, integrated trading markets, there are presently two platforms (Euronext and NOREX) incorporating twelve exchanges (four and eight, respectively). Figure 3 shows how much trading is taking place on these exchanges, and compares them with trading in equities in the other European equities markets.
Figure 3 shows that as the consolidation among exchanges has removed the trading barriers between a large number of exchanges, they come to account for a growing fraction of the total trading turnover in equities in Europe. This is particularly true of Euronext, where the consolidation of the three exchanges in Belgium, France, the Netherlands, and Portugal has created the second largest exchange in Europe in terms of the value of shares traded.

5.2.2.2. New Products

Another way in which cross-border trading has been taking place has been through the development of offerings of investment funds that either specialise/concentrate in “foreign” (from the viewpoint of the investor) shares, or funds aimed at “foreign” investors (from the viewpoint of the fund manager) through the UCITS passport. As described above, the trend in recent years has been for less trading in shares by retail investors and more investing through intermediated products such as investment funds and UCITs.

UCITS are a new investment vehicle, and so it is not surprising that the trading turnover is considerably smaller than for equities. Some exchanges apparently do not report UCITs trading statistics as a separate item to FESE, leaving gaps in the data and making formal comparisons hard.

Finally, one of the fastest growing investment vehicles in recent years has been exchange traded funds (ETFs). These assets can be traded, as their name implies, like individual company shares on stock exchanges, but they have the same risk
profile as investment funds. According to the Financial Times, there were almost 400 ETFs listed around the world as of the end of 2005. Of this total 28 are listed in the UK, of which 15 represent investments in European markets other than the UK. ETFs are not limited to equity markets, but also provide exposure to fixed income and property markets. Most ETFs are designed to track the total returns of a specific index (e.g., the DJ Euro STOXX 50) or a specific investment style (e.g., the DJ Euro STOXX Value).

As of July 2006, there were 216 ETFs in Europe with assets of $71.3bn; the volume of trading in ETFs is a relatively small (but growing) fraction of total turnover. Most observers expect the number and size of ETF offerings in Europe to increase significantly in the next few years. The FSA notes that trading in ETFs in the UK doubled in 2005 from 2004.

The impact of all these (and others that we may not have mentioned) mechanisms that are economically equivalent to cross-border trading, is to provide a way for investors to invest internationally more cheaply than a cross-border trade. In the case of cross-listing and ETFs this is clearly the case as they are settled as domestic transactions. It may also apply to UCITs and international investment funds.

In the case of the two consolidated exchanges it is not yet the case that a cross-border trade will execute as cheaply as a domestic transaction, but according to both Euroclear and NOREX this will be the case once the associated infrastructure is completed.

With international investment funds, the cross-border trading is being done by the fund manager rather than by investors and since institutional post-trading costs are significantly lower than they are for individual investors total costs will be lower than they would be if all the individuals had done the trades themselves. Whether the total costs are lower than the equivalent domestic transactions would have cost is an empirical question that cannot be readily answered.

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6. Summary and Conclusions

In this report we have reviewed the Working Document released by the Commission and examined its analysis, methodology and conclusions. We have focused on the quantitative analysis of the gains from integration of the European post-trading services industry.

We note with interest the Commission’s recently stated intention of undertaking a major study of the post-trading industry. We would encourage the Commission to address in its study the areas of ambiguity and uncertainty we have identified in this report. The following summarises some of the key points made within the body of this report.

Comments on the estimated reduction in trading costs arising from eliminating the barriers to cross-border trading

We have identified a number of areas where the estimates of the potential reduction in trading costs arising from integration of the European post-trading industry derived by the Commission are subject to uncertainty, the impact of which can be quantified, and a number of areas of uncertainty, the potential impact of which we cannot quantify but which we expect to have a material impact on the results.

Additionally, we have identified a number of areas where the analysis could be extended (or contracted) to provide additional insights into the nature of the results. The lack of transparency between studies on which the Working Document relies, and availability of only high level data, both impede being able to make reliable and accurate estimates about the economic impact of removing the barriers to cross-border trading.

The common problem is the lack of up to date data in a common framework and collected and provided in a consistent and transparent manner. It is for this reason that we welcome the Commission’s announcement that it will conduct a major study of the post-trading industry, and that part of that study will include gathering data.

Wider implications of the Commission’s econometric analysis

We note a number of observations about the econometric analysis contained in Annex II of the Working Document.

The econometric results indicate significant heterogeneity across different regional exchanges. Estimating an “average” reduction across the EU may therefore hide substantial dispersion in potential gains across different regions of the EU. It would therefore have been informative to present the results for individual countries, to highlight any substantial differences across countries, and to confirm that an average approach does not lead to unduly large deviations from the country-specific results.

The econometric analysis as presented does not differentiate between domestic and cross-border trades. It is not clear what proportion of the share data relied upon represents cross-border trades, or whether the characteristics of the average cross-border trade are similar to those of the average domestic trade in terms of trade size, frequency of trades inside and outside the bid-ask spread. Furthermore, the authors do not appear to have tested whether the underlying economic relationships differ between domestic and cross-border trades; it is possible that the relationship between market liquidity and transactions cost would differ depending on the price of
trades. We would therefore suggest that when creating the new dataset on post-trading activities that such data be incorporated to allow this level of analysis.

Similarly, access to more, better and more recent data will remove the necessity of having to use a measure of implicit trading costs as a proxy for the true variable of interest, namely the total trading costs associated with cross-border trading.

Finally, the Commission’s quantitative analysis implicitly assumes “full integration”, i.e. removal of all barriers to cross-border trading. In reality what is likely to occur is an “intermediate case” where barriers to cross-border trading decrease in varying proportions across the EU. Therefore it would be beneficial to the Commission and to industry participants to have an estimate of the economic impact of the intermediate case.

**Wider considerations**

There are several areas that we feel have not been addressed by the Commission in its work to date that can have an impact on cross-border trading, and therefore on clearing and settlement. True financial market integration involves all parts of the value chain, and it is therefore crucial to consider the question of post-trading in the larger context of integration of all parts of the financial market infrastructure and how changes and consolidation in other parts of the value chain can and have affected the post-trading industry cross-border trading.

The type of investor (individuals or institutions) who is likely to invest cross-border in the European Union will have an impact on the extent and magnitude of the potential cost savings and economic impact. This is because of the large economies of scope and scale in financial markets, and the different trading cost structures for individuals and institutional investors.

The Commission implicitly assumes that the higher transactions costs imposed on investors by the barriers are responsible for the home equity bias, and that removing these barriers will remove the home bias. However, there is considerable research which shows that transactions costs by themselves are insufficient to explain the home bias. Therefore, it is unlikely that removing the barriers to cross-border trading will by itself remove the home bias effect.

Financial markets do not wait for regulators to find solutions to problems or remove barriers. The list of possible ways in which investors can presently circumvent the barriers to cross-border trading includes: the listing of equities in multiple countries and/or multiple exchanges; the consolidation of exchanges and trading platforms which can lead to effectively the same result; and the development of new products.

Finally, we recognise the enormous difficulties involved in a study of such scope as that undertaken by the Commission, particularly when there is a paucity of appropriate data which then requires using less than ideal proxies, and when dealing with the many types and varying sized markets of the European Union. We trust that our comments will be taken in the appropriate spirit, as suggestions for improvement rather than as criticisms.
7. Bibliography


European Central Bank, “The Eurosystem is evaluating opportunities to provide settlement services for securities transactions”, press release, 7 July, 2006.


Europolitics, “Clearing and Settlement: Code of Conduct Finally Signed”, 8 November 2006;


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Appendix A.  The Post-trading Process

In this Appendix we set out the elements of the post-trading process. Our discussion is brief, as these have been discussed by others in great detail elsewhere.95

The elements of the post-trading process are illustrated in Figure A.1 below, which also sets out the necessary elements of the trading process which precedes them. The figure shows the activity chain and the type of organization responsible for each step in the process. The process is generic, although there may be differences in the types of organization providing each component of the service between different jurisdictions.


The clearing function is the first step in the post-trading process and represents the link between trading and settlement – the clearing process starts once the counterparts have executed a trade and ends with agreement on, and issuance of, settlement instructions. Clearing involves finalising the obligations of each party to a transaction, including incorporating and verifying the information required for settlement (securities identification codes, settlement date, settlement venue), and the existence of sufficient funds (buyer) and securities (seller).

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). Moreover, a clearinghouse can act as a Central Counterparty (CCP) by becoming the buyer to every seller and the seller to every buyer, thus assuming the risk of counterparty default (referred to as “novation”). While economies of scale clearly exist in clearing

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services, we are not aware of any study that has examined them in detail, or that has considered whether there is a minimum sufficient volume required for efficient operation.

The settlement function is the process by which ownership of the securities is passed from seller to buyer and funds to pay for them from buyer to seller. After settlement has occurred the transaction is complete. Settlement can either combine the security stage and the funds stage into a single action, or it can treat them separately. If both stages are linked, in what is known as “delivery versus payment” (“DVP”), then the transfer of securities is not legally effective without the funds payment, and vice versa. The term “free of payment” (“FOP”) is used where the two stages are not linked.

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. While historically most settlements involved the physical delivery, today the transfer of ownership typically occurs by means of electronic transfer of dematerialised share certificates.

Where the intermediary is not a direct member of the relevant CSD, a custodian will be employed as an agent to intermediate the transaction (custody services). The custodian would receive securities into a ring-fenced account and may provide further services such as the management of corporate actions, tax services, dividend receipts and interest payments.
Appendix B. Review of Key Papers Relied on by the Authors of the Working Document

The authors of the Working Document and associated Annexes rely heavily on four key studies in formulating their approach and conclusions. While the main part of the report focuses on ways in which the EC uses these studies, this Appendix briefly summarizes the key points and findings of each of them.


Stoll (2000), his presidential address to the American Finance Association, contains both a review of the literature and his own empirical evidence on friction in financial markets. He begins by defining friction as something that “measures the difficulty with which an asset is traded.”96 This can be measured either in terms of the length of time necessary to complete a trade, or by the price concession needed for an immediate transaction; this latter measure is known as the “price of immediacy”. The bid-ask spread is an observable measure of the frictions that exist in financial markets.

Stoll points out that there are two types of friction in financial markets: real frictions, and informational frictions. Real frictions occur because: (i) dealers, market makers and others who supply immediacy in doing so consume real economic resources (capital and labor) that must be paid for; and (ii) because suppliers of immediacy take on inventory risk for which compensation must be provided. Informational frictions, on the other hand, exist because suppliers of immediacy face the possibility of trading with investors who have more or better information about the value of the asset than they do; the bid-ask spread exists to compensate suppliers of immediacy for losses from trading with informed investors.

Stoll then examines different measures of friction, to assess whether they reflect real or informational frictions, or some combination of both. He finds that both quoted and effective spreads measure total friction – in other words, both real and informational friction. The traded spread, on the other hand, is a measure of real friction since it reflects the real earnings for suppliers of immediacy, by estimating what is earned on a round trip.

The model that Stoll estimates, and that is used the Commission in Annex II is:

\[ s_i = a_0 + a_1 \log V_i + a_2 \sigma_i^2 + a_3 \log MV_i + a_4 \log P_i + a_5 \log N_i + e_i , \]  

(1)

Where the \( s_i \) is stock i’s proportional quoted half-spread, \( V_i \) is the daily dollar trading volume, \( \sigma_i^2 \) is the return variance, \( MV_i \) is the stock’s market capitalisation, \( P_i \) is the closing stock price, \( N_i \) is the number of trades per day, and \( e \) is the error term.

The empirical results show that real frictions account for different degrees of total friction, according to the type of market: the auction market of the NYSE has a much lower proportion of real friction (25%) compared with the Nasdaq dealer market (66%).

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The authors of this piece attempt to determine the linkage between the impact of automated trading systems on trading costs, and how that in turn affects the cost of equity capital of issuing companies in North America, Europe, and Latin America. Their primary goal was to estimate what effect automation of the trading process might have on the cost of equity.

They find that reductions in trading costs can have a very large stimulative effect on trading turnover, but that increases in the trading turnover of large capitalisation companies do not have a material impact on the cost of equity. Instead, they find that decreases in trading costs have a significant and direct causal effect on the cost of equity capital.

The cost of equity capital is estimated based on a discounted cash flow model, and is of the form:

\[
k = \frac{DIV_t}{P_0} + g
\]

where \( k \) is the cost of equity (defined as the return required by investors), \( DIV_t \) is dividend expected in the coming year, \( P_0 \) is the current stock price, and \( g \) is the long-term growth rate in dividends. For this study, the authors use as a proxy for \( g \) an estimate of the long-term sustainable growth rate in earnings per share. The authors use two versions of \( k \): \( k_0 \) is the cost of capital using the current year’s dividend as a proxy for \( DIV_t \); \( k_1 \) is the cost of capital using the following year’s actual dividend.

Domowitz and Steil perform both univariate and multivariate regressions of the relationship between trading costs, turnover, and the cost of equity capital. The univariate regressions show that effect of turnover on the cost of equity is economically small and statistically insignificant. For trading costs, however, the elasticities are quite large and statistically significant. The results suggest that a 10% decrease in trading costs in North America or Europe would lead to a 1.2% - 1.5% decrease in the cost of equity capital.

The multivariate regression that is estimated by Domowitz and Steil is of the form:

\[
y_{it} = \alpha_i + \beta_1 c_{it} + \beta_2 \tau_{it} + \epsilon_{it},
\]

where \( y \), \( c \), and \( \tau \) are the cost of capital, trading cost, and turnover respectively, all measured in logs; \( \alpha_i \) is a country-specific effect. The results of these regressions are shown in Table B.1.
### Table B.1
Domowitz and Steil: Multivariate Regression Results

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>United States/Europe (k₀)</th>
<th>United States/Europe (k₁)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading cost</td>
<td>0.008</td>
<td>0.138</td>
<td>0.167</td>
</tr>
<tr>
<td></td>
<td>(0.063)</td>
<td>(0.044)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>Turnover</td>
<td>-0.056</td>
<td>-0.004</td>
<td>-0.016</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.027)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>R²</td>
<td>0.055</td>
<td>0.093</td>
<td>0.095</td>
</tr>
</tbody>
</table>

*Standard errors in parentheses
*Source: Domowitz and Steil (2000), Table 12.5*

Including turnover as an additional explanatory variable to trading cost leads to larger elasticities than when trading cost was the only independent variable. For \( k₀ \), the elasticity increases by about 14%, while for \( k₁ \), it is about 10%. However, it is also the case that the elasticity of turnover on the cost of capital is smaller when trading costs are included than when it is the only explanatory variable.

Domowitz and Steil conclude that once the correlation between trading cost and turnover is taken into account, turnover ceases to have an economically significant impact on the cost of equity. In other words, “trading volume has no effect on the cost of equity capital for large public companies.”


Domowitz et al. document the extent to which execution costs vary with volatility and liquidity across a sample of 42 countries’ equity markets during the period September 1996 to December 1998. The sample includes both developed and emerging equity markets, and of particular relevance to the present study is the fact that the 42 countries include all of the EU 15, as well as the Czech Republic and Hungary – two emerging markets that have since joined the EU.

There is considerable variation in the level of trading costs by country, as can be seen in Table B.2, which reports the data from Domowitz et al. (2001) for those countries presently in the EU. The authors define the two components of trading costs, explicit and implicit, as follows:

- **Explicit costs**: the direct costs of trading, such as broker commission costs, taxes, etc.
- **Implicit costs**: indirect trading costs, the major one being the price impact of the trade.

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The table shows the result of computing trading costs in basis points, as a percentage of trade value. As the authors themselves point out, there are some important limitations to the data used to generate these statistics. First, their sample contains data that is representative only of institutional trades, and therefore does not apply to retail investors. Second, there is no way of distinguishing between different execution venues (e.g., crossing systems or upstairs markets).

### Table B.2
Mean One-Way Equity Trading Costs and Components across Sample Countries: EU Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Costs (basis points)</th>
<th>Explicit Costs (basis points)</th>
<th>Implicit Costs (basis points)</th>
<th>Explicit Costs as Proportion of Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>43.8</td>
<td>30.8</td>
<td>13.0</td>
<td>70%</td>
</tr>
<tr>
<td>Belgium</td>
<td>35.0</td>
<td>25.4</td>
<td>9.6</td>
<td>73%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>143.7</td>
<td>78.7</td>
<td>64.9</td>
<td>55%</td>
</tr>
<tr>
<td>Denmark</td>
<td>40.7</td>
<td>28.1</td>
<td>12.6</td>
<td>69%</td>
</tr>
<tr>
<td>Finland</td>
<td>43.4</td>
<td>27.9</td>
<td>15.5</td>
<td>64%</td>
</tr>
<tr>
<td>France</td>
<td>29.5</td>
<td>22.8</td>
<td>6.7</td>
<td>77%</td>
</tr>
<tr>
<td>Germany</td>
<td>37.7</td>
<td>24.3</td>
<td>13.4</td>
<td>64%</td>
</tr>
<tr>
<td>Greece</td>
<td>65.5</td>
<td>58.2</td>
<td>7.3</td>
<td>89%</td>
</tr>
<tr>
<td>Hungary</td>
<td>143.4</td>
<td>74.8</td>
<td>68.7</td>
<td>52%</td>
</tr>
<tr>
<td>Ireland</td>
<td>130.7</td>
<td>106.0</td>
<td>24.7</td>
<td>81%</td>
</tr>
<tr>
<td>Italy</td>
<td>34.8</td>
<td>26.3</td>
<td>8.5</td>
<td>76%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>63.8</td>
<td>20.1</td>
<td>43.6</td>
<td>32%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>42.2</td>
<td>23</td>
<td>19.3</td>
<td>55%</td>
</tr>
<tr>
<td>Portugal</td>
<td>62.7</td>
<td>43.8</td>
<td>18.9</td>
<td>70%</td>
</tr>
<tr>
<td>Spain</td>
<td>41.9</td>
<td>32.5</td>
<td>9.5</td>
<td>78%</td>
</tr>
<tr>
<td>Sweden</td>
<td>35.8</td>
<td>26.2</td>
<td>9.6</td>
<td>73%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>54.5</td>
<td>39.3</td>
<td>15.2</td>
<td>72%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>61.71</strong></td>
<td><strong>40.48</strong></td>
<td><strong>21.24</strong></td>
<td><strong>68%</strong></td>
</tr>
</tbody>
</table>

Source: Domowitz et al., (2001), Table 1, p.227.

There is also considerable variation in the amount and proportion of trading cost components over time as well as across countries, as can be seen in Table B.3. Note that the level of transaction costs in Eastern Europe is much higher and more volatile than Western Europe. Domowitz et al. further document that the composition of trading costs also changes through time. Overall, implicit costs fall three times faster than explicit costs; this holds both for Western Europe and for Eastern Europe.

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98 One basis point equals 1/100th of 1%, or 0.0001.
Table B.3
One-Way Equity Trading Costs Over Time and by Region

<table>
<thead>
<tr>
<th>Quarter</th>
<th>All Countries (basis points)</th>
<th>North America (basis points)</th>
<th>West Europe (basis points)</th>
<th>East Europe (basis points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996 III</td>
<td>74.9</td>
<td>68.2</td>
<td>52.0</td>
<td>129.0</td>
</tr>
<tr>
<td>1996 IV</td>
<td>77.2</td>
<td>54.0</td>
<td>52.9</td>
<td>148.6</td>
</tr>
<tr>
<td>1997 I</td>
<td>75.0</td>
<td>63.0</td>
<td>50.8</td>
<td>176.3</td>
</tr>
<tr>
<td>1997 II</td>
<td>70.6</td>
<td>49.3</td>
<td>46.8</td>
<td>139.9</td>
</tr>
<tr>
<td>1997 III</td>
<td>71.5</td>
<td>43.8</td>
<td>47.6</td>
<td>123.7</td>
</tr>
<tr>
<td>1997 IV</td>
<td>73.1</td>
<td>51.1</td>
<td>50.3</td>
<td>130.2</td>
</tr>
<tr>
<td>1998 I</td>
<td>67.8</td>
<td>45.9</td>
<td>44.3</td>
<td>133.2</td>
</tr>
<tr>
<td>1998 II</td>
<td>64.5</td>
<td>35.0</td>
<td>44.4</td>
<td>75.0</td>
</tr>
<tr>
<td>1998 III</td>
<td>62.6</td>
<td>32.3</td>
<td>43.2</td>
<td>147.6</td>
</tr>
</tbody>
</table>

Mean 70.8 49.2 48.0 142.8
Std. Dev. 5.0 11.8 3.6 16.6
Maximum 77.2 68.2 52.9 176.3
Minimum 62.6 32.3 43.2 75.0

Source: Domowitz et al., (2001), Table 2, p.230.

The authors then model a triangular, recursive system of equations in order to isolate the dynamic relationship that exists between the key factors, namely volatility, trading costs, and turnover (liquidity). The system is as follows:

\[ A y_{it} = B x_{it} + \lambda_{it} + \epsilon_{it} \]

\[ A = \begin{bmatrix} 1 & -\alpha_{12} & -\alpha_{13} \\ 0 & 1 & -\alpha_{21} \\ 0 & 0 & 1 \end{bmatrix} \] (2)

Where \( y_{it} \) is a vector of dependent variables \( y_{it} = (\tau_{it}, c_{it}, \sigma_{it}) \), and \( \tau_{it} \) is turnover for country \( i \) at time \( t \), \( c_{it} \) is total costs, and \( \sigma_{it} \) is volatility. The vector \( x_{it} \) consists of a set of pre-determined variables that include market capitalisation and dummy variables for emerging markets and geographic regions such as West Europe and East Europe. The advantage of estimating the three equations as a system is that the problems of multi-collinearity and errors in variables described in the main body of the report in the context of Annex II are avoided.


London Economics attempt to quantify the impact of integrating all asset markets in the European Union. For equities and corporate bonds, they first identify the costs of market fragmentation then model the potential economic benefits from removing the barriers to fully integrated markets. In the case of equity markets, the costs of fragmentation are defined in terms of trading costs. The benefits are measured by how the cost of trading will decrease once markets are integrated, which in turn will reduce the cost of capital of listed companies.

The authors base their empirical formulation on a two-equation system, in which one equation models trading costs and the other models trading turnover:
Equation 3.2

\[ tc_{it} = \alpha_0 + \lambda_1 tc_{it-1} + \lambda_2 tc_{2t-2} + \lambda_3 tc_{3t-3} + \alpha_1 \mu_{it} + \alpha_2 \mu_{it-1} + \alpha_3 \mu_{it-2} + \alpha_4 \sigma_{it}^2 + \alpha_5 \sigma_{it-1}^2 + \alpha_6 \sigma_{it-2}^2 + \alpha_7 mdep_{it} + \alpha_8 tick_i + \alpha_9 \text{LARGE} + \sum_j \alpha_{i10} d_{ij} + \sum_k \alpha_{i11} d_{ik} + \epsilon_i + \gamma_{it} \]

Equation 3.3

\[ \mu_{it} = \beta_0 + \delta_1 \mu_{it-1} + \delta_2 \mu_{2t-2} + \delta_3 \mu_{3t-3} + \beta_1 tc_{it} + \beta_2 tc_{it-1} + \beta_3 tc_{it-2} + \beta_4 \sigma_{it}^2 + \beta_5 \sigma_{it-1}^2 + \beta_6 \sigma_{it-2}^2 + \sum_j \beta_{i10} d_{ij} + \sum_k \beta_{i11} d_{ik} + \mu_i + \phi_i + \psi_{it} \]

Where \( tc_{it} \) is trading cost, \( \mu_{it} \) is (the logarithm of) trading turnover, \( \sigma_{it}^2 \) is the return volatility of stock \( i \), \( mdep_{it} \) is the (logarithm of) stock \( i \)'s market capitalisation, \( tick_i \) is the relative tick size of the security, \( \text{LARGE} \) is a dummy variable for large stocks, \( d_i \) is a set of sector dummies, \( d_k \) is a set of country/exchange dummies. Additionally, there are both security-specific fixed effects ( \( f_i \) and \( \mu_i \) ) and time effects ( \( \eta_t \) and \( \phi_t \) ).

The authors point out that one of the advantages of estimating a system of two equations, which involves treating both trading costs and turnover as endogenous, any possible biases in the parameter estimates should be avoided. Estimating equations 3.2 and 3.3, is not straightforward, since there is unobserved heterogeneity in the dependent variables. This is dealt with by taking the first differences of 3.2 and 3.3, which eliminates all variables that are time-invariant but leaves \( tc_{it} \) correlated with one of the regressors (trading turnover), creating the very problem of endogeneity they were trying to avoid. This can be corrected using two stage least squares, where instruments are used in the first stage to estimate the two endogenous variables.\(^99\)

\(^{99}\) The instruments for trading turnover in the trading costs equation are given by their lags (t-2, t-3, t-4); instruments for trading costs in the trading turnover equation are given by their lags and by \( \text{LARGE} \) and \( tick \).
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 City of London Corporation provides.

Older than Parliament itself, the City of London 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 City of London 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 City of London 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.