

SPECIAL INTEREST SERIES



Report prepared for the City of London Corporation
by London Economics
Published October 2010

Understanding the Impact of MiFID

in the Context of Global and
National Regulatory Innovations



City of London Economic Development
PO Box 270, Guildhall, London, EC2P 2EJ
www.cityoflondon.gov.uk/economicresearch

SPECIAL INTEREST SERIES



Report prepared for the City of London Corporation
by London Economics
Published October 2010

Understanding the Impact of MiFID

in the Context of Global and
National Regulatory Innovations



City of London Economic Development
PO Box 270, Guildhall, London, EC2P 2EJ
www.cityoflondon.gov.uk/economicresearch

Understanding the Impact of MiFID in the Context of Global and National Regulatory Innovations is published by the City of London. The authors of this report are London Economics.

This report is intended as a basis for discussion only. Whilst every effort has been made to ensure the accuracy and completeness of the material in this report, the authors, London Economics, and the City of London, give no warranty in that regard and accept no liability for any loss or damage incurred through the use of, or reliance upon, this report or the information contained herein.

October 2010

© **City of London**
PO Box 270, Guildhall
London
EC2P 2EJ

<http://www.cityoflondon.gov.uk/economicresearch>

Table of Contents

Executive Summary.....	1
1 Background and Introduction.....	5
2 MiFID Objectives with Regard to Secondary Market Equity Trading.....	7
2.1 Introduction	7
2.2 Competition and the creation of new markets and services	7
2.3 Transparency.....	9
2.4 Best execution.....	10
2.5 Summary of Chapter 2	11
3 Economic Analysis	12
3.1 Potential impacts.....	12
3.2 Empirical assessment of the impact of MiFID	15
3.3 Conclusions of Chapter 3.....	20
4 Assessing the Macroeconomic Impact of Capital Market Integration – The 2002 London Economics Study	21
4.1 Introduction	21
4.2 Key findings of the 2002 London Economics study.....	21
4.3 Conclusions of Chapter 4.....	24
5 Quantitative Analysis of the Impact of MiFID on Implicit Equity Trading Costs	25
5.1 Introduction	25
5.2 Data sample.....	25
5.3 Statistical estimation of the impact of MiFID on the relationship between the size of the secondary equity markets and implicit trading costs	29
5.4 Macroeconomic impact of changes in trading costs.....	32
5.5 Conclusions of Chapter 5.....	33
6 Stakeholder Consultation	35
6.1 Overview and response rate	35
6.2 Market perceptions on the impacts of MiFID on secondary market equity trading	35
6.3 Market perceptions on transparency requirements	37

Table of Contents

6.4	Market perceptions of best execution	38
6.5	Conclusions to Chapter 6	40
7	Conclusions.....	41
8	References	42
Annex 1	The relevant recitals of MiFID	44
Annex 2	Quantitative Methodology and Detailed Results.....	50
Annex 3	Consultation guide.....	66

Executive Summary

MiFID and its impacts in secondary market equity trading

Since its EU-wide implementation in November 2007, MiFID has significantly modified the environment and structure of secondary market equity trading in Europe. New trading infrastructures have entered the market, resulting in loss of market share for major incumbent stock exchanges and in reduced trading fees in many instances.

While the market structure was adjusting to post-MiFID environment, the average order size fell sharply as a result of structural and technological change and, in response to this, internal crossing (as defined and permitted by MiFID) and trading through dark pools have become more important.

Moreover, supporting and facilitating some of these structural market changes, rapid and substantial technological innovation has contributed to greatly increased transaction speed (i.e. reduced latency) and substantial growth in algorithmic trading.

Given all these changes, it is difficult to separate the effects of MiFID from those resulting from the other structural developments

The key aims of the present study are to clarify whether as the result of MiFID:

- the macroeconomic benefits expected in a previous London Economics study on the macroeconomic impact of the integration of EU financial markets¹ have materialised;
- national liquidity pools have been broken down; and
- pan-European trading has grown more than it would have in the absence of MiFID.

The 2002 London Economics study showed that the full integration of European capital markets would result in lower trading costs of between 25% and 90% depending on the trading venues in the EU comprising 15 Member States (EU15).

This reduction in trading cost was estimated to reduce by between 10 and 50 basis points the returns required by investors over the longer run as trading their holdings becomes less expensive.

In turn, this reduction in the cost of capital, together with a reduction in the cost of debt caused by financial market integration, was shown to stimulate investment over the longer run and hence raises the level GDP over the longer run. Overall, EU15 GDP (at constant prices) was expected to be raised by 1.1% in the long run.²

¹ London Economics, *Quantification of Macro-Economic Impact of Integration of EU Financial Markets*, Final Report to European Commission, Directorate General for Internal Market, November 2002

² This result was obtained from a simulation with the macroeconomic models of the European

The estimates of the 2002 London Economics study on the impact of European financial market integration have been updated for both the pre-MiFID period of January 2006 to October 2007 and the post MiFID period of January 2009 to December 2009. The year 2008 is excluded from the empirical analysis because, as a result of the financial crisis, market conditions were highly unsettled during that year.³

The update focuses on trading cost of a sample of stocks representing the top 50 equities on the set of Euronext exchanges, the London Stock Exchange and the Deutsche Börse; and the top 20 stocks from other regulated markets within the EU-25 plus Switzerland, except for Malta and Luxembourg where data on the top 5 stocks were considered in each.

A simple review of implicit trading costs⁴ on the different equity trading venues in the sample suggests that these costs fell sharply between 2000 and 2001, the period covered by the first study, and 2006-2007. In the more recent period of January 2009 to December 2009, implicit trading costs appear to be higher than in the pre-MiFID period.

However, it may well be inaccurate to attribute the increase in implicit trading costs in the post-MiFID period to liquidity fragmentation brought about by MiFID as many other factors, such as increased volatility and reduced level of trading activity were at play as well.

The estimation results of different models of trading cost are consistent with the finding that the impact of market depth (or liquidity) on implicit trading costs increased sharply between the period 2000-2001 and 2006-07.

In contrast, the statistical analysis in this study shows that estimated impact of market depth on implicit trading costs is almost nil in the post MiFID period while in the pre MiFID period it is economically and statistically significant

This suggests that MiFID has been effective in reducing the barriers between the various trading venues through increased competition.

In other words, MiFID achieved financial market integration in secondary equity trading and thus reduced trading costs. Using the estimates of impact of the reduction of trading costs on the cost of capital and the impact of the latter on GDP from the 2002 study, this study finds that, *ceteris paribus*, MiFID can be said to have raised the long-run level of EU GDP (at constant prices) by about 0.7% to 0.8% percent.

economies of Oxford Economic Forecasting.

³ While 2009 was a much less turbulent year than 2008, it is possible that the 2009 data used in the analysis were still influenced by the lingering effects of the financial crisis and other factors that cannot be controlled-for when undertaking the empirical analysis of the impact of MiFID.

⁴ The implicit trading costs are defined as the effective percentage spread. The latter is equal to two times the ratio of the absolute difference between the effective price and the quote mid-point to the effective price. It is a standard measure used in academic studies of equity trading costs.

Data tracking the distribution across equity trading venues of stocks listed in the main index of the major European incumbent trading venues show that since the introduction of MiFID, non-incumbent trading venues have gained significant market shares. This would not have been possible without the abolition of the concentration rule effective in most national markets prior to MiFID.

The views of stakeholders on the impact of MiFID so far and potential improvements

To complement the empirical analysis, a number of stakeholders were also asked to give the views on the impact of MiFID so far.

The key points emerging from this stakeholder consultation exercise is that:

- MiFID-induced competition among equity trading venues is viewed as having reduced trading costs.
- Savings that arise from lower trading costs have not yet been fully passed by broker-dealers to investors. However, competition among broker-dealers is viewed as likely to increase the pass-through over time.
- MiFID has significantly improved pre-trade transparency.
- Lack of consolidated post-trade price information is viewed by some stakeholders as an issue as impacts on broker-dealers' ability to carry out best execution of trades and investors' ability to monitor whether best execution has taken place.
- The MiFID best execution rule has not yet been fully effective.

Conclusions

On the basis of the analysis we conducted, the answer to the three research questions set out at the beginning of the executive summary are as follows.

First, figures on the split of trading in equities between the trading venues where these equities are listed and other trading venues show that the latter have gained considerable market share.

The abolition of the concentration rule, whereby in many jurisdictions trading in listed equities could only be undertaken on the listing trading venue, has allowed for the emergence of new providers of equity trading services and a broader, more pan-European approach to the offering of a number of equity trading venues.

In other words, pan-European trading has grown more than it would have in the absence of MiFID, as in many instances in the pre-MiFID regime it would not have been possible to offer pan-European trading services.

Second, the estimation results reported in the present study show that in the post-MiFID period, differences in market depth or liquidity across trading venues do not explain differences in observed levels of implicit trading costs.

This observation suggests that the competition among equity trading venues which MiFID brought about allows liquidity to move more freely across trading venues, and that separate pools are now linked. Without competition among

trading venues, it is unlikely that the pre-MiFID separation of liquidity pools would have broken down.

The empirical analysis presented in the report indicates that, *ceteris paribus*, the macroeconomic outcomes expected by the 2002 London Economics study may well have been largely realised. Overall, MiFID is estimated to have raised the long-run level of EU GDP (at constant prices) by about 0.7% to 0.8% percent.

1 Background and Introduction

London Economics were commissioned in May 2010 by the City of London to undertake research designed to develop a *better* understanding of the impact of the Markets in Financial Instruments Directive (MiFID).

MiFID aims to achieve an integrated financial market, in which investors are effectively protected and the efficiency and integrity of the overall market are safeguarded.

Since its EU-wide implementation in November 2007, MiFID has had a profound impact on secondary markets for equity, resulting in significant entry into the provision of equity trading services, a loss of market share of major incumbent stock exchanges and reduced trading fees in many instances.

At the same time, for a variety of reasons, the average trade size has fallen sharply and, in response to this, internal crossing (as defined and permitted by MiFID) and trading through dark pools have become more important.

Some commentators also argue that implicit trading costs, that is, bid-ask spreads, have narrowed as liquidity moves more easily across trading infrastructures.

Supporting and facilitating, if not encouraging some of these structural market changes, has been rapid and substantial technological innovation has occurred, which has contributed to greatly increased transaction speed (i.e. reduced latency) to the point that it has now become one of the unique selling points of new trading infrastructures.

Another important structural development, not directly attributable to MiFID, relates to the substantial growth in algorithmic trading.

While the consensus view is that the cost of equity trading has fallen in recent years, in large part if not entirely as the result of the introduction by MiFID of competition in equity trading, the results so far are much less encouraging with regards to the cost of clearing and settlement.

At present, the landscape for clearing and settlement has changed little relative to the pre-MiFID situation but this may change in the future.

Finally, one should also note that while equity trading costs have come down, the evidence on whether investors have benefited from this reduction is much less clear-cut. This potential lack of achieved benefits to investors is likely to reflect the combination of: (i) a decrease in average trade size (which implies that even if the pre-trade costs have decreased, the total trade costs of a given equity block may not have reduced as more trades have to be undertaken to buy/sell that block); and (ii) possibly, less than full pass-through of savings in equity trading costs to investors.

The key aims of the present study are to clarify whether as the result of MiFID:

- the macroeconomic benefits expected in a previous London Economics' study on the macroeconomic impact of the integration of EU financial markets⁵ have materialised;
- national liquidity pools have been broken down; and
- pan-European trading has grown to a greater extent than would otherwise have happened in the absence of MiFID.

The 2002 London Economics study showed that the full integration of European capital markets would result in lower trading costs of between 25% and 90% depending on the trading venues in the EU comprising 15 Member States (EU15).

This reduction in trading cost was estimated to reduce by between 10 and 50 basis points the returns required by investors over the longer run as trading their holdings becomes less expensive.

In turn, this reduction in the cost of capital, together with a reduction in the cost of debt caused by financial market integration, was shown to stimulate investment over the longer run and hence raise the level GDP over the longer run. Overall, EU15 GDP (at constant prices) was expected to be raised by 1.1% in the long run.

The remainder of this report is structured as follows.

Chapter 2 provides a brief overview of the objectives of MiFID.

Chapter 3 presents and summarises the existing economic literature on the impacts MiFID might be expected to achieve.

Chapter 4 provides a summary overview of the methodological approach taken in the 2002 London Economics study and its key results regarding equity trading.

Chapter 5 describes the results of the empirical analysis undertaken to assess whether the expected benefits of MiFID have materialised.

Chapter 6 reviews evidence gathered through qualitative interviews with stakeholders, including investors, broker-dealers and operators of trading infrastructures.

Finally, Chapter 7 brings together the strands of evidence throughout the report and concludes.

⁵ London Economics (2002).

2 MiFID Objectives with Regard to Secondary Market Equity Trading

This chapter sets out the objectives of MiFID in relation to secondary equity markets based on the recitals of MiFID directives and regulation.

Of particular interest are the areas of competition, transparency and best execution, which are considered in turn in sections 2.2-2.4.

The results of this analysis highlight the economic rationale and assumptions underlying MiFID. In general, in order to achieve its overarching objective, MiFID requires a number of other pre-conditions to also be met.

2.1 Introduction

The overarching objectives of MiFID are to create an integrated financial market, in which investors are effectively protected and the efficiency and integrity of the overall market are safeguarded.

These objectives are set out in detail in the recitals of the MiFID Level 1 and Level 2, which consist of:

- Commission Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments; and subsequently,
- Commission Directive 2006/73/EC of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive.
- Commission Regulation (EC) No 1287/2006 of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards record-keeping obligations for investment firms, transaction reporting, market transparency, admission of financial instruments to trading, and defined terms for the purposes of that Directive.

Detailed statements within MiFID Level 1 and MiFID Level 2 that relate to its objectives in regard to competition, transparency and best execution are provided for reference purposes within Annex 1.

The present chapter provides a brief overview of these objectives and selected text from the abovementioned documents highlighting the economic rationale and assumptions underlying MiFID.

2.2 Competition and the creation of new markets and services

MiFID replaces the 1993 Investment Services Directive (ISD). Under the ISD, countries were permitted to use a "concentration rule" under which all equity retail orders had to be executed on a regulated market, thereby limiting the scope for competition.

MiFID removed the concentration rule and allows other trading platforms to compete with regulated markets for order flow.

Indeed, the Directive distinguishes three categories of trading infrastructures:

- The first two, "Regulated Markets" (RMs) and "Multilateral Trading Facilities" (MTFs) are "multilateral systems operated and/or managed by a market operator, which brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments" (European Commission, 2004). A regulated market has clear and transparent rules regarding the trading of financial instruments.
- The third system is a "systematic internaliser" (SI). This is an *"investment firm, which on an organized, frequent and systematic basis, deals on own account by executing client orders outside a regulated market or multilateral trading facility"* (European Commission, 2004)."

The principle objectives of encouraging competition between secondary equity trading venues for execution services are manifold, revolving around the efficient functioning of securities markets. With regard to MiFID Level 1, these objectives are summarised as follows in Commission Regulation (EC) No 1287/2006 of 10 August 2006:

"[MiFID consists of a] framework of rules designed to promote competition between trading venues for execution services so as to increase investor choice, encourage innovation, lower transaction costs, and increase the efficiency of the price formation process on a pan-Community basis."

European Commission (2006b)

To ensure trading venues could compete effectively with one another once MiFID was implemented, a number of pre-conditions were also set out.

For instance, ensuring that the legal definitions of RMs and MTFs *"are closely aligned to reflect that they represent the same organised trading functionality"* (European Commission, 2004); and additionally, ensuring that investment firms are provided with sufficient access to RMs throughout the Community.

"Investment firms should all have the same opportunities of joining or having access to regulated markets throughout the Community. Regardless of the manner in which transactions are at present organised in the Member States, it is important to abolish the technical and legal restrictions on access to regulated markets."

(European Commission, 2004)

In the spirit of this statement, MiFID Level 1 sets out the main objectives competition was intended to achieve and pre-conditions for these benefits to be realised. While the fulfilment of these pre-conditions is a pre-requisite for the achievement of MiFID's overarching objectives, it should be noted that they also lead to other impacts of economic importance. Many of these pre-conditions relate to transparency and best execution, which are considered in the following sections.

2.3 Transparency

Two forms of transparency are addressed within MiFID: pre-trade transparency, requiring investors to be provided with access to quote information prior to trading or information on outstanding order flow accumulated in the order book; and post-trade transparency, which requires completed trade information to be publicly disseminated.⁶

Regarding pre-trade transparency, regulated markets and MTFs that are quote-driven are required to publish the best bid and offer of every market maker and regulated markets, while MTFs that are order-driven are required to publish their five best bids and offers. Systematic internalisers must provide quotes to market participants for stocks that also trade on regulated markets.

Regarding post-trade transparency, trading venues are required to provide details of executed trades, including time stamps, the price, the quantity and the execution venue.

These requirements are complementary to the objectives MiFID aims to realise through greater competition. Indeed, part of the original rationale for the transparency requirements was to address potential competition issues. Transparency requirements were viewed as essential to yield competitive outcomes, and for the various secondary equity trading markets to operate as if they were a single market.

Fair competition requires that market participants and investors be able to compare the prices that trading venues (i.e. regulated markets, MTFs and intermediaries) are required to publish."

(European Commission, 2004)

Related to transparency regarding price information, MiFID also requires that "investors are adequately informed about the "true level of actual and potential transactions" (European Commission, 2006b).

Overall, MiFID focuses on the removal of barriers that may hinder price formation processes and relies on market forces to produce services that market participants may require, for instance, to compare prices.

"It is recommended that Member States remove any obstacles which may prevent the consolidation at European level of the relevant information [for price comparison] and its publication."

(European Commission, 2004)

⁶ A number of Articles within MiFID Level 1 deal with transparency: Article 27 [Obligation for investment firms to make public firm quotes], Article 28 [Post-trade disclosure by investment firms], Article 29 [Pre-trade transparency requirements for MTFs], Article 30 [Post-trade transparency requirements for MTFs], Article 44 [Pre-trade transparency requirements for regulated markets] and Article 45 [Post-trade transparency requirements for regulated markets].

Moreover, the expected effectiveness of the transparency regime also directly impacts on the achievement of MiFID's best execution objectives.

2.4 Best execution

The aim of the best execution requirement is summarised within MiFID as follows:

"It is necessary to impose an effective 'best execution' obligation to ensure that investment firms execute client orders on terms that are most favourable to the client. This obligation should apply to the firm which owes contractual or agency obligations to the client."

(European Commission, 2004)

The best execution rule within MiFID opens with the following statement:

"Member States shall require that investment firms take all reasonable steps to obtain, when executing orders, the best possible result for their clients taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order. Nevertheless, whenever there is a specific instruction from the client, the investment firm shall execute the order following the specific instruction"

(European Commission, 2004)

An interesting aspect of the best execution rule is that it takes various dimensions of orders into account as opposed to price alone. This poses a potential problem for investors in monitoring whether best execution has taken place.

In response to this point, investment firms are mandated to adopt particular conduct of business procedures as well as procedures relating to the prevention of conflicts of interest.⁷ This provides investors with an understanding of investment firms' execution practices against which to benchmark the actual execution of trades.

MiFID also includes provisions relating to order handling and trade reporting⁸, to ensure that investment firms execute orders quickly and sequentially, and are acting in the best interests of their clients. In addition, MiFID requires trade reporting to be sufficiently standardised so as to be comparable across different trading systems.

⁷ Articles 13, 18 and 19, Commission Directive 2004/39/EC

⁸ Articles 21, 22 and 25, Commission Directive 2004/39/EC

2.5 Summary of Chapter 2

The central objectives of MiFID in regard to competition are to increase the efficient functioning of securities markets. Contributing towards these goals are transparency requirements and best execution rules.

The various provisions within MiFID are intended to interact with each other in such a way so as to achieve its overarching objectives. In order to achieve a competitive landscape in secondary market equity trading, investors and equity traders require choice in trading venues. In addition, transparency requirements allow investors to compare prices across different trading venue, while best execution rules specify that multiple dimensions of equity trades need to be taken into account.

The next chapter discusses these various aspects from an economic perspective.

3 Economic Analysis

This chapter provides an economic analysis of whether a) MiFID has achieved, or is progressing towards its stated objectives in the area of secondary market equity trading, and b) if it has resulted in any important unintended consequences not previously anticipated by policy-makers, based on existing economics and finance literature.

Following the structure of the discussion in the previous chapter in which competition, transparency and best execution were considered in turn, section 3.1 analyses the likely impacts of MiFID from a theoretical perspective, while section 3.2 reviews the empirical evidence on the impact of MiFID on secondary market equity trading, based on an assessment of existing research.

3.1 Potential impacts

3.1.1 Competition and the creation of new markets and services

Two developments have made it possible for competition to emerge among equity trading venues:

- Firstly, technological innovations have made it possible to swiftly direct orders through alternative trading systems.
- Secondly, through the removal of the concentration rule⁹, MiFID has facilitated a competitive environment in which technological innovations in trading systems can be more fully exploited.

Combined, these factors may have served to achieve a number of the overarching objectives of MiFID.

- Firstly, competition among trading venues may be associated with increased liquidity due to the increased dispersion of trading (Hamilton, 1979).
- Secondly, competition may also be associated with innovation through the provision of different types of services across trading venues, which is beneficial insofar as it addresses the needs of different investor types.
- Thirdly, competition may influence explicit and implicit trading costs.

However, a number of potential unintended consequences, relating to order flow fragmentation could also impact upon key stakeholder groups such as exchanges, investors and intermediaries in ways that run contrary to the objectives of MiFID. For example:

- *MiFID may cause trading costs to rise.* In a competitive and more fragmented trading environment, operators of trading infrastructures may be bearing larger costs than they would otherwise bear if the

⁹ The concentration rule is a provision in the 1993 Investment Services Directive (Directive 93/22/EC) that permitted individual member states to require orders from investors in that member state to be executed only on regulated markets.

market for securities were consolidated. This is because an important cost of operating a trading venue is fixed. In a competitive environment, therefore, multiple operators of trading venues using broadly similar technologies will each have higher average costs than they might otherwise have if they jointly served a given set of market participants, that is, they do not benefit from economies of scale.

- *Liquidity may contract if it is costly to interact with multiple trading venues. This is due to the presence of liquidity externalities.* At any given point in time, the market with the greatest number of participants will attract all other participants because, on average, it offers the highest probability of order execution at the most competitive price, that is, it offers the greatest liquidity. As such, fragmentation of order flow could impact upon liquidity, as it may be costly to find a counterparty across multiple trading venues compared to one in which the market for securities is consolidated (Mendelson, 1987).

In short, assessing MiFID's net effect on competition can only be determined on the basis of empirical analysis. On the one hand, competition may result in market participants being better serviced by trading venues, innovations and other associated benefits. On the other hand, competition may result in additional costs relating to loss of economies of scale and liquidity externalities.

3.1.2 Transparency

A priori, one would expect that transparency requirements contribute towards the achievements of MiFID's overarching objectives regarding secondary market equity trading.

More specifically, transparency is expected to lead to "*efficiency of the overall price formation process for equity instruments*" and to "*assist[s] the effective operation of best execution obligations*".¹⁰

This is supported by evidence on pre-trade transparency in some relatively recent studies. Baruch (2005), for instance, finds that increasing limit order book transparency is likely to lead to improved liquidity, measured by the price impact of market orders; and greater price quality, insofar as prices revealed more information about the fundamental value of securities. This view is supported by the results of an empirical study by Boehmer, Saar and Yu (2005).

However, the relationship between transparency and the objectives of MiFID may not be necessarily so clear-cut. For instance, greater transparency may lead to losses among limit-order providers to momentum traders, which would cause a reduction in market depth. This would also be associated with increased volatility and higher execution costs.

¹⁰ Implementing Directive 2006/73/EC Recital 44

With regards to post-trade transparency, there is little theoretical or empirical evidence in the economics and finance literature. The key debate, however, appears to be around the issue of consolidated price information and how this affects best execution – particularly, whether the private market has, to date, provided adequate solutions to achieve comprehensive post-trade information.

A separate issue relates to exceptions to the transparency provisions. It is argued by some commentators that dark pools of liquidity, due to a lack of publicly displayed bid and offer quotes, can hinder the efficient functioning of secondary equity trading, particularly the process of price discovery. In contrast, some market participants argue that dark pools of liquidity represent an important mechanism for executing block trades more efficiently.

As in the case of competition in the secondary equity markets, it is therefore an empirical matter to determine whether, at an aggregate level, the benefits of the transparency requirements and other provisions associated with MiFID have had a net positive or negative impact on trading costs and on secondary equity markets more generally.

3.1.3 Best execution

The economic rationale for encouraging best execution, among other things, is that it promotes liquidity provision.

Weston (2000), for example, credits the success of electronic communication networks (ECNs) in attracting order flow to the introduction of order handling rules that permit public limit orders to compete directly with market-makers on traditional exchanges. As ECNs permit investors to trade directly with one another under these rules, a reduction in spreads and fees charged by broker-dealers has been observed also.

More recently, Degryse (2009) summarised a number of studies¹¹ on the impact of ECNs and rules associated with their use on the market quality of traditional exchanges and found that:

- Trading on ECNs is associated with tighter bid–ask spreads and greater market depth.
- ECNs permit a reduction in transaction costs (and not only among “easier” trades).
- ECNs contribute to price discovery.

By and large, there appears to be a strong economic rationale for the introduction of best execution rules. However, under these rules, there are some potential unintended consequences that must be taken into account and addressed.

¹¹ See Huang (2002), Hendershott and Mendelson (2000), Simaan et al. (2003), Domowitz (2001), Barclay et al. (2003), Weston (2000), Conrad et al. (2003), Benhamou and Serval (2000), Domowitz et al. (2001), Domowitz and Steil (1999), and Næs and Ødegaard (2006) in Degryse (2009).

Overall, whilst best execution rules are in principle beneficial, there may be unintended consequences associated with their implementation that counter-balance the positive impacts they were expected to achieve. The relative size of these costs and benefits are explored in detail in the following section.

3.2 Empirical assessment of the impact of MiFID

Due to the relatively recent implementation of MiFID, there is a scarcity of completed research focusing directly on the magnitude of the impact of MiFID to date.

The main study in this regard focuses on the impact of MiFID using trading data from the three-month period after its implementation for 153 European blue chip equities (Gresse, 2010). In particular, the impact of MiFID is analysed through the effect that market fragmentation has had on spreads, market depth, liquidity and prices.

The key findings of Gresse are as follows.

- Quoted spreads appear to have narrowed as a result of MiFID, on average, across trading venues.
- However, only global traders - those accessing multiple trading venues - appear to benefit, with spreads actually increasing for trading on shares' primary exchanges.
- Liquidity appears to have fallen as a result of MiFID in general, with the exception of increases in internalised order flow that have resulted in the post-MiFID period.¹²
- Market depth has also, in general, fallen in the post-MiFID period, and price quality appears to have deteriorated as well.

Each of these four conclusions is discussed in greater detail in the following sections.

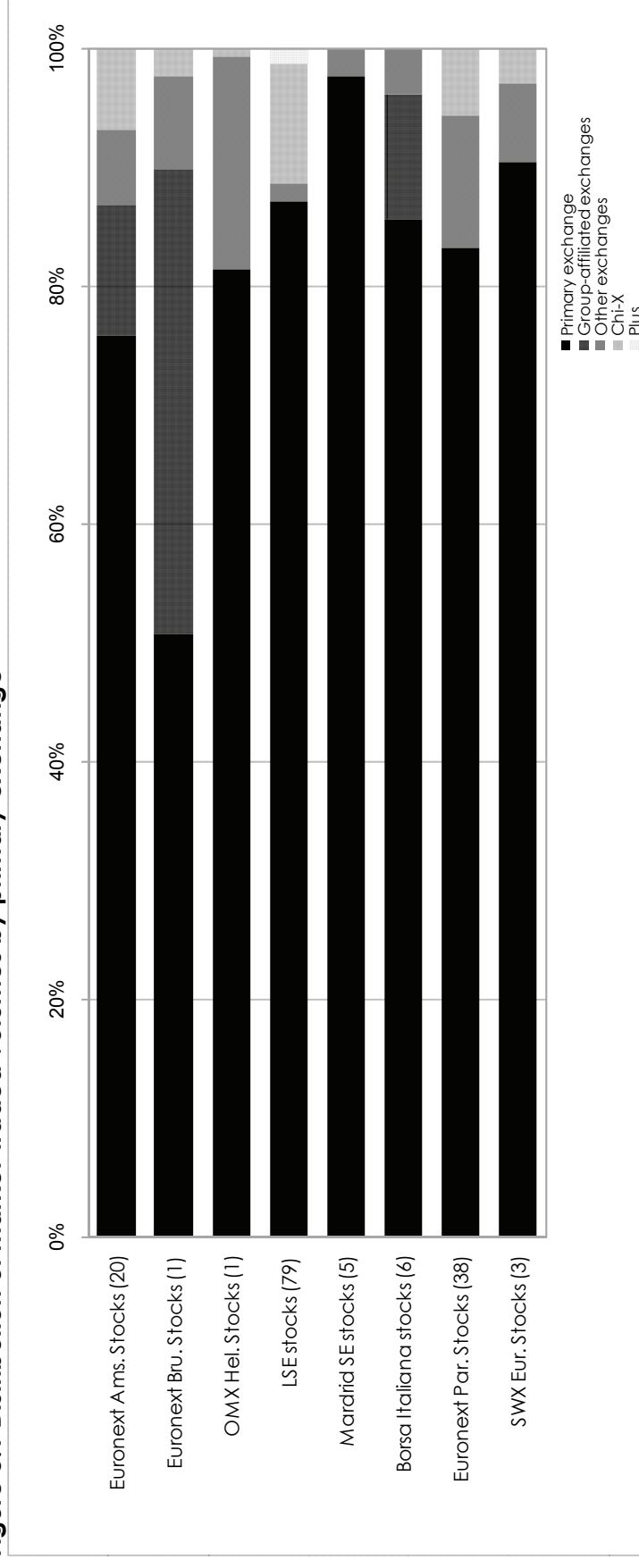
3.2.1 Market fragmentation

The data reported in Gresse's study show the distribution of market-traded volumes between different types of trading venues for stocks from eight incumbent trading venues in the immediate period following the introduction of MiFID.

At that time, the majority of order flow was still predominantly channelled through the primary exchange. With the exceptions of the Euronext Brussels and Euronext Amsterdam stocks, over 80% of order flow was channelled through the primary exchange for the blue chip stocks considered (Figure 3.1).

¹² Some market participants have noted that this conclusion may not fully take account of the consolidated trading volume and of the general downturn in equity trading during the period covered by the study.

Figure 3.1 Distribution of market-traded volumes by primary exchange



Source: Gresse (2010)

This picture has changed radically in recent years, especially in the case of the larger incumbent trading venues that face robust competition from a number of alternative venues such as Chi-X, Bats, Turquoise, Burgundy and from other incumbent trading venues (see Table 3.1).

Thus, MiFID has had an impact on the emergence of pan-European trading as, without the abolition of the concentration rule which applied in almost all national markets in the pre-MiFID period, no competition to the incumbent trading venue would have been possible.

Table 3.1 Share of trading volume in stocks included in main stock index on incumbent trading venues

Index	Incumbent Venue	Share of Incumbent Venue
AEX	Euronext-NYSE Amsterdam	62.9%
BEL 20	Euronext-NYSE Brussels	69.4%
CAC 40	Euronext-NYSE Paris	68.5%
DAX	Deutsche Börse Xetra	67.6%
FTSE 100	London Stock Exchange	51.2%
FTSE 250	London Stock Exchange	62.2%
IBEX 35	Bolsa de Madrid	84.2%
FTSE MIB	Borsa Italiana	78.7%
PSI 20	Euronext-NYSE Lisbon	91.5%
OMX C20	Nasdaq-OMX Copenhagen	80.5%
OMX H25	Nasdaq-OMX Helsinki	68.7%
OMX S30	Nasdaq-OMX Stockholm	57.2%

Source: Source: Thomson Reuters Monthly Market Share Reports for all order book trading for August 2010 <http://financial.thomsonreuters.com/marketsharereports>

3.2.2 Potential impact of fragmentation on spreads

In order to gain an indication of the impact on spreads that MiFID has had through fragmentation in the immediate period following the implementation of MiFID, Gresse (2010) conducted a correlation analysis between different measures of spreads¹³ and fragmentation for 153 European blue chip stocks

¹³ The spread variables shown in Table 3.2 are as follows. Local spreads refer to spread variables relating to the primary exchange on which a given stock is listed. Global spreads refer to spread variables relating to all trading venues relating to a given stock under consideration, namely: primary exchanges, group-affiliated exchanges, other exchanges, Chi-X and Plus. The difference between quoted and effective spread variables is the trading costs actually paid. For more details, see Gresse (2010).

shown. The results of this analysis are shown in Table 3.2 and provide some interesting findings.

Table 3.2: Potential impact of fragmentation on spreads

	Local quoted spread	Local effective spread	Global quoted spread	Global effective spread
Fragmentation of the total order flow	-0.0019 (0.8987)	-0.0262* (0.0897)	-0.0272* (0.0777)	0.1421*** (0.0000)
Fragmentation of the market-traded order flow	-0.028* (0.0867)	0.1794*** (0.000)	-0.1190*** (0.0000)	-0.0098* (0.5106)

Note: ***, **, * indicates statistical significance at the 1%, 5% and 10% level, respectively.

Source: Gresse (2010)

Prima facie, the results suggest no impact of MiFID through fragmentation on spreads. There is no correlation between local quoted spreads and measures of fragmentation and no statistically significant correlation (at the 5% level or better) between local effective spreads and fragmentation of the total order flow.

Interestingly, however, the results are consistent with the view that traders with access to multiple trading venues reap the gains of competition among trading venues, while market participants on primary exchanges face higher spreads as a result of fragmentation under MiFID. This is because fragmentation of the market-traded order flow (excluding systematic internalisers and OTC) is associated with higher local effective spreads and lower global quoted spreads.

3.2.3 Potential impact of fragmentation on liquidity

Gresse (2010) also undertook a correlation analysis between a number of illiquidity variables¹⁴ and fragmentation variables. The results of this analysis are presented in Table 3.3.

Generally, while fragmentation is associated with a reduction in liquidity, traders with access to channels through which they can internalise order flow have seen an overall increase in liquidity.

¹⁴ Illiquidity variables capture the marginal cost of trading one share of a stock, i.e., the price sensitivity of the stock; therefore, the greater the value of the variable the more illiquid the stock. The quoted illiquidity variables are constructed by considering the second-by-second quoted spreads and the quantities that can be traded within those spreads; and the effective illiquidity variables are constructed on a trade-by-trade basis by considering effective spreads and trade sizes. For more details, see Gresse (2010).

Table 3.3 Potential impact of fragmentation on liquidity

	Local quoted illiquidity ratio	Local effective illiquidity ratio	Global quoted illiquidity ratio	Global effective illiquidity ratio
Fragmentation of the total order flow	0.0749*** (0.0000)	0.1618*** (0.0000)	0.0407*** (0.0045)	-0.1727*** (0.0000)
Fragmentation of the market-traded order flow	0.0329*** (0.0298)	0.0760*** (0.0004)	-0.0569*** (0.0006)	0.0313** (0.0231)

Notes: Figure in (.) is the t-statistic and ***, **, * indicates statistical significance at the 1%, 5% and 10% level, respectively

Source: Gresse (2010)

Considering fragmentation of the total order flow, illiquidity is positively correlated with fragmentation, except in the case of global effective illiquidity, which falls with the fragmentation of the total order flow.

3.2.4 Potential impact of fragmentation on depth

The results of an analysis of the potential impact of fragmentation on market depth (measured by the volume to be traded to move prices by one unit) are presented in Table 3.4.

Table 3.4 Potential impact of fragmentation on depth

	Local depth	Global depth
Fragmentation of the total order flow	-0.1576*** (0.0000)	-0.1320*** (0.0000)
Fragmentation of the market-traded order flow	-0.1181*** (0.0000)	-0.0777*** (0.0000)
Share of the internalised order flow	-0.1045*** (0.0000)	-0.0989*** (0.0000)

Notes: Figure in (.) is the t-statistic and ***, **, * indicates statistical significance at the 1%, 5% and 10% level, respectively

Source: Gresse (2010)

On average, depth is associated with a reduction in fragmentation. This may be the product of two different effects. On the one hand, trading volumes may increase with fragmentation due to increased arbitrage opportunities, implying an increase in market depth. However, on the other hand, fragmentation may be associated with a decrease in average order size, which causes market depth to fall. Overall, it appears that the latter effect dominates the former.

3.2.5 Fragmentation and price quality

Price quality in the Gresse study is measured by the ratio of short-term return to long-term return variance. The rationale for adopting such a measure is that prices should follow a random walk process if they are efficient. In such a case, the price quality ratio should equal one. However, if prices are inefficient, the price quality ratio will be greater than one (under sticky prices) or less than one (under price over-reaction).¹⁵

Panel regression analysis is used to measure the effect of fragmentation on price quality, controlling for any stock-specific, day-specific effects and autocorrelation.

The results of this empirical analysis show that fragmentation in market-traded order flow causes a deterioration in price quality but changes in the share of internalised order flow do not affect price quality.

3.3 Conclusions of Chapter 3

From a theoretical perspective the various changes brought about by MiFID in the area of secondary market equity trading should be in line with the stated MiFID objectives, although some unintended, negative, effects may also arise. Thus, empirical analysis is critical to assess the impacts of MiFID.

So far, empirical research on the effects of MiFID on equity trading is very scant. The only major empirical study in this area, focusing on the impact of MiFID in the immediate period following the introduction of MiFID found that:

- Quoted spreads appear to have narrowed as a result of MiFID, on average, across trading venues.
- However, the ability to capture narrow spreads appears to increase by accessing multiple trading venues.
- Liquidity appears to have fallen as a result of MiFID in general, with the exception of increases in internalised order flow that have resulted in the post-MiFID period.
- Market depth has also, in general, fallen in the post-MiFID period, and price quality appears to have deteriorated as well.

Data tracking the distribution across equity trading venues of stocks listed in the main index of the major European incumbent trading venues show that since the introduction of MiFID, non-incumbent trading venues have gained significant market shares. This would not have been possible without the abolition of the concentration rule effective in most national markets prior to MiFID.

¹⁵ More details regarding the price quality measures used can be found in Gresse (2010).

4 Assessing the Macroeconomic Impact of Capital Market Integration – the 2002 London Economics Study

4.1 Introduction

The 2002 study by London Economics used a three step approach to assess the impact of capital market integration in the area of secondary market equity trading.

- First, it quantified the effect that the elimination of all the barriers to a fully integrated secondary equity market in the EU would have on implicit equity trading costs in secondary equity trading markets in the EU. This quantification was based on an empirical model relating implicit trading costs on various stock exchanges to market depth, volatility and a number of other variables.
- Next, the study used an estimated model linking the cost of equity capital of a company to the implicit trading cost in the equity of the company to derive an estimate of the effect that a fully integrated European capital market would have for the cost of equity capital more generally.
- Finally, it assessed the macroeconomic impact of a reduction in the cost of equity capital (in terms of higher investment in equipment and structures and GDP) that would arise out of full European capital market integration.

4.2 Key findings of the 2002 London Economics study

The 2002 study covered the following countries/stock exchanges: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany-Frankfurt, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, United Kingdom, US-NASDAQ and US-NYSE.

The key findings are reported here.

Trading costs

With regards to implicit equity trading costs, the study found that, in the long run, implicit equity trading costs were negatively related to total market size and positively to the volatility of returns in 2000 and 2001 (see Equation 1).

$$\text{Equation 1: Trading costs} = 0.01893 - 0.0120 * \text{Market capitalisation} \\ + 0.3506 * \text{Volatility}$$

Where:

- “Trading costs” of a stock were measured as the effective bid-ask spread in percentage form.¹⁶ The average trading cost was 3.995% across all markets covered by the 2002 study and ranged from 1.153% at the NYSE to 9.464% in Australia.
- “Market capitalisation” of market was measured as the sum of the market capitalisation of all firms listed on that exchange. The average market depth was US\$ 2.847 trillion on average across the market covered by the study over the period 2000-2001 and ranged from US\$11.210 trillion for the NYSE to US\$ 0.018 trillion in New Zealand.
- “Volatility” of a stock was measured by the volatility of returns and computed for each stock as the standard deviation of the stock's return over a period of a month. The average volatility of all stocks in a market ranged from 1.92 % (standard deviation as a percentage of stock's price) in Spain to 4.68% in Australia and averaged 3.58% across all markets covered by the study.

Using the estimated equation, an estimate of the average trading cost for the fully integrated market was derived using the mean returns' volatility for EU stocks and the total EU stock market capitalisation in 2001. This yielded an estimate of an average trading cost of 1.008% of the market price under an integrated European capital market, which was very similar to average trading cost levels observed on NYSE at that time.

Post-full-financial-market integration trading costs were estimated to be 25% and 90% lower than the pre-full-financial-market-integration trading costs across the various European equity trading venues.

Cost of equity capital

One of the main conclusions of the body of literature on securities market microstructure is that asset returns are increasing in trading costs (Amihud and Mendelson (1986), Amihud and Mendelson (1991), Aiyagary and Gertler (1991), Vayanos (1998)). Intuitively, in a world where trading is costly, investors require higher returns to compensate for higher trading costs. This translates in higher financing costs for firms. The key implication of this relationship is that by lowering the opportunity cost of capital, liquidity-increasing policies may further increase capital accumulation and then employment and growth.

The 2002 study updated and expanded Domowitz and Steil's (2001) study by re-estimating the relationship between trading costs and the cost of equity capital at company level using microeconomic data.

¹⁶ See Annex 3 for a detailed discussion of alternative measures of trading costs.

The final reduced form equation derived from the econometric estimation of the model linking the cost of equity capital is given in Equation 2:

$$\text{Equation 2: Change in cost of equity capital} = 0.5734 * \text{percentage change in trading cost}$$

Based on this equation and the reduction in trading costs reported, the cost of equity capital was estimated to fall by 25 and 50 basis points.

Table 4.1 presents the predicted reduction in trading costs and cost of equity capital for the EU equity markets covered by the 2002 study.

Table 4.1: Estimated reduction in trading costs and cost of capital

Country – trading venue	Percentage reduction in trading costs	Predicted decrease in the cost of capital (basis points)
Austria	87.3	50.1
Belgium	85.5	49.0
Denmark	81.4	46.7
Finland	80.6	46.2
France	85.2	48.9
Germany	80.9	46.4
Ireland	38.0	21.8
Italy	84.7	48.6
Luxembourg	64.4	36.9
Netherlands	85.5	49.0
Poland	85.0	48.7
Spain	23.4	13.4
Sweden	77.9	44.6
United Kingdom	45.7	26.2

Source: London Economics (2002)

Impact on investment and GDP

The key results¹⁷ of the study were that, as a result of the combined reduction in the cost of equity, bond and bank finance caused by full European capital market integration:

- The level of EU15 GDP (at constant prices) was expected to be raised by 1.1%, or €130 billion in 2002 prices, in the long-run;
- GDP per capita at current prices in the EU15 was estimated to be €600 higher in the EU and GDP per capita; at 2002 prices €350 higher;
- Total business investment in the EU15 was projected to be almost 6.0% higher and private consumption was projected to increase by 0.8%;
- Finally, total employment was projected to be 0.5% higher.

The reduction in the cost of equity finance was the most important factor. It accounted for half a percentage point (or 45%) of the 1.1 percentage point increase in the EU15 level of GDP (at constant prices).

4.3 Conclusions of Chapter 4

The study by London Economics in 2002 found that the full integration of EU capital markets could result in significant reductions in implicit trading cost across the various equity trading venues existing at that time in Europe, and that such a decrease would lower the cost of equity capital by between 25 and 50 basis points.

In turn, the lower cost of equity capital was estimated to raise the long-run level of EU15 GDP (at constant prices) by about half a percentage point.

Moreover, the integration of equity and debt markets, in combination with a reduced reliance of bank finance by businesses, was estimated to raise the long-run level of EU15 GDP (at constant prices) by about 1.1 percentage points.

¹⁷ This result was obtained from a simulation with the macroeconomic models of the European economies of Oxford Economic Forecasting. Different models with different sensitivities of investment to the cost of capital may yield somewhat different results.

5 Quantitative Analysis of the Impact of MiFID on Implicit Equity Trading Costs

5.1 Introduction

This chapter presents the key results of an update of the empirical analysis of the relationship between market size and implicit trading costs presented in the 2002 London Economics study. The econometric analysis is presented here in summary form with Annex 2 providing a detailed description of the methodology and estimation results.

5.2 Data sample

The update of the 2002 study is based on a sample of stocks representing the top 50 equities on the set of Euronext exchanges, the London Stock Exchange and the Deutsche Börse; and the top 20 stocks from other regulated markets within the EU-25 plus Switzerland, with the exception of Malta and Luxembourg, where data on the top 5 stocks were considered in each.

The selection of stocks was based on companies' average market capitalisation over the period 2nd January 2006 - 31st December 2009 when this data was available. In addition to this selection process, a series of filters were applied¹⁸.

In Table 5.1, information on average effective spreads, quoted spreads, stock volatility, trading turnover and market depth is reported by country – trading venue for the period 2006-October 2007 (pre-MiFID) and calendar year 2009 (post-MiFID). As a result of the highly unsettled market conditions throughout 2008, this particular year is excluded from the sample period used for the empirical analysis.

¹⁸ Stocks experiencing extreme price movements such as more than a 200% growth rate or a percentage decrease as greater than 50% in any of the key variables (bid, ask, price) were dropped from the sample were observations of cross markets (i.e. negative bid-ask spreads). This is because the a priori hypothesis was that such data most likely reflected stocks' characteristics outside the scope of the analysis or reporting errors.

Table 5.1 Descriptive statistics, pre- and post-MiFID²

Country – trading venue	Effective spread (% of price) ⁵			Quoted spread (% of price) ⁵			Stock volatility ^{1,5}			Trading turnover (%)			Total market cap. ^{3,4}		
	2001-2002	2006-2007	2009	2001-2002	2006-2007	2009	2001-2002	2006-2007	2009	2001-2002	2006-2007	2009	2001-2002	2006-2007	2009
Austria – Vienna	7.95	4.43	0.44	7.61	4.26	0.64	2.22	0.10	3.74	1.16	5.855	0.249	0.025	0.099	0.060
Belgium – Brussels	6.94	1.15	2.56	5.49	1.72	2.87	3.00	0.79	2.20	0.99	0.127	0.157	0.158	1.878	1.481
Denmark – Copenhagen	5.42	0.27	2.56	5.61	0.47	0.60	2.28	0.65	1.26	2.18	0.270	0.256	0.118	0.559	0.429
Finland – Helsinki	5.20	0.34	0.75	6.22	0.66	1.61	3.14	0.97	2.40	2.32	0.458	0.376	0.218	0.559	0.429
France – Paris	6.83	0.91	1.73	5.93	1.28	2.06	2.99	0.51	1.32	1.69	0.383	0.351	1.342	1.878	1.481
Germany – Frankfurt	5.27	1.12	5.30	5.20	5.67	9.74	3.16	2.37	2.77	2.46	0.007	0.003	1.201	0.847	0.708
Greece – Athens	1.63	2.40	5.83	1.61	8.66	5.09	3.11	1.67	3.28	5.48	0.214	0.177	0.091	0.103	0.069
Ireland – Dublin	6.60	2.57	1.14	6.90	2.65	1.66	3.34	4.74	5.35	1.97	0.100	0.292	0.074	0.077	0.034
Italy – Milan	2.83	1.98	1.67	1.51	0.95	3.02	2.05	0.91	5.35	2.88	0.409	0.479	0.588	0.518	0.356
United Kingdom – London	1.86	0.62	2.07	7.98	2.25	2.29	3.19	0.87	5.92	7.27	0.305	0.149	2.209	1.903	1.434
Netherlands – Amsterdam	3.45	2.40	5.29	3.63	6.87	5.64	2.90	1.17	7.42	4.55	0.158	0.257	0.468	1.878	1.481
Portugal – Lisbon	6.72	1.29	1.78	6.20	1.57	2.54	2.35	5.99	14.64	1.98	0.276	0.166	0.063	1.878	1.481
Spain – Madrid	1.32	1.74	3.05	1.32	2.91	8.29	1.92	2.33	5.62	4.26	0.008	0.001	0.402	0.678	0.712
Sweden – Stockholm	4.56	0.12	0.48	5.12	0.44	0.58	4.06	1.37	3.71	3.84	0.351	0.302	0.444	0.559	0.429
Switzerland – Zürich	3.90	0.86	4.07	4.22	1.70	6.97	2.62	0.44	1.04	1.67	0.001	0.001	0.185	0.607	0.569
Estonia – Tallinn	-	1.77	3.56	-	1.37	4.05	-	6.15	8.62	-	0.140	0.099	-	0.559	0.429
Hungary – Budapest	-	1.98	4.29	-	2.65	6.33	-	2.88	5.32	-	0.337	0.143	-	0.021	0.014
Lithuania – Vilnius	-	1.61	5.19	-	1.42	3.47	-	8.89	8.03	-	0.074	0.038	-	0.559	0.429
Latvia – Riga	-	6.09	7.89	-	4.55	6.37	-	5.21	7.08	-	0.056	0.038	-	0.559	0.429
Norway – Oslo	-	0.36	0.79	-	0.63	1.00	-	5.22	10.40	-	0.491	0.470	-	0.146	0.109

Country – trading venue	Effective spread (% of price) ⁵			Quoted spread (% of price) ⁵			Stock volatility ^{1,5}			Trading turnover (%)			Total market cap. ^{3,4}		
Poland – Warsaw	-	0.60	0.75	-	0.50	0.68	-	2.73	6.22	-	0.119	0.173	-	0.079	0.067
Slovakia – Bratislava	-	5.21	3.50	-	8.69	2.29	-	0.88	0.98	-	0.003	0.002	-	0.003	0.003
Slovenia – Ljubljana	-	5.75	1.99	-	2.28	3.26	-	0.85	1.57	-	0.040	0.066	-	0.008	0.008
MEAN	4.70	1.48	2.58	4.97	2.80	3.57	2.82	1.66	4.40	2.98	0.22	0.21	0.51	0.93	0.74
STANDARD DEVIATION	2.13	1.14	1.79	2.13	2.49	2.90	0.58	1.65	3.42	1.76	0.16	0.14	0.62	0.73	0.57
MEDIAN	5.20	1.15	2.07	5.49	1.72	2.54	2.99	0.97	3.71	2.32	0.24	0.25	0.22	0.61	0.57

Notes: (-) Trading venue not represented in 2002 London Economics study;

(1) Stock volatility variable based on stock returns as measured by capital appreciation, excluding dividend payments;

(2) January 2006 -November 2007 and January 2009 – December 2009;

(3) Total market capitalisation for Euronext reported under Brussels, Paris and Amsterdam and total market capitalisation for NASDAQ OMX Nordic reported under Copenhagen, Helsinki, Stockholm, Tallinn, Riga and Vilnius;

(4) Total market capitalisation reported in €trillion for 2000-1 and £trillion 2006-7 and 2009;

(5) Observations of key variables (effective spreads, quoted spreads and stock volatility) with extreme values were dropped from the statistics above. Specifically, effective spreads were capped at 10%, quoted spreads were capped at 50% and stock volatility values were capped at 20%.

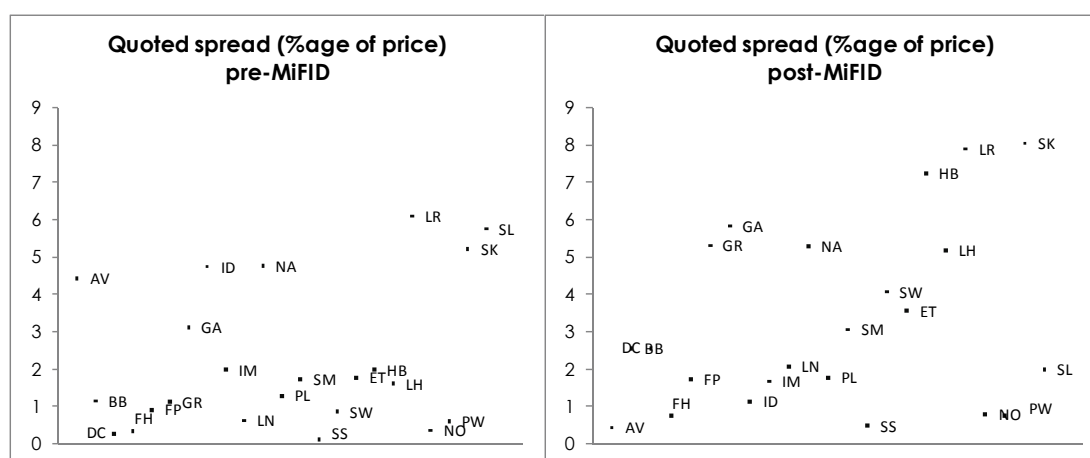
Source: London Economics' statistical analysis

The data reported in Table 5.1 show that implicit trading costs, as proxied by the quoted spread expressed in percentage of stock prices:

- Fell sharply between 2000-2001, the period covered by the 2002 study, and 2006-2007;
- Increased thereafter by, on average, from 2.80% to 3.57% between the pre- and post-MiFID environment.

This general picture of increasing trading costs in the post MiFID period is corroborated by the information on the standard deviation of quoted spreads, which has risen from 2.49 in the pre-MiFID period to 2.90 in the post-MiFID period. Visually, this can be seen in Figure 5.1, where there is a lower concentration of quoted spread values post-MiFID.

Figure 5.1 Comparison of quoted spreads, by venue pre- and post-MiFID

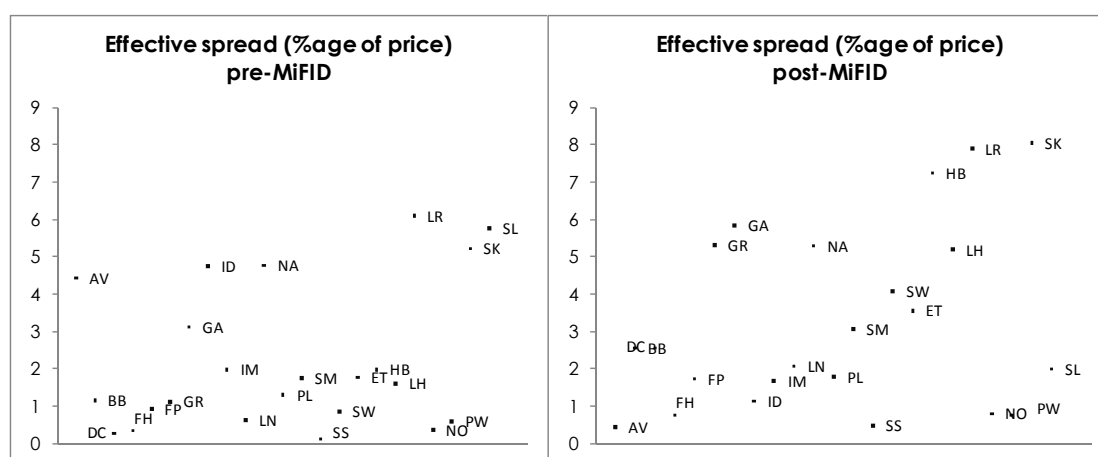


Note: Data points ordered by name of regulated markets followed by alternative trading systems

Source: London Economics' analysis of Bloomberg data

Effective spreads have evolved similarly (Figure 5.2), having widened from 1.48% pre-MiFID to 2.58% post-MiFID.

Figure 5.2 Comparison of effective spreads, pre- and post-MiFID



Note: Data points ordered by name of regulated markets followed by alternative trading systems

Source: London Economics' analysis of Bloomberg data

One could be led to infer from this data that the introduction of MiFID has increased trading costs. However, many other factors, including the financial crisis, affected the evolution of the implicit trading costs in the post-MiFID environment.

Indeed, stock volatility rose substantially in the post MiFID period with the standard deviation of stock returns rising from 1.65 to 3.42 and the median stock volatility more than tripling from 0.97 to 3.71. High stock volatility is generally associated in the economic literature with wider market spreads due to uncertainty surrounding short-term fluctuations in prices.

Moreover, trading turnover also fell marginally over the period, from 0.22% to 0.21% of the market capitalisation of the stocks being traded on a daily basis between the pre- and post-MiFID period. Again, higher implicit trading costs are typically associated in the economic literature with lower trading turnover.

Thus, a number of factors may explain the differences in pre-MiFID and post-MiFID in implicit trading costs and a more detailed statistical analysis is required to assess the contribution of each of the potential factors. The next section provides the results of such a multivariate analysis.

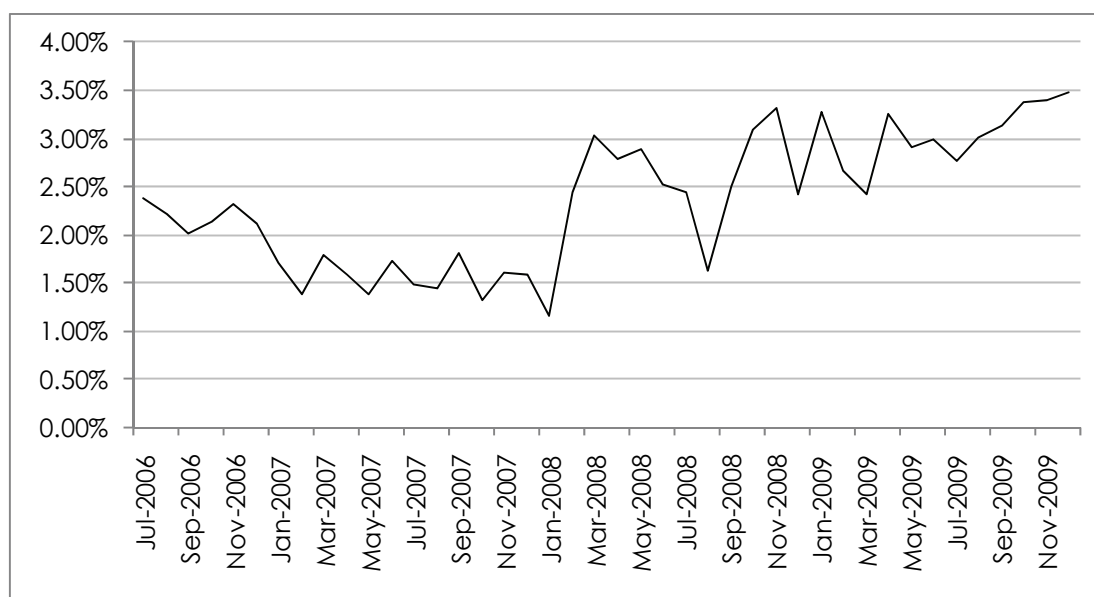
5.3 Statistical estimation of the impact of MiFID on the relationship between the size of the secondary equity markets and implicit trading costs

This section provides an overview of the key results of the updated econometric analysis undertaken in the previous study by London Economics. The detailed methodological approach is presented in detail in Annex 2. This section presents a summary overview of the approach and the key results and also describes the key considerations to take into account in this analysis.

5.3.1 Time period of the analysis

Figure 5.3 provides a clear illustration of the evolution of the average of the effective trading spreads over the pre- and post-MiFID periods. The two volatile periods (between January 2008 and March 2008 and between September 2008 and November 2008) illustrate the sharp impact of the global economic crisis on secondary markets for equity, while the periods prior to November 2007 and since January 2009 represent relatively more stable economic circumstances.

Figure 5.3 Average effective spread (expressed as % of stock price), July 2006-December 2009



Source: London Economics' analysis of Bloomberg data

As MiFID was implemented in November 2007, it would be impossible to distinguish its impacts from that of the economic crisis on market spreads in the months immediately afterwards.

Moreover, one would not expect the impact of MiFID to be fully reflected in the market place in the immediate period following the coming into force of MiFID. For these two reasons, we considered that it would be more fruitful to compare the level of implicit trading costs over two windows of more stable economic circumstances while giving the reform time to bed down.

Therefore, the periods of January 2006-October 2007 and January 2009-December 2009 were used to represent the pre- and post-MiFID period.

5.3.2 The impact of MiFID on implicit trading costs

In order to assess the impact of MiFID on the implicit equity trading costs, the estimated long-run relation between market capitalisation and trading costs is shown in Table 5.2. The estimates of the 2002 long-run relationships are taken directly from London Economics' 2002 study and the estimates for the pre-MiFID and post-MiFID period are derived from the estimation results of three different versions of the basic model used in the 2002 study.

Model I is exactly the same as in the 2002 study, while model II also includes a general measure of market volatility and model III includes furthermore a variable distinguishing large from small firms.

Table 5.2 Estimates of impact of market depth (liquidity) and volatility on implicit trading costs

	2002 study -2000-2001		pre-MiFID 2006-2007		post-MiFID 2009	
	Market depth	Volatility	Market depth	Volatility	Market depth	Volatility
Model I	-0.1200	0.3566	-0.273	0.009	-0.034	-0.007
Model II			-0.738	0.031	-0.014	-0.006
Model III			-0.741	0.030	-0.008	-0.006

Source: London Economics (2002) and empirical results reported at Annex 2

Two key points emerge from this:

- The impact of market depth (or liquidity) on implicit trading costs increased sharply between the period 2000-2001 and 2006-07. Indeed the results for model 1 show that an increase in market depth of £1trillion results in a decrease in implicit trading cost of 27.3 basis points in the pre-MiFID period and 12 basis points in 2000-2001.

This suggests that impact of the barriers between the different trading venues and a lack of competition between trading venues became more pronounced during the decade.

- In contrast, the impact of market depth on implicit trading costs is small in the post MiFID period in comparison to the pre MiFID period.

Again using model 1, an increase of £1 trillion in market depth is now associated with a reduction of only 3.4 basis points in implicit trading costs.

This result is consistent with the view that MiFID has been effective in breaking down the barriers between the various trading venues through increased competition. From an economic perspective, the estimated long run coefficient of the market depth variable is small

enough to suggest that all the benefits arising from the integration of European equity market have largely been reaped.

The same message emerges from the more complex models and, thus the general conclusion of MiFID having had an impact on implicit trading cost holds across the various models of implicit trading costs.

It is true that observed trading costs are higher in the post MiFID period than in the pre-MiFID period but this may well be due to other factors. In the absence of MiFID and the competition in equity trading that MiFID brought about, actual implicit trading costs could have been even higher.

This point is important to bear in mind in the discussion of the macroeconomic impact of MiFID in the following section.

5.4 Macroeconomic impact of changes in trading costs

In order to assess the macroeconomic impact of MiFID, one needs to compare the estimated impact on the economy of full European market integration under the pre-MiFID regime and the MiFID regimes.

Such impacts were derived using the methodology adopted in London Economics' 2002 study and further details are provided in Annex 2. For the purpose of the present analysis, Table 6.3 provides estimates of the macroeconomic impacts of changes in implicit trading costs on real GDP for the EU as a whole for each of the three specifications used to model the relationship between market depth and trading costs. Country details are provided in Annex 2.

The estimates of the impact of full European financial market integration reported show that the gains in terms of higher levels of economic activity in the long run are of the order of 0.8% to 0.9% in the pre-MiFID environment.

Actual gains could be higher as trading fees on the various equity trading platforms have fallen in response to increased competition among the various equity trading venues.

However, because MiFID has largely brought about competition through the integration of the different trading venues into a broader pool of liquidity across the EU, few further gains are to expected in the post MiFID environment through the mechanism of lower trading cost due to financial market integration.

This is not to say there are no further gains to be reaped from deeper financial integration, but such gains would be caused by other factors.

Thus, the difference between the estimated impact on the long-run level of EU GDP (at constant prices) under the pre-MiFID and post-MiFID regimes provides a good indication of the impact of MiFID.

Overall, MiFID can be said to have raised the long-run level of EU GDP (at constant prices) by about 0.7% to 0.8% percent.

In considering these figures, it is important to note that the present report discussed a number of systemic and structural developments that may have a detrimental impact on trading costs and hence the cost of equity capital and the level of GDP (at constant prices).

However, the figures reported here are estimated relative to a scenario (or counterfactual) in which all the other developments (positive and negative) are implicitly taken into account.

Thus, they provide an estimate of the impact at the margin of lower trading cost brought about by MiFID through competition.

Table 5.3 Estimates of the impact of full European financial market integration on the long-run level of EU GDP

Model	Impact on long run level of real GDP of full European financial market integration – pre-MiFID (a)	Impact on long run level of real GDP of full European financial market integration – post-MiFID (b)	Difference pre-MiFID and post-MiFID (a)–(b)
Model I	0.831%	0.156%	0.67%
Model II	0.888%	0.063%	0.83%
Model III	0.888%	0.039%	0.85%

Source: London Economics' statistical analysis

5.5 Conclusions of Chapter 5

The estimates of the 2002 London Economics study on the impact of European financial market integration have been updated for both the pre-MiFID period of January 2006 to October 2007 and the post MiFID period of January 2009 to December 2009. The year 2008 is excluded from the empirical analysis because, as a result of the financial crisis, market conditions were highly unsettled during that year.

The update focuses on the trading cost of a sample of stocks representing the top 50 equities on the set of Euronext exchanges, the London Stock Exchange and the Deutsche Börse, and the top 20 stocks from other regulated markets within the EU-25 plus Switzerland, except Malta and Luxembourg, where data on the top 5 stocks were considered in each.

A simple review of implicit trading costs on the different equity trading venues in the sample show that these costs fell sharply between 2000-2001, the period covered by the first study, and 2006-2007. In contrast, in the more recent period of January 2009 to December 2009, implicit trading costs were higher than in the pre-MiFID period.

However, it may not be appropriate to attribute the increase in implicit trading costs in the post-MiFID period to liquidity fragmentation brought about by MiFID as many other factors, such as increased volatility and reduced level of trading activity were at play as well.

The estimation results of different models of trading cost show that the impact of market depth (or liquidity) on implicit trading costs increased sharply

between the period 2000-2001 and 2006-07. In contrast, the impact of market depth on implicit trading costs is negligible in the post MiFID period in comparison to the pre MiFID period.

This suggests that MiFID has been effective in breaking down the barriers between the various trading venues through increased competition. From an economic perspective, the estimated long run coefficient of the market depth variable is small enough to be interpreted as suggesting that all the benefits arising from the integration of European equity market have largely been reaped.

When the differences in the impact of size of market depth (liquidity) on implicit trading costs are passed through to the model of the cost of equity capital and GDP (at constant prices), the resulting estimates of the impact on the long run level of GDP (at constant prices) show that, overall, MiFID can be said to have raised the long-run level of EU GDP (at constant prices) by about 0.7% to 0.8% percent.

6 Stakeholder Consultation

6.1 Overview and response rate

A stakeholder consultation was undertaken as part of the present study to gather views of secondary equity trading on the evolution of trading fees and trading costs to inform the quantitative assessment of the macroeconomic impact of MiFID. The consultation interview guide is provided at Annex 3. A mix of closed and open-ended questions was chosen to gain a sense of perceptions among market participants as a whole while also developing a qualitative understanding for the basis of these perceptions.

In total, 70 organisations were contacted, including major trading infrastructures, broker-dealers and investors of which 8 participated in the consultation exercise, representing an 11% response rate. Whilst the total number of responses collected was relatively low, a number of respondents were associations representing a large body of member organisations. The sample also includes a larger number of buy-side than sell-side market participants and as such, the results presented here reflect more issues faced by the buy-side than other groups.

6.2 Market perceptions on the impacts of MiFID on secondary market equity trading

6.2.1 Liquidity fragmentation

Liquidity fragmentation was perceived to have increased sizeably for equities with larger market capitalisation, while liquidity in equities with smaller market capitalisation was not perceived to be fragmented, as these are traded largely on primary exchanges.

Given investor preferences (e.g. for small or large cap stocks), therefore, the incidence of liquidity consequences of MiFID could vary across different groups of investors.

6.2.2 Trading costs

Stakeholders highlighted the difficulty of disentangling the effect of MiFID from the effect of the global economic crisis on trading costs. As a result, the following findings should be interpreted with caution.

Liquidity fragmentation was deemed to have had a material effect on trading costs, with a number of other cost-reducing and cost-increasing drivers having been at play too. As a result of these different forces, the overall costs of trading are perceived to have increased moderately.

In general, stakeholders believed competition has reduced trading costs, but due to liquidity fragmentation these benefits have not been fully realised. Stakeholders noted the fact that higher search costs associated with identifying counterparties for orders across venues had led to a fundamental increase in total trading costs, despite reductions in quoted market spreads.

Put another way, liquidity fragmentation has resulted in a smaller proportion of an order being executed at a given price. As the number of trades that need to be completed to fill an order has increased, the net effect is perceived to be an increase in the overall cost of trading. This is particularly the case as the fees of many clearing houses are set on a per transaction basis.

Implicit trading costs are viewed as having fallen in general. However, implicit trading costs of large orders were perceived to have risen due to a larger market impact. This larger market impact results from the fact that the average trade size has fallen in recent years.

However, commentators noted that larger orders that tap dark pools of liquidity receive more favourable terms, which not all market participants have access to.

It was also noted that there are a number of counteracting forces at play.

The provision of liquidity by high frequency traders was viewed as a positive influence on market spreads by some stakeholders. The same was true of the reduction in minimum tick sizes within different trading venues.

Generally, however, the various stakeholder assessments are consistent with the results of section 3.2 – that is, the total cost of trading appears to have increased but those with access to dark pools of liquidity appear to have been affected relatively less due to the competitive terms offered through these venues.

6.2.3 Broker-dealer fees

Stakeholders, on average, perceived broker-dealer fees to have increased moderately in the post-MiFID period.

Stakeholders stated that one needs to clearly distinguish between two types of strategic response of broker-dealers to MiFID.

- One group decided that it was strategically optimal, given their client base, to invest in the infrastructure necessary to connect to a large number of trading venues. This was based on the assumption that these outlays would be outweighed by the resultant increase in demand and the reduction in trading costs achieved over time.
- A second group of broker-dealers perceived an advantage in being a second-mover insofar as it would be beneficial to observe the operational success of alternative trading platforms prior to committing to trade on them.

Overall, the view of stakeholders is that cost reductions passed on broker-dealers have been minimal so far because of the cost of initial outlays, as well as other factors such as cumbersome clearing and settlement arrangements in some Member States.

However, some investors were optimistic about the future benefits broker-dealers may pass through to investors. It was argued that systems were in place for broker-dealer fees to more closely reflect actual trading costs on

different trading platforms than current fee structures allow for, and that this pass-through may be spurred over time through broker-dealer competition.

6.3 Market perceptions on transparency requirements

6.3.1 Pre-trade transparency

The general perception with regards to pre-trade transparency stipulations of MiFID is that in the absence of such legal requirements, few market participants would have implemented them.

Stakeholders were also largely in favour of waivers to pre-trade transparency requirements as this permits trading strategies to be hidden from other market participants (waivers for large-scale trades were particularly supported).

High frequency traders were highlighted by some stakeholders as having a particular ability to use pre-trade transparency requirements in such a way as to drive other liquidity providers away from the marketplace.

The impact of high frequency traders was the primary focus of opinion provided by stakeholders on the price consequences of pre-trade transparency requirements. There was a strong consensus that two effects were of central importance.

- First, high frequency traders are perceived to effectively provide liquidity by exploiting arbitrage opportunities between trading venues, resulting in more competitive market spreads in the system as a whole.
- Secondly, however, high frequency traders were perceived to increase volatility in secondary equity markets and securities markets more generally. High frequency traders were described as highly risk-averse and effectively removing liquidity precisely when it is required by the financial system – during periods of high volatility.

The net effect of these two offsetting forces is ambiguous, although a majority of stakeholders participating in this consultation felt that, on balance, high frequency traders have been detrimental to market quality.¹⁹

With regard to liquidity, stakeholders noted that increased volatility resulting from the activity of high frequency traders and market conditions more generally, had led to a reduction in the overall level of liquidity in the financial system. However, most stakeholders felt that liquidity was impacted upon more by the introduction of competition than through transparency requirements.

¹⁹ For a detailed account of the impact of high frequency traders, see responses to the Committee of European Securities Regulators consultation entitled "Micro-Structural Issues of the European Equity Markets".

6.3.2 Post-trade transparency

The main issue raised by stakeholders in the consultation exercise was the lack of consolidated price information and how this impacts upon broker-dealers' ability to carry out best execution of trades on the one hand, and investors' ability to monitor whether best execution has taken place on the other (best execution is discussed in section 6.4).

One key recurring theme was MiFID's reliance on commercial parties to provide post-trade information, when adequate resources may not be available for them to consolidate this information.

Issues such as poor data quality, especially with respect to OTC trades, significantly delayed publication of trade information, and double counting, were problems that were frequently mentioned, all of which contribute to inaccurate information about the true level and price of different transactions.

Some stakeholders felt that, due to the discretion with which broker-dealers can report transactions under current post-trade transparency requirements, post-trade information does not necessarily provide clarity as to the actual level and nature of transactions, which impacts upon the effectiveness of best execution.

More importantly, however, it was not felt that particular improvements in post-trade transparency would be beneficial to the efficient functioning of markets. This is due to the fact that high quality data provided by a given market participant without delay would allow other market participants to observe trading strategies and exploit them such that the overall level of market activity may fall below an optimal level.

This is not to say that the provision of post-trade information is not important, merely that it should be provided with a delay that balances the benefits of transparency (e.g. for best execution) against its costs (e.g. discouraging transactions that would otherwise take place).

6.4 Market perceptions of best execution

Views regarding the implementation of the best execution rule are mixed.

Stakeholders indicated that the main issue of concern is the large number of transaction dimensions that are to be taken into account in the determination of best execution, including price, costs, speed and likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order.

Without a clear focus as to what constitutes best execution, particularly with the inclusion of a substantial number of non-price factors, stakeholders felt that there is excessive discretion in the interpretation of the rule.

Other points raised by stakeholders with regard to the implementation of the best execution rule include the following:

- It was felt that putting in place a best execution policy was a costly and non-beneficial process. Specifically, several stakeholders felt that many broker-dealers' best execution policies were more reflective of the legal provider's standardised set of best execution terms and conditions rather than a policy tailored to the specific characteristics of the broker-dealer itself. Moreover, buy-side firms felt that best execution policies were vague to a point to which buy-side firms did not feel they were in a position to monitor broker-dealers on behalf of their clients.
- The consistency of the transposition of the best execution rule by national authorities was questioned. Stakeholders felt that without explicit guidance or enforcement there is little incentive for some, especially smaller firms, to adopt the best execution rule in any meaningful sense. The incentive to adopt a real and meaningful best execution rule was viewed as being further reduced in Member States where the quality of implementation of the best execution rule was felt to be poor.

In addition to these factors, or perhaps as a result of them, stakeholders observed that few, if any, clients are concerned with or express an interest in best execution policies. Moreover, some stakeholders argued that it is in their competitive interest to achieve best execution and therefore should not necessarily require inclusion within MiFID.

However, stakeholders noted that a number of firms had taken a more positive view of MiFID. They reported that these firms had reviewed their best execution policies and that this was an important process internally in terms of increasing awareness regarding the standards of execution that are expected to be reached. Other firms, to ensure that best execution standards are upheld, have established monitoring committees that review transactions on a qualitative basis, as attempting to quantitatively monitor the application of the best execution rule was viewed as being unlikely to be effective given the breadth of MiFID provisions.

Stakeholders also identified a number of perhaps unintended consequences resulting from the lack of clarity of the best execution rule in MiFID:

- The expansion of dark pools of liquidity has increased trading costs for the buy-side because discovering information on prices and liquidity is costly within these trading venues.
- With regard to additional infrastructure costs borne by broker-dealers, small firms appear to have had to spend proportionately more than larger firms. This is because the fixed costs of putting in place the required infrastructure for transacting on multiple trading venues are distributed over fewer clients. As such, smaller broker-dealers and buy-side firms with direct access as a group face a disproportionate cost disadvantage in the MiFID implementation, which, if not offset by other changes, will render them less competitive.
- Retail firms also bear a disproportionate cost burden of MiFID implementation in comparison to wholesale firms. One stakeholder, for instance, noted that each group of firms faces broadly the same costs of compliance; however, retail firms continue to trade largely on primary exchanges and therefore do not benefit from the competitive

advantage of connecting to multiple trading venues. In the near term at least, this implies that retail firms face a less favourable benefit-to-cost ratio than wholesale firms from MiFID implementation. Overall, over the medium term this likely to be less of an issue as retail firms also adopt a multi-venue trading approach.

Overall, a very small majority of stakeholders felt that the effectiveness of the best execution rules has been limited so far and this limited impact is only due to the fact that firms had to reflect on their own practices regarding best execution.

6.5 Conclusions to Chapter 6

Liquidity fragmentation was perceived by stakeholders to have increased sizeably for equities with larger market capitalisation, whilst liquidity in equities with smaller market capitalisation was not perceived to be fragmented, as these are traded largely on primary exchanges.

In general, stakeholders believed that MiFID-induced competition among equity trading venues has reduced trading costs, but due to liquidity fragmentation these benefits have not been fully realised. Moreover, as a result of a number of other factors at play, such as decreasing size of the average trade, the total trading cost of a large order is viewed as having increased even though the per-trade cost has fallen. Obviously, this development is not related to MiFID but is caused by other structural changes in the market place. Any empirical assessment of MiFID needs to take account of these structural changes, which occurred at the same time as MiFID was being implemented, in order to avoid erroneous conclusions about the potential impact of MiFID.

Moreover, the savings that arise from lower trading costs have not yet been fully passed by broker-dealers to investors. However, competition among broker-dealers is viewed as likely to increase the pass-through over time.

MiFID is viewed by stakeholders as having made a major contribution to pre-trade transparency, as in the absence of the legal requirement, little would have occurred in that area. Regarding post-trade transparency, the main issue raised by stakeholders in the consultation exercise was the lack of consolidated price information and how this impacts upon broker-dealers' ability to carry out best execution of trades on the one hand, and investors' ability to monitor whether best execution has taken place on the other.

Most stakeholders felt that the MiFID best execution rule has not yet been effective. Moreover, stakeholders expressed the view that the combination of the best execution rule and fragmentation of liquidity has created a competitive disadvantage for smaller sell-side and buy-side firms with direct access, as the fixed cost of putting in place of the required infrastructure to connect to a large number of competing equity trading venues has to be covered by a lower level of activity.

7 Conclusions

The three research questions to be addressed by the present study are the following:

- Have the macroeconomic benefits expected in a previous London Economics study (2002) on the macroeconomic impact of the integration of EU financial markets materialised?
- Have national liquidity pools been broken down? and,
- Has pan-European trading has grown more than it would have in the absence of the MiFID?

The answer to all three questions is yes.

Pan-European trading

Data on the split in trading of equities between the exchanges where the equity is listed (i.e. the incumbent venues) and other trading venues shows that the latter have gained considerable market share at the expense of the incumbent trading venues.

The abolition of the concentration rule, whereby in many jurisdictions trading in listed equities could only be undertaken on the listing trading venue, has allowed the emergence of new providers of equity trading services and a broader, more pan-European approach to the offering of a number of equity trading venues.

In other words, pan-European trading has grown more than it would have in the absence of the MiFID, as in many instances in the pre-MiFID regime it simply would not have been possible to offer pan-European trading services.

National liquidity pools

The estimation results reported in the present study show that, in the post-MiFID period, differences in market depth or liquidity across trading venues do not explain differences in observed levels of implicit trading costs.

This implies that the competition among equity trading venues that MiFID brought about allows liquidity to now move freely across trading venues and the separate pools are now linked. Without competition among trading venues it is unlikely that the pre-MiFID separation of liquidity pools would have broken down.

Estimated impact on the level of real economic activity

The results of the analysis in Chapter 5 are consistent with the interpretation that *ceteris paribus*, the macroeconomic outcomes expected by the 2002 London Economics study have been realised. Overall, MiFID is estimated to have raised the long-run level of EU GDP (at constant prices) by about 0.7% to 0.8%.

However, a number of other systemic or structural developments factors have affected negatively the cost of equity trading in the post MiFID period, and thus obfuscate the gains resulting from MiFID.

8 References

- Baruch, S. (2005), "Who Benefits from an Open Limit-Order Book?" *Journal of Business*, 78(4), 1267-1306
- Bhattacharya, U. and Daouk, H. (2002). "The world price of insider trading", *Journal of Finance*, 57(1), pp. 75-108
- Bessembinder, H. & Kaufman, H.M. (1997). "A cross-exchange comparison of execution costs and information flow for NYSE-listed stocks", *Journal of Financial Economics*, 46(3), 293-319.
- Boehmer, E., Saar G. & Yu, L. (2005), "Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE", *The Journal of Finance*, 60(2), 783-815
- Branch, B. and Freed, W. (1977). "Bid-ask Spread on AMEX and the Big Board", *Journal of Finance*, vol.32
- Demsetz, H. (1968). "The Cost of Transacting", *Quarterly Journal of Economics*, vol. 38, pp. 33-53
- Domowitz, I., Glen, J. and Madhavan, A., (2000), "Liquidity, volatility and equity trading costs across countries and over time", *Journal of International Finance*, forthcoming
- Domowitz, I. and Steil, B. (2002). "Innovation in equity trading systems: the impact on transactions costs and cost of capital" in (Nelson, R., Victor, D. and Steil, B. (eds.)). *Technological Innovation and Economic Performance*, Princeton University Press
- Degryse, H. (2009), "Competition between financial markets in Europe: what can be expected from MiFID?", *Financial Markets and Portfolio Management*, 23, 1, 93-103
- Easley, D., Kiefer, N.M. & O'Hara, M. (1996), "Cream-Skimming or Profit-Sharing? The Curious Role of Purchased Order Flow", *Journal of Finance*, 51(3), 811-833.
- European Commission (2004), Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments, Brussels: Official Journal of the European Union L 145 30.04.2004, 1-44
- European Commission (2006a), Commission Regulation (EC) No 1287/2006 of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards record-keeping obligations for investment firms, transaction reporting, market transparency, admission of financial instruments to trading, and defined terms for the purposes of that Directive. Brussels: Official Journal of the European Union L 241 2.9.2006, 1-25
- European Commission (2006b), Directive 2006/73/EC of the European Parliament and of the Council of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive, Brussels: Official Journal of the European Union L 241 2.9.2006, 26-58

- Ferrarini, G.A. & Recine, F. (2006), "The MiFID and Internalisation", in G. Ferrarini and E. Wymeersch (eds.), *Investor Protection in Europe: Corporate Law Making, the MiFID and Beyond*, Oxford: Oxford University Press
- Foucault, T. & Menkveld, A. (2008), "Competition for Order Flow and Smart Order Routing Systems", *Journal of Finance*, 63(1), 119-158
- Gresse, C. (2010), "Multi-Market Trading and Market Quality", <http://basepub.dauphine.fr/handle/123456789/3148>
- Gajewski, J. & Gresse, C. (2007), "Centralised order books versus hybrid order books: A paired comparison of trading costs on NSC (Euronext Paris) and SETS (London Stock Exchange)", *Journal of Banking & Finance*, 31(9), 2906-2924
- Harris, L. (2003), "Trading and exchanges: market microstructure for practitioners", Oxford University Press US.
- Hamilton, J. L. (1979), "Marketplace Fragmentation, Competition, and the Efficiency of the Stock Exchange", *Journal of Finance*, 34(1), 171-187
- Hendershott, T. & Mendelson, H. (2000), "Crossing Networks and Dealer Markets: Competition and Performance", *Journal of Finance*, 55(5), 2071-2115
- Jain, P. (2001), "Institutional Design and Liquidity at Stock Exchanges around the World", Kelley School of Business – Indiana University, mimeo
- London Economics (2002), "Study on the "quantification of the macro-economic impact of integration of EU financial markets", http://ec.europa.eu/internal_market/securities/overview_en.htm
- Madhavan, A. (1992). "Trading Mechanisms in Securities Markets", *Journal of Finance*, vol. 47, pp. 607-641
- Madhavan, A. (1995). "Consolidation, Fragmentation, and the Disclosure of Trading Information", *Review of Financial Studies*, vol. 8, pp. 579-603
- Madhavan, A., Porter, D. & Weaver, D. (2005), "Should securities markets be transparent? *Journal of Financial Markets*", 8(3), 265-287
- Mendelson, H. (1987), "Consolidation, Fragmentation, and Market Performance", *Journal of Financial and Quantitative Analysis*, 22(2), 189-207
- Pagano, M. (1989), "Trading Volume and Asset Liquidity", *The Quarterly Journal of Economics*, 104(2), 255-274
- Perold, A. F. and Sirri, E. R. (1997). "The Cost of International Equity Trading", Harvard Business School – Research Division Working Paper 97-012
- Stoll, H. (1978). "The Pricing of Security Dealer Services: An Empirical Study of NASDAQ Stocks", *Journal of Finance*, 33, pp. 1153-1172.
- Stoll, H. (2001), "Friction", Working Paper 00-06, Vanderbilt University
- Tinic, S. M. and West, R. R. (1972). "The Economics of Liquidity Services", *Quarterly Journal of Economics*, vol. 86, pp. 79-93
- Weston, J.P. (2000), "Competition on the Nasdaq and the Impact of Recent Market Reforms", *Journal of Finance*, 55(6), 2565-2598
- World Bank (2010), "Comparing European and U.S. Securities Regulations: Mifid Versus Corresponding U.S. Regulations", World Bank Publications

Annex 1 The relevant recitals of MiFID

This annex presents the objectives of MiFID set out in the recitals of Commission Directive 2004/39/EC, Commission Directive 2006/73/EC and Commission Regulation (EC) No 1287/2006 as they relate to secondary equity market trading.

A1.1 Commission Directive 2004/39/EC

- (5) It is necessary to establish a comprehensive regulatory regime governing the execution of transactions in financial instruments irrespective of the trading methods used to conclude those transactions so as to ensure a high quality of execution of investor transactions and to uphold the integrity and overall efficiency of the financial system. A coherent and risk-sensitive framework for regulating the main types of order-execution arrangement currently active in the European financial marketplace should be provided for. It is necessary to recognise the emergence of a new generation of organised trading systems alongside regulated markets which should be subjected to obligations designed to preserve the efficient and orderly functioning of financial markets. With a view to establishing a proportionate regulatory framework provision should be made for the inclusion of a new investment service which relates to the operation of an MTF.
- (33) It is necessary to impose an effective 'best execution' obligation to ensure that investment firms execute client orders on terms that are most favourable to the client. This obligation should apply to the firm which owes contractual or agency obligations to the client.
- (34) Fair competition requires that market participants and investors be able to compare the prices that trading venues (i.e. regulated markets, MTFs and intermediaries) are required to publish. To this end, it is recommended that Member States remove any obstacles which may prevent the consolidation at European level of the relevant information and its publication.
- (44) With the two-fold aim of protecting investors and ensuring the smooth operation of securities markets, it is necessary to ensure that transparency of transactions is achieved and that the rules laid down for that purpose apply to investment firms when they operate on the markets. In order to enable investors or market participants to assess at any time the terms of a transaction in shares that they are considering and to verify afterwards the conditions in which it was carried out, common rules should be established for the publication of details of completed transactions in shares and for the disclosure of details of current opportunities to trade in shares. These rules are needed to ensure the effective integration of Member State equity markets, to promote the efficiency of the overall price formation process for equity instruments, and to assist the effective operation of 'best execution' obligations. These considerations require a comprehensive transparency regime applicable to all transactions in shares irrespective of their execution by an investment firm on a bilateral basis

or through regulated markets or MTFs. The obligations for investment firms under this Directive to quote a bid and offer price and to execute an order at the quoted price do not relieve investment firms of the obligation to route an order to another execution venue when such internalisation could prevent the firm from complying with 'best execution' obligations.

- (47) Investment firms should all have the same opportunities of joining or having access to regulated markets throughout the Community. Regardless of the manner in which transactions are at present organised in the Member States, it is important to abolish the technical and legal restrictions on access to regulated markets.
- (48) In order to facilitate the finalisation of cross-border transactions, it is appropriate to provide for access to clearing and settlement systems throughout the Community by investment firms, irrespective of whether transactions have been concluded through regulated markets in the Member State concerned. Investment firms which wish to participate directly in other Member States' settlement systems should comply with the relevant operational and commercial requirements for membership and the prudential measures to uphold the smooth and orderly functioning of the financial markets.
- (53) It is not the intention of this Directive to require the application of pre-trade transparency rules to transactions carried out on an OTC basis, the characteristics of which include that they are ad hoc and irregular and are carried out with wholesale counterparties and are part of a business relationship which is itself characterised by dealings above standard market size, and where the deals are carried out outside the systems usually used by the firm concerned for its business as a systematic internaliser.
- (71) The objective of creating an integrated financial market, in which investors are effectively protected and the efficiency and integrity of the overall market are safeguarded, requires the establishment of common regulatory requirements relating to investment firms wherever they are authorised in the Community and governing the functioning of regulated markets and other trading systems so as to prevent opacity or disruption on one market from undermining the efficient operation of the European financial system as a whole. Since this objective may be better achieved at Community level, the Community may adopt measures in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve this objective.

Commission Directive 2006/73/EC

- (12) However, a regulatory regime which entails too much uncertainty for investment firms may reduce efficiency. Competent authorities are expected to issue interpretative guidance on provisions on this Directive, with a view in particular to clarifying the practical

application of the requirements of this Directive to particular kinds of firms and circumstances. Non-binding guidance of this kind might, among other things, clarify how the provisions of this Directive and Directive 2004/39/EC apply in the light of market developments. To ensure a uniform application of this Directive and Directive 2004/39/EC, the Commission may issue guidance by way of interpretative communications or other means. Furthermore, the Committee of European Securities Regulators may issue guidance in order to secure convergent application of this Directive and Directive 2004/39/EC by competent authorities.

- (64) For the purposes of the provisions on reporting to clients, a reference to the type of the order should be understood as referring to its status as a limit order, market order, or other specific type of order.
- (66) When establishing its execution policy in accordance with Article 21(2) of Directive 2004/39/EC, an investment firm should determine the relative importance of the factors mentioned in Article 21(1) of that Directive, or at least establish the process by which it determines the relative importance of these factors, so that it can deliver the best possible result to its clients. In order to give effect to that policy, an investment firm should select the execution venues that enable it to obtain on a consistent basis the best possible result for the execution of client orders. An investment firm should apply its execution policy to each client order that it executes with a view to obtaining the best possible result for the client in accordance with that policy. The obligation under Directive 2004/39/EC to take all reasonable steps to obtain the best possible result for the client should not be treated as requiring an investment firm to include in its execution policy all available execution venues.
- (67) For the purposes of ensuring that an investment firm obtains the best possible result for the client when executing a retail client order in the absence of specific client instructions, the firm should take into consideration all factors that will allow it to deliver the best possible result in terms of the total consideration, representing the price of the financial instrument and the costs related to execution. Speed, likelihood of execution and settlement, the size and nature of the order, market impact and any other implicit transaction costs may be given precedence over the immediate price and cost consideration only insofar as they are instrumental in delivering the best possible result in terms of the total consideration to the retail client.
- (68) When an investment firm executes an order following specific instructions from the client, it should be treated as having satisfied its best execution obligations only in respect of the part or aspect of the order to which the client instructions relate. The fact that the client has given specific instructions which cover one part or aspect of the order should not be treated as releasing the investment firm from its best execution obligations in respect of any other parts or aspects of the client order that are not covered by such instructions. An investment firm should not induce a client to instruct it to execute an order in a particular way, by expressly indicating or implicitly suggesting the

content of the instruction to the client, when the firm ought reasonably to know that an instruction to that effect is likely to prevent it from obtaining the best possible result for that client. However, this should not prevent a firm inviting a client to choose between two or more specified trading venues, provided that those venues are consistent with the execution policy of the firm.

- (69) Dealing on own account with clients by an investment firm should be considered as the execution of client orders, and therefore subject to the requirements under Directive 2004/39/EC and this Directive and, in particular, those obligations in relation to best execution. However, if an investment firm provides a quote to a client and that quote would meet the investment firm's obligations under Article 21(1) of Directive 2004/39/EC if the firm executed that quote at the time the quote was provided, then the firm will meet those same obligations if it executes its quote after the client accepts it, provided that, taking into account the changing market conditions and the time elapsed between the offer and acceptance of the quote, the quote is not manifestly out of date.
- (70) The obligation to deliver the best possible result when executing client orders applies in relation to all types of financial instruments. However, given the differences in market structures or the structure of financial instruments, it may be difficult to identify and apply a uniform standard of and procedure for best execution that would be valid and effective for all classes of instrument. Best execution obligations should therefore be applied in a manner that takes into account the different circumstances associated with the execution of orders related to particular types of financial instruments. For example, transactions involving a customised OTC financial instrument that involve a unique contractual relationship tailored to the circumstances of the client and the investment firm may not be comparable for best execution purposes with transactions involving shares traded on centralised execution venues.
- (71) For the purposes of determining best execution when executing retail client orders, the costs related to execution should include an investment firm's own commissions or fees charged to the client for limited purposes, in cases where more than one venue listed in the firm's execution policy is capable of executing a particular order. In such cases, the firm's own commissions and costs for executing the order on each of the eligible execution venues should be taken into account in order to assess and compare the results for the client that would be achieved by executing the order on each such venue. However, it is not intended to require a firm to compare the results that would be achieved for its client on the basis of its own execution policy and its own commissions and fees, with results that might be achieved for the same client by any other investment firm on the basis of a different execution policy or a different structure of commissions or fees. Nor is it intended to require a firm to compare the differences in its own commissions which are attributable to differences in the nature of the services that the firm provides to clients.

- (72) The provisions of this Directive that provide that costs of execution should include an investment firm's own commissions or fees charged to the client for the provision of an investment service should not apply for the purpose of determining what execution venues must be included in the firm's execution policy for the purposes of Article 21(3) of Directive 2004/39/EC.
- (73) It should be considered that an investment firm structures or charges its commissions in a way which discriminates unfairly between execution venues if it charges a different commission or spread to clients for execution on different execution venues and that difference does not reflect actual differences in the cost to the firm of executing on those venues.
- (74) The provisions of this Directive as to execution policy are without prejudice to the general obligation of an investment firm under Article 21(4) of Directive 2004/39/EC to monitor the effectiveness of its order execution arrangements and policy and assess the venues in its execution policy on a regular basis.
- (76) The best execution obligation under Directive 2004/39/EC requires investment firms to take all reasonable steps to obtain the best possible result for their clients. The quality of execution, which includes aspects such as the speed and likelihood of execution (fill rate) and the availability and incidence of price improvement, is an important factor in the delivery of best execution. Availability, comparability and consolidation of data related to execution quality provided by the various execution venues is crucial in enabling investment firms and investors to identify those execution venues that deliver the highest quality of execution for their clients. This Directive does not mandate the publication by execution venues of their execution quality data, as execution venues and data providers should be permitted to develop solutions concerning the provision of execution quality data. The Commission should submit a report by 1 November 2008 on the market-led developments in this area with a view to assessing availability, comparability and consolidation at a European level of information concerning execution quality.

A1.2 Commission Regulation (EC) No 1287/2006

- (3) Detailed and fully harmonised transparency requirements and rules regulating transaction reporting are appropriate so as to ensure equivalent market conditions and the smooth operation of securities markets throughout the Community, and to facilitate the effective integration of those markets. Certain aspects of record-keeping are closely allied as they make use of the same concepts as are defined for transaction reporting and transparency purposes.
- (4) The regime established by Directive 2004/39/EC governing transaction reporting requirements in respect of transactions in financial instruments aims to ensure that relevant competent authorities are

properly informed about transactions in which they have a supervisory interest. For those purposes it is necessary to ensure that a single data set is collected from all investment firms with a minimum of variation between Member States, so as to minimise the extent to which businesses operating across borders are subject to different reporting obligations, and so as to maximise the proportion of data held by a competent authority that can be shared with other competent authorities. The measures are also designed to ensure that competent authorities are in a position to carry out their obligations under that Directive as expeditiously and efficiently as possible.

- (5) The regime established by Directive 2004/39/EC governing transparency requirements in respect of transactions in shares admitted to trading on a regulated market aims to ensure that investors are adequately informed as to the true level of actual and potential transactions in such shares, whether those transactions take place on regulated markets, multilateral trading facilities, hereinafter 'MTFs', systematic internalisers, or outside those trading venues. Those requirements are part of a broader framework of rules designed to promote competition between trading venues for execution services so as to increase investor choice, encourage innovation, lower transaction costs, and increase the efficiency of the price formation process on a pan-Community basis. A high degree of transparency is an essential part of this framework, so as to ensure a level playing field between trading venues so that the price discovery mechanism in respect of particular shares is not impaired by the fragmentation of liquidity, and investors are not thereby penalised. On the other hand, that Directive recognises that there may be circumstances where exemptions from pre-trade transparency obligations, or deferral of post-trade transparency obligations, may be necessary. This Regulation sets out details of those circumstances, bearing in mind the need both to ensure a high level of transparency, and to ensure that liquidity on trading venues and elsewhere is not impaired as an unintended consequence of obligations to disclose transactions and thereby to make public risk positions.
- (6) For the purposes of the provisions on record-keeping, a reference to the type of the order should be understood as referring to its status as a limit order, market order, or other specific type of order. For the purposes of the provisions on record-keeping, a reference to the nature of the order or transaction should be understood as referring to orders to subscribe for securities or the subscription of securities, or to exercise an option or the exercise of an option, or similar client orders or transactions.
- (18) Information which is required to be made available as close to real time as possible should be made available as close to instantaneously as technically possible, assuming a reasonable level of efficiency and of expenditure on systems on the part of the person concerned. The information should only be published close to the three minute maximum limit in exceptional cases where the systems available do not allow for a publication in a shorter period of time.

Annex 2 Quantitative Methodology and Detailed Results

This section presents technical details relating to the quantitative methodology for the quantitative analysis conducted

Background

There are several approaches that can be pursued in order to measure the cost of market fragmentation. In this section an analytical framework linking capital market integration to trading costs is outlined. It is the same analytical framework that had been used in the 2002 London Economics study.

Stoll (2000) relates market spreads to individual firms' trading characteristics in the following cross-section regression for the US stocks listed on NYSE and Nasdaq:

$$\text{Equation 1: } s_i = a_0 + a_1 v_i + a_2 \sigma_i^2 + a_3 mv_i + a_4 p_i + a_5 n_i + \gamma_i$$

where s_i is the stock's proportional quoted spread defined as (ask price-bid price)/transaction price, v_i is (the logarithm of) daily dollar volume of security, σ^2 is the return variance, mv_i is (the logarithm of) stock's market capitalisation, p_i is log stock's closing price, n_i is log number of trades per day and γ_i is the error term.

The rationale for these variables is based primarily on order processing and inventory considerations. A larger trading volume, average size and number of trades, and firm size increase the probability of locating a counterparty, and thereby reduce inventory risk. The stock's return variance measures the risk of adverse price changes of a stock added to inventory. The price variable controls for the effect of discreteness and is an additional proxy for risk because low price stocks tend to be riskier. Stoll (2000) finds that the empirical relationship in Equation 1 is very strong and explains over 60% of cross-sectional variation in spreads in NYSE stocks (Adjusted $R^2 = 0.6688$). These results are consistent with those of Demsetz (1968), Stoll (1978), Tinic and West (1972) and Branch and Freed (1977).

Volatility and trading turnover are modelled as exogenous drivers of spreads in the majority of studies discussed above. From a policy perspective it is also of interest to uncover the determinants of these variables and examine how they interact with trading costs. For example, volatility of stock returns is itself driven by many factors, including the evolution of fundamentals, arrival of new information, regional factors, country-specific factors, and the method of organising trading on the stock exchange. Madhavan (1992) predicts that prices are more volatile in order-driven systems than in quote-driven systems. Madhavan (1995) also finds that market fragmentation results in higher price volatility and that stock prices are also more volatile in markets without mandatory trade disclosure (low transparency). On a separate note, the volume of trading turnover for securities can also be affected by trading costs and other exchange design features and this could create a bias in parameter estimates.

The single-equation approach outlined in Equation 1 has been recently generalised to multi-equation systems that analyse the impact of various market characteristics on liquidity and trading costs. For example, Domowitz, Glen and Madhavan (2000) use a triangular system of equations where volatility is both an exogenous driver and a function of market, regional and country-specific factors. In turn, volatility affects trading costs. Turnover is related to the cost of trading and may be affected by volatility as well. While economic theory suggests higher trading costs will reduce turnover, the effect of volatility is ambiguous. On the one hand, higher volatility may induce more trading because it is associated with a greater dispersion in traders' viewpoints, while on the other, risk-averse traders may reduce their trading in volatile markets.

The results obtained by Domowitz, Glen and Madhavan (2000) show that lower costs of trading, usually associated with better liquidity and substantially increased trading activity. Should costs fall in other developed markets to the extent that they declined in North America over the sample period, turnover is predicted to increase by about 33%.

Turnover is less sensitive to cost in emerging markets than in more developed economies. This is economically intuitive as trading volumes in emerging markets may be more sensitive to political factors such as privatisation than to trading costs per se.

In relation to the trading cost regression, Domowitz et al. (2000) show that market capitalisation has an economically and statistically significant effect in reducing trading costs. Finally, the volatility regression shows that emerging markets experienced higher volatility. Larger market capitalisation in emerging markets tends to dampen volatility, as might be expected, but the results for developed and emerging economies alike are statistically and economically negligible.

By using a similar approach, Jain (2001) investigates the institutional characteristics of 51 stock exchanges and analyses the impact of these and other market characteristics on closing bid-ask spreads, volatility and trading turnover. Institutional characteristics such as narrower tick sizes, designated market makers, consolidated limit order books, hybrid trading mechanisms, automated trade execution, centralized order flow, and better shareholder rights are associated with lower spreads. These features also influence volatility and trading turnover, which in turn affect spreads.

There are important methodological differences between the Jain (2001) study and those by Domowitz et al. (2000) and Perold et al. (1997). Whereas the latter two studies compute implicit trading costs by taking the difference between the transaction price and an indexed price, the Jain (2001) study uses the actual quoted and effective spreads at the close of each day. These are likely to be more accurate representations of costs especially if intra-day volatility in prices is high. Higher volatility could widen the gap between transaction prices and indexed prices even though the actual spreads at any given point may be low.

Another important difference is that the Jain (2001) study measures spreads at firm level (individual stocks) and relates them to the total market capitalisation

of each exchange, providing an estimate of the impact of the size of the stock market on trading costs. The results show that total market capitalisation has an economically and statistically significant effect on trading costs.

Empirical formulation

Empirical model

Drawing on this, the empirical formulation is based on a two-equation system, with one equation modelling trading costs and the other modelling trading turnover. This specification has essentially two main advantages. Firstly, it makes explicit the essential interactions among the variables of interest and the channels through which market depth affects trading costs. Secondly, by treating both trading costs and trading turnover as endogenous, this approach should avoid any possible bias in parameter estimates caused by possible correlation of turnover with the residual term.

Denoting stocks by $i=1, \dots, N$, and time by $t=1, \dots, T$, the framework is based on the following two equations:

Equation 1:

$$tc_{it} = a_0 + \lambda_1 tc_{it-1} + \lambda_2 tc_{it-2} + \lambda_3 tc_{it-3} + a_1 tt_{it} + a_2 tt_{it-1} + a_3 tt_{it-2} + a_4 \sigma_{it}^2 + a_5 \sigma_{it-1}^2 + a_6 \sigma_{it-2}^2 + a_7 mdep_{it} + a_8 tick_{it} + a_9 LARGE_{it} + \sum_j a_{10j}^j d_j + \sum_k a_{11k}^k d_k + f_i + \eta_t + \gamma_{it}$$

Equation 2:

$$tt_{it} = \beta_0 + \delta_1 tt_{it-1} + \delta_2 tt_{it-2} + \delta_3 tt_{it-3} + \beta_1 tc_{it} + \beta_2 tc_{it-1} + \beta_3 tc_{it-2} + \beta_4 \sigma_{it}^2 + \beta_5 \sigma_{it-1}^2 + \beta_6 \sigma_{it-2}^2 + \beta_7 mdep_{it} + \sum_j \beta_8^j d_j + \sum_k \beta_9^k d_k + \mu_i + \varphi_{it}$$

where tc_{it} is trading cost, tt_{it} is (the logarithm of) trading turnover, σ^2 is the volatility of returns from shares, $mdep_{it}$ is (the logarithm of) total stock market capitalisation - a proxy for the liquidity and depth of the market, $tick_{it}$ is the relative tick size expressed as a percentage of the midpoint of that security, $LARGE_{it}$ is a dummy variable proxying for the size of the issuer company, d_j denotes a full set of sector dummies, d_k denotes a full set of country/exchange dummies, $f_i(\mu_i)$ are share-specific fixed effects, $\eta_t(\varphi_t)$ are time effects and $\alpha, \beta, \gamma, \delta$ denote vectors of parameters of interest.

The full sets of sectoral and country dummies identified above cover all unobserved sectoral and country-specific factors, and institutional characteristics influencing the level of trading costs (turnover) across sectors and markets. Examples of country-specific institutional characteristics include the presence of market makers, limit order books, market fragmentation, transparency of order flow, automatic execution of trades, developed markets, ownership of exchange by mutual cooperative of brokers, the existence and effectiveness of shareholder protection laws and rights as in Bhattacharya and Daouk (2002), etc.

The $f_i(\mu_i)$ terms cover all unobserved security-specific factors influencing the level of transaction cost (turnover), while the $\eta_t(\varphi_t)$ terms capture shocks

common to all securities. Finally, γ_i (ψ_{it}) captures all other shocks to share trading costs (turnover) and it is assumed to be serially uncorrelated. Absence of serial correlation is assured by the inclusion of dynamics in the form of lagged dependent and core independent variables (autoregressive model). Once the above system of equations has been estimated, it will be possible to compute the effects of European financial integration on trading costs and trading turnover. In particular, the proposed system will allow us to estimate: (i) what the average trading cost in a fully integrated European financial market would be; and (ii) what would be the gain for each country of further financial market integration.

Estimation strategy

The estimation of Equation 1 presents several econometric challenges, including dealing with unobserved heterogeneity in the trading costs and turnover variables, endogeneity of some of the right-hand-side variables and obtaining a reduced form for the trading cost equation. We deal with each of these issues below.

As long as the fixed effects in Equation 1 are uncorrelated with the included variables, consistent estimates of the parameters of interest can still be identified. This is unlikely to be the case however. As the seminal literature on panel data estimation has clarified (see, for example, Hoch 1962, Mundlack 1961, Nerlove 1965) omitting controls for unobserved factors such as, for example, the systematic risk of the stock or for other variables that are difficult to measure or obtain will lead to biased and inconsistent estimates.

There are various approaches in the literature used to deal with unobserved heterogeneity. A simple way to eliminate the stock fixed effect is to apply first differences to Equation 1 and Equation 2 to obtain:

Equation 3

$$\Delta tc_{it} = \lambda_1 \Delta tc_{it-1} + \lambda_2 \Delta tc_{it-2} + \lambda_3 \Delta tc_{it-3} + a_1 \Delta tt_{it} + a_2 \Delta tt_{it-1} + a_3 \Delta tt_{it-2} + a_4 \Delta \sigma_{it}^2 + a_5 \Delta \sigma_{it-1}^2 + a_6 \Delta \sigma_{it-2}^2 + a_7 \Delta mdep_{it} + \Delta \eta_t + \Delta \gamma_{it}$$

Equation 4:

$$\Delta tt_{it} = \delta_1 \Delta tt_{it-1} + \delta_2 \Delta tt_{it-2} + \delta_3 \Delta tt_{it-3} + \beta_1 \Delta tc_{it} + \beta_2 \Delta tc_{it-1} + \beta_3 \Delta tc_{it-2} + \beta_4 \Delta \sigma_{it}^2 + \beta_5 \Delta \sigma_{it-1}^2 + \beta_6 \Delta \sigma_{it-2}^2 + \beta_7 \Delta mdep_{it} + \Delta \mu_i + \Delta \phi_{it}$$

Note that differencing eliminates all the variables that are time-invariant and that tc_{it-1} is correlated with the equations error. The technique to estimate such dynamic panel data model is due, among others, to Arellano and Bond (1991). This method essentially uses further lags of the level or the difference of the dependent variable to 'instrument' the lagged dependent variables included in the model after the elimination of the fixed effects through first differencing. The validity of this technique depends on the absence of serial correlation in the error term, which can be investigated using serial correlation tests developed by Arellano and Bond (1991).

Once the implications of unobserved heterogeneity in the dependent variables are dealt with, the above system of equations still violates one of the

assumptions of least squares estimation. Specifically, the disturbances of the trading cost equation are correlated with one of the regressors (trading turnover), thus creating a problem of endogeneity.

For example, a technology shock to the trading system may induce a decrease in trading cost and a possible rise in turnover. Therefore, in order to avoid possible biases in the parameter estimates, these variables are treated as endogenous using the Arellano Bond methodology.

Finally, once consistent estimates of the parameters of interest have been obtained, the reduced form for the trading cost equation can be obtained by: (i) imposing long-run equilibrium conditions (steady state) on both the equations; (ii) calculating long-run coefficients for both the equations; and (iii) substituting the long-run trading turnover equation for the trading turnover variable in the long-run trading cost equation. This yields a trading cost equation that can then be used to estimate the average trading cost in a fully integrated market.

In the next paragraphs the data sources used will be described and some measurement issues with respect to our variables of interest will be discussed.

Data definitions and measurement issues

Data sources

The majority of the data used for the analysis below is sourced from Bloomberg Professional Services from which provided stock- and venue-specific information for the period 2nd January 2006 to 31st December 2009.

The sample of stocks considered in the analysis was selected in order to represent the top 50 equities on the set of Euronext exchanges, the London Stock Exchange and the Deutsche Börse; and the top 20 stocks from other regulated markets in the EU-25 and Switzerland, except Malta and Luxemburg where data on the top 5 stocks were considered in each.

The method for selecting stocks was based on companies' average market capitalisation over the period 2nd January 2006 - 31st December 2009, where this information was available. In addition to the above process for selecting the data sample, a series of filters were applied²⁰, yielding a final sample of data on 23 trading venues.

The frequency of stock-specific data is daily. Observations on trading costs, for instance, were constructed as follows from raw daily data on closing bid, ask and transaction prices.

First, daily measures of trading costs were constructed for all sample stocks.

²⁰ Stocks experiencing extreme price movements such as more than a 200% growth rate or a percentage decrease greater than 50% in any of the key variables (bid, ask, price) were dropped from the sample as were observations of cross markets (i.e. negative bid-ask spreads). This is because the a priori hypothesis was that such data most likely reflected stocks' characteristics outside the scope of the analysis or reporting errors.

Second, for each stock in the sample, average monthly trading costs were calculated to obtain a single data point per month. This procedure yields a monthly time series of trading costs of up to 24 months in length for each stock.

This methodology, used, for example, also by Stoll (2000) and Jain (2001), has two main advantages: it provides a more accurate measurement of trading costs than simply taking one observation per month; additionally, it reduces substantially the measurement error due to random day-to-day fluctuations in market spreads.

Historical information on market-wide variables (for example, a volatility index) was based on standard data produced by Bloomberg for these measures. Information on total market capitalisation for trading venues was collected from the Federation of European Stock Exchanges (FESE).

Data definitions

Trading costs: there are several alternative measures of trading costs, each of them with different characteristics²¹. The quoted and effective spreads are static measures observable at the moment of the trade²². The quoted percentage spread is defined as:

$$QPS = (A-B)/P$$

where A denotes the ask price, B the bid price and P the effective transaction price.

As many transactions take place inside the quoted spread, this measure may overstate trading costs. An alternative measure of the trading cost is the effective percentage spread, which can be defined as:

$$EPS = 2 * |P-M| / P$$

where M is the quote mid-point, i.e. $(A+B)/2$. This measure potentially captures the fact that large trades, that exceed the volume of securities the market is willing to trade at the quoted bid and ask prices, may move prices in the direction of the trade, i.e. the market impact effect. Therefore, the effective percentage spread is preferred as a measure of trading costs because it incorporates both the impacts of market spreads and market impact on trading costs, even if it does not disentangle the two effects.

²¹ For a discussion of several alternative measures of trading costs see Stoll (2000) and Domowitz, Glen and Madhavan (2000).

²² A problem with the use of the Bid-Ask spread in a continuous auction market is that it applies to relatively small trades. This problem can be overcome by measuring the hypothetical average price that can be obtained in the auction for a given order size, using data from the limit order book. In particular, this average price can be computed for the order size for which dealers post firm quotes. Upon computing the price for buy and sell orders, one obtains the average market spread, Pagano (1997).

Stock volatility: the volatility of returns is computed for each stock as the standard deviation of the stock's return in terms of capital appreciation over a period of a month.

Trading turnover: for each stock, trading turnover is defined as the ratio between trading volume and market capitalisation.

Market capitalisation: this variable is computed as the sum of market capitalisation of all firms listed on that trading venue.

Macroeconomic shocks: modelled as dummies for each exchange/country and time dummies.

In addition to these key variables used in the estimation of Equation 3 and Equation 4, additional control variables were used to test the robustness of these results, as set out below.

LARGE: a dummy variable taking value 1 if the company shows an average capitalisation above the median value of the venue where it is traded and 0 otherwise.

Volatility index: Based on the Euro Stoxx 50® Volatility Index, which is a measure of market expectations of near-term up to long-term volatility based on the EURO STOXX 50 options prices.

Estimation results

Three different models were estimated.

- The first model (model I) consists of equations 3 and 4 described above.
- The second model (model II) adds a volatility measure in the two equations to better control for the impact of heightened uncertainty caused by the financial crisis.
- The third model (model III) includes in addition a control dummy for large companies.

The long-run estimates for the relationship between trading costs and market depth and trading costs and stock volatility, pre- and post-MiFID are discussed in detail in Chapter 6

The key empirical result is that, in all the models, the estimated coefficient of the market depth variable is almost zero in the post-MiFID period whereas in the pre-MiFID period it is even larger than in the previous London Economics study.

In other words, in the pre-MiFID period, the level of implicit trading costs was negatively correlated with the size of the market, a sign of fragmentation of liquidity. In contrast, in the post-MiFID period this correlation is practically reduced to zero due to better integration of the different markets through competition between venues.

Moreover, the estimation results of models I – model III suggest that this is likely to be due to MiFID rather than competing explanations, including:

- the impact of the uncertainty captured by the inclusion of the volatility index in model II; and
- differences in firm size captured by the large firm size control in model III.

Table A3.1 Long-run relationship between trading costs and market depth (mdep) and trading costs and stock volatility σ^2 , pre- and post-MiFID

	Pre-MiFID		Post-MiFID	
	mdep	σ^2	mdep	σ^2
Model I	-0.273	0.009	-0.034	-0.007
Model II (incl. volatility index)	-0.738	0.031	-0.014	-0.006
Model III (incl. volatility index and large firm size control)	-0.741	0.030	-0.008	-0.006

Note: The pre-MiFID covers the period January 2006 – October 2007 and the post-MiFID period covers the period January 2009 – December 2009

Source: London Economics statistical analysis

The estimation results of the short-run econometric model underlying these results are shown in Table A3.2, where the coefficients on the key variables of interest – trading cost, trading turnover, stock volatility and market depth – are reported.

Table A3.2 Short-run estimates of trading costs and trading turnover, pre- and post-MiFID

	Model I				Model II				Model III			
	Pre-MiFID		Post-MiFID		Pre-MiFID		Post-MiFID		Pre-MiFID		Post-MiFID	
	Δt_{Cit}	Δt_{fit}	Δt_{Cit}	Δt_{fit}	Δt_{Cit}	Δt_{fit}	Δt_{Cit}	Δt_{fit}	Δt_{Cit}	Δt_{fit}	Δt_{Cit}	Δt_{fit}
Δt_{Cit}	NA	0.005	NA	-3E-4	NA	0.004	NA	-6E-4	NA	0.004	NA	-6E-4
Δt_{Cit-1}	0.269	-6E-4	-0.017	-1E-4	0.230	-2E-4	-0.041	-2E-4	0.231	-3E-4	-0.041	-2E-4
Δt_{Cit-2}	-0.113	-4E-3	-0.158	-5E-4	-0.138	-0.004	-0.174	-7E-4	-0.138	-0.005	-0.173	-7E-4
Δt_{Cit-3}	0.055	NA	-0.096	NA	0.014	NA	-0.109	NA	0.015	NA	-0.108	-6E-4
Δt_{fit}	0.103	NA	-0.670	NA	0.056	NA	-0.970	NA	0.055	NA	-0.968	NA
Δt_{fit-1}	-0.468	0.029	-0.611	0.097	-0.553	-0.029	-0.750	0.077	-0.547	-0.029	-0.725	0.077
Δt_{fit-2}	-0.706	-0.067	-0.599	-0.015	-0.731	-0.095	-0.787	-0.022	-0.723	-0.095	-0.861	-0.022
Δt_{fit-3}	NA	-0.040	NA	-0.030	NA	-0.052	NA	-0.036	NA	-0.052	NA	-0.036
$\Delta \sigma^2_{fit}$	-2E-4	0.000	-2E-4	0.000	-2E-4	0.000	-2E-4	0.000	-2E-4	0.000	2E-4	0.000
$\Delta \sigma^2_{fit-1}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\Delta \sigma^2_{fit-2}$	0.000	0.000	-2E-4	0.000	0.000	0.000	-2E-4	0.000	0.000	0.000	2E-4	0.000
$\Delta mdep_{it}$	0.117	0.004	-0.005	-1E-4	0.105	0.003	-0.004	0.000	0.107	0.003	-0.004	0.000
No. of observations	4,671	4,658	3,557	3,549	4,560	4,547	3,455	3,447	4,560	4,547	3,455	3,447

Notes: Coefficient estimates reported from Arrelano-Bond one-step estimation for interpretation. All coefficient estimates significant at the 1% level in Arrelano-Bond two-step estimation.

Source: London Economics statistical analysis

Macroeconomic impacts

Overview

The long-run estimates of the relationship between trading cost and market depth in the pre- and post-MiFID period play a key role in determining the macroeconomic impacts (in terms of changes to the long-run level of real GDP) of changes in observed market depth in the pre- and post-MiFID period.

The causal mechanism involved is the following:

- increases in market depth through European capital market integration reduce trading costs;
- lower trading cost in turn reduce the rate of return required by investors of equity capital;
- this, in-turn, has a positive impact on the level of real GDP by stimulating investment and raising the equilibrium level of an economy's stock of capital.

This section briefly elaborates on the link between a) trading costs and the cost of capital and b) the cost of capital and real GDP. For a complete discussion, see London Economics (2002).²³

Link between trading costs and the costs of equity capital

The relationship between trading costs and the cost of capital modelled at the company level in London Economics (2002) and the estimates derived from this study, are used to compute the change in the cost of capital resulting from changes in trading cost estimated for the pre- and post-MiFID periods.

Following Domowitz and Steil (2001), the cost of capital by country is estimated at the company level. First, a measure of investors' required rate of return on equities in each market is constructed, based on a basic dividend discount model (DDM). Following this, three steps are carried out: (i) a calculation of simple correlations between turnover, trading costs and the cost of equity is carried out; (ii) an univariate regression of the cost of capital measure on trading costs and turnover are separately estimated; and (iii) a multivariate regression is estimated of the cost of capital measure on trading costs and turnover together.

Based on and expanding the above methodology, the long-run relationship between the cost of capital and trading cost was estimated to be the following.

Equation 5: $\Delta k = 0.5734 \Delta tc$

where Δk denotes change in cost of capital and Δtc denotes change in trading cost.

²³ http://ec.europa.eu/internal_market/securities/overview_en.htm

Using estimates of the change in trading costs predicted by observed changes in market depth during the pre- and post-MiFID periods and the long-run estimated relationship between trading costs and market depth set out in chapter 6, the predicted decrease in the cost of capital was computed for trading venues represented in the data sample. These estimates were then used to determine the impact of reductions in the cost of capital on real GDP.

Link between the cost of equity capital and the level of real GDP in the long run

The relationship between the cost of equity capital and the long-run level of real GDP is also based on London Economics (2002), which showed the following changes in the level of real GDP resulting from a given decrease in the cost of capital, by Member State as reproduced in the below.

Table A.3.3 Estimates of relationship between cost of capital and real GDP

Country – trading venue	Percentage decrease in the cost of capital	Percentage change in real GDP
Austria	50.1	0.5
Belgium	49	0.6
Denmark	46.7	0.2
Finland	46.2	0.8
France	48.9	0.8
Germany	46.4	0.6
Greece	21.8	
Ireland	48.6	0.5
Italy	36.9	0.9
Luxembourg	49	0.2
Netherlands	40.6	0.3
Poland	48.7	0.5
Spain	13.4	0.5
Sweden	44.6	0.4
United Kingdom	26.2	0.5
EU-15 average	36.2	0.5

Source: London Economics (2002)

Using a linear interpolation of these on a country-by-country basis and taking the EU-15 average for Switzerland and Member States that have since joined the European Union, the final macroeconomic impacts of changes in market depth pre- and post-MiFID were calculated. These results are presented in Table A.3.4.

Table A.3.4 Macroeconomic impacts of changes in trading costs, pre- and post-MiFID implementation, by country – trading venue

Country – trading venue Econometric model specification		Pre-MiFID implementation						Post-MiFID implementation					
		β	Δt_c	Δc_c	$\Delta \text{real GDP}$	β	Δt_c	Δc_c	$\Delta \text{real GDP}$				
Austria - Vienna													
	Model I	-0.273	-2.027	-1.162	1.160%	-0.034	-0.193	-0.111	0.111%				
	Model II	-0.738	-4.184	-2.399	2.394%	-0.014	-0.082	-0.047	0.047%				
	Model III	-0.741	-4.184	-2.399	2.394%	-0.008	-0.050	-0.029	0.029%				
Belgium – Brussels													
	Model I	-0.273	-0.908	-0.521	0.637%	-0.034	-0.155	-0.089	0.109%				
	Model II	-0.738	-0.908	-0.521	0.637%	-0.014	-0.062	-0.036	0.044%				
	Model III	-0.741	-0.908	-0.521	0.637%	-0.008	-0.038	-0.022	0.027%				
Denmark – Copenhagen													
	Model I	-0.273	-0.023	-0.013	0.006%	-0.034	-0.190	-0.109	0.047%				
	Model II	-0.738	-0.023	-0.013	0.006%	-0.014	-0.076	-0.044	0.019%				
	Model III	-0.741	-0.023	-0.013	0.006%	-0.008	-0.047	-0.027	0.012%				
Finland – Helsinki													
	Model I	-0.273	-0.097	-0.056	0.097%	-0.034	-0.190	-0.109	0.189%				
	Model II	-0.738	-0.097	-0.056	0.097%	-0.014	-0.076	-0.044	0.076%				
	Model III	-0.741	-0.097	-0.056	0.097%	-0.008	-0.047	-0.027	0.047%				
France – Paris													
	Model I	-0.273	-0.670	-0.384	0.628%	-0.034	-0.155	-0.089	0.145%				
	Model II	-0.738	-0.670	-0.384	0.628%	-0.014	-0.062	-0.036	0.058%				

Model III	-0.741	-0.670	-0.384	0.628%	-0.008	-0.038	-0.022	0.036%
Germany – Frankfurt								
Model I	-0.273	-0.876	-0.502	0.866%	-0.034	-0.181	-0.104	0.179%
Model II	-0.738	-0.876	-0.502	0.866%	-0.014	-0.073	-0.042	0.072%
Model III	-0.741	-0.876	-0.502	0.866%	-0.008	-0.045	-0.026	0.044%
Greece – Athens								
Model I	-0.273	-2.026	-1.162	2.664%	-0.034	-0.203	-0.116	0.266%
Model II	-0.738	-2.153	-1.235	2.832%	-0.014	-0.081	-0.047	0.107%
Model III	-0.741	-2.153	-1.235	2.832%	-0.008	-0.050	-0.029	0.066%
Ireland – Dublin								
Model I	-0.273	-2.033	-1.166	2.158%	-0.034	-0.202	-0.116	0.215%
Model II	-0.738	-2.331	-1.336	2.475%	-0.014	-0.081	-0.047	0.086%
Model III	-0.741	-2.331	-1.336	2.475%	-0.008	-0.050	-0.029	0.053%
Italy – Milan								
Model I	-0.273	-1.736	-0.995	0.539%	-0.034	-0.193	-0.111	0.060%
Model II	-0.738	-1.736	-0.995	0.539%	-0.014	-0.077	-0.044	0.024%
Model III	-0.741	-1.736	-0.995	0.539%	-0.008	-0.048	-0.027	0.015%
United Kingdom – London								
Model I	-0.273	-0.379	-0.218	0.415%	-0.034	-0.156	-0.090	0.171%
Model II	-0.738	-0.379	-0.218	0.415%	-0.014	-0.063	-0.036	0.069%
Model III	-0.741	-0.379	-0.218	0.415%	-0.008	-0.039	-0.022	0.043%
Netherlands – Amsterdam								
Model I	-0.273	-1.541	-0.884	1.088%	-0.034	-0.155	-0.089	0.109%

Model II	-0.738	-2.153	-1.235	1.520%	-0.014	-0.062	-0.036	0.044%
Model III	-0.741	-2.153	-1.235	1.520%	-0.008	-0.038	-0.022	0.027%
Portugal – Lisbon								
Model I	-0.273	-1.047	-0.600	0.616%	-0.034	-0.155	-0.089	0.091%
Model II	-0.738	-1.047	-0.600	0.616%	-0.014	-0.062	-0.036	0.037%
Model III	-0.741	-1.047	-0.600	0.616%	-0.008	-0.038	-0.022	0.023%
Spain – Madrid								
Model I	-0.273	-1.495	-0.857	2.558%	-0.034	-0.181	-0.104	0.309%
Model II	-0.738	-1.495	-0.857	2.558%	-0.014	-0.073	-0.042	0.124%
Model III	-0.741	-1.495	-0.857	2.558%	-0.008	-0.045	-0.026	0.077%
Sweden – Stockholm								
Model I	-0.273	0.000	0.000	0.000%	-0.034	-0.190	-0.109	0.122%
Model II	-0.738	0.000	0.000	0.000%	-0.014	-0.076	-0.044	0.049%
Model III	-0.741	0.000	0.000	0.000%	-0.008	-0.047	-0.027	0.030%
Switzerland – Zurich								
Model I	-0.273	-0.614	-0.352	0.487%	-0.034	-0.186	-0.106	0.147%
Model II	-0.738	-0.614	-0.352	0.487%	-0.014	-0.075	-0.043	0.059%
Model III	-0.741	-0.614	-0.352	0.487%	-0.008	-0.046	-0.026	0.037%
Estonia – Tallinn								
Model I	-0.273	-	-	-	-0.034	-0.190	-0.109	0.151%
Model II	-0.738	-	-	-	-0.014	-0.076	-0.044	0.061%
Model III	-0.741	-	-	-	-0.008	-0.047	-0.027	0.037%
Hungary – Budapest								

Model I	-0.273	-	-	-	-	-0.034	-0.204	-0.117	0.162%
Model II	-0.738	-	-	-	-	-0.014	-0.082	-0.047	0.065%
Model III	-0.741	-	-	-	-	-0.008	-0.051	-0.029	0.040%
Lithuania – Vilnius									
Model I	-0.273	-	-	-	-	-0.034	-0.190	-0.109	0.151%
Model II	-0.738	-	-	-	-	-0.014	-0.076	-0.044	0.061%
Model III	-0.741	-	-	-	-	-0.008	-0.047	-0.027	0.037%
Latvia – Riga									
Model I	-0.273	-	-	-	-	-0.034	-0.190	-0.109	0.151%
Model II	-0.738	-	-	-	-	-0.014	-0.076	-0.044	0.061%
Model III	-0.741	-	-	-	-	-0.008	-0.047	-0.027	0.037%
Norway – Oslo									
Model I	-0.273	-	-	-	-	-0.034	-0.201	-0.115	0.159%
Model II	-0.738	-	-	-	-	-0.014	-0.081	-0.046	0.064%
Model III	-0.741	-	-	-	-	-0.008	-0.050	-0.029	0.040%
Poland – Warsaw									
Model I	-0.273	-	-	-	-	-0.034	-0.203	-0.116	0.160%
Model II	-0.738	-	-	-	-	-0.014	-0.081	-0.047	0.064%
Model III	-0.741	-	-	-	-	-0.008	-0.050	-0.029	0.040%
Slovakia – Bratislava									
Model I	-0.273	-	-	-	-	-0.034	-0.205	-0.117	0.162%
Model II	-0.738	-	-	-	-	-0.014	-0.082	-0.047	0.065%
Model III	-0.741	-	-	-	-	-0.008	-0.051	-0.029	0.040%

Slovenia – Ljubljana											
Model I	-0.273	-	-	-	-	-0.034	-0.205	-0.117	0.162%		
Model II	-0.738	-	-	-	-	-0.014	-0.082	-0.047	0.065%		
Model III	-0.741	-	-	-	-	-0.008	-0.051	-0.029	0.040%		
Sample average											
Model I	-0.273	-2.027	-1.162	1.160%	-0.034	-0.193	-0.111	0.111%			
Model II	-0.738	-4.184	-2.399	2.394%	-0.014	-0.082	-0.047	0.047%			
Model III	-0.741	-4.184	-2.399	2.394%	-0.008	-0.050	-0.029	0.029%			

Note: β = estimated coefficient of the market depth variable in the long-run reduced form trading cost equation, Δtc = absolute change in trading cost arising from full European market integration, Δcc = change in the cost of equity capital arising from the reduction in the trading cost, $\Delta real GDP$ = change in the long-run level of GDP (at constant prices) caused by the reduction in the cost of equity capital

Source: London Economics statistical analysis

Annex 3 Consultation guide

Section A. Competition and the creation of new markets and services

MiFID, alongside technological innovation, has enhanced competition and led to the creation of new markets and services in the secondary trading of equities. In this section, we would like you to consider your views of the impacts this has had on market quality (as distinct from the impact of the global economic crisis).

1. What has been the impact of trading fragmentation on liquidity fragmentation?

Liquidity fragmentation has...

- | | |
|----------------------------|---|
| Remained the same | 1 |
| Reduced moderately..... | 2 |
| Reduced substantially..... | 3 |
| Grown moderately | 4 |
| Grown substantially | 5 |
| Do not know | 6 |

2. What has been the impact on explicit trading costs (i.e. trading costs, clearing and settlement costs and fees for broker-dealers) in secondary markets for equity, and why?

OPEN RESPONSE

Explicit trading costs have...

- | | |
|------------------------------|---|
| Remained the same | 1 |
| Reduced moderately..... | 2 |
| Reduced substantially..... | 3 |
| Increased moderately | 4 |
| Increased substantially..... | 5 |
| Do not know | 6 |

3. What has been the impact on implicit trading costs (i.e. bid-ask spreads) in secondary markets for equity, and why?

OPEN RESPONSE

Implicit trading costs have...

- | | |
|------------------------------|---|
| Remained the same | 1 |
| Reduced moderately..... | 2 |
| Reduced substantially..... | 3 |
| Increased moderately | 4 |
| Increased substantially..... | 5 |
| Do not know | 6 |
-

4. What has been the impact on fees charged by broker-dealers in secondary markets for equity, and why?

OPEN RESPONSE

Fees have...

- | | |
|------------------------------|---|
| Remained the same | 1 |
| Reduced moderately..... | 2 |
| Reduced substantially..... | 3 |
| Increased moderately | 4 |
| Increased substantially..... | 5 |
| Do not know | 6 |

Section B. Best execution

In this section we would like you to consider the impacts of MiFID's best execution rules on secondary market trading of equities, which are intended to yield the best possible result for clients.

5. How well do you believe best execution rules have been implemented by market participants in secondary markets for equities?

Please consider the breadth of best execution rules under MiFID relating to factors such as account price, costs, speed and likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order.

OPEN RESPONSE

6. Have there been any unanticipated consequences of best execution rules that policy-makers may not have considered at the time of devising the principles of MiFID?

Please consider your answers to Question 1 and Question 2 in this response.

OPEN RESPONSE

7. Overall, how effective do you feel best execution rules are in relation to their objective to yield the best possible result for clients?

OPEN RESPONSE

Best execution rules are...

- | | |
|--|---|
| Largely ineffective | 1 |
| Partially ineffective and partially effective..... | 2 |
| Largely effective | 3 |

Section C. Pre-trade transparency

In this section we would like you to consider the impacts of pre-trade transparency provisions within MiFID against its objectives to improve the "efficiency of the overall price formation process for equity instruments" and assist in "the effective operation of best execution obligations".

- 8. How well do you believe pre-trade transparency requirements have been implemented by market participants in secondary markets for equities?**

OPEN RESPONSE

- 9. Have pre-trade transparency requirements resulted in any surprising changes to the incentives faced by market participants?**

OPEN RESPONSE

- 10. To what extent do you feel there have been changes to prices resulting from MiFID's pre-trade transparency requirements?**

Please consider the potential impact MiFID might have had on price volatility and price quality (i.e. how accurately prices reflect fundamental values, sometimes measured as the ratio of short-term to long-term return variances) among other issues.

OPEN RESPONSE

- 11. Has the implementation of pre-trade transparency requirements affected the provision of liquidity in the system as a whole?**

Liquidity provision has...

- | | |
|-----------------------------|---|
| Remained the same | 1 |
| Reduced moderately | 2 |
| Reduced substantially | 3 |
| Grown moderately | 4 |
| Grown substantially | 5 |
| Do not know | 6 |

- 12. In your view, what other impacts do you feel MiFID's transparency requirements have had?**

Please consider your answers to previous questions

OPEN RESPONSE

Section D. Post-trade transparency

In this section we would like you to consider the impacts of post-trade transparency provisions within MiFID against its objectives to improve the "efficiency of the overall price formation process for equity instruments" and assist in "the effective operation of best execution obligations".

13. Does a lack of consolidated price information under MiFID's post-trade transparency requirements pose a challenge to achieving best execution, and why?

In your response, please consider search costs that may be associated with collecting and processing information required to achieve best execution.

OPEN QUESTION

14. Once a transaction has been completed, does a lack of consolidated price information under MiFID's post-trade transparency requirements pose a serious issue in monitoring whether or not best execution had taken place?

OPEN QUESTION

Section E. Suggested changes to MiFID

15. What changes to MiFID, if any, do you feel should be brought into effect, and why?

OPEN RESPONSE

Section F. Additional comments

If, in addition to the points addressed above, there are any additional issues that you feel should be considered during this research, please provide them below.

OPEN RESPONSE

Glossary

ATS	Alternative Trading System
ECN	Electronic Communication Network
GDP	Gross Domestic Product
ISD	Investment Service Directive
MiFID	Markets in Financial Instruments Directive
MTF	Multilateral Trading Facility
OTC	Over the Counter
RM	Regulated Market
SI	Systematic Internaliser

List of Tables

Table 3.1 Share of trading volume in stocks included in main stock index on incumbent trading venues	17
Table 3.2: Potential impact of fragmentation on spreads	18
Table 3.3 Potential impact of fragmentation on liquidity.....	19
Table 3.4 Potential impact of fragmentation on depth.....	19
Table 4.1: Estimated reduction in trading costs and cost of capital	23
Table 5.1 Descriptive statistics, pre- and post-MiFID ²	26
Table 5.2 Estimates of impact of market depth (liquidity) and volatility on implicit trading costs.....	31
Table 5.3 Estimates of the impact of full European financial market integration on the long-run level of EU GDP	33
Table A3.1 Long-run relationship between trading costs and market depth (mdep) and trading costs and stock volatility σ^2 , pre- and post-MiFID	57
Table A3.2 Short-run estimates of trading costs and trading turnover, pre- and post-MiFID.....	58
Table A.3.3 Estimates of relationship between cost of capital and real GDP	60
Table A.3.4: Macroeconomic impacts of changes in trading costs, pre- and post-MiFID implementation, by country – trading venue	61

List of Figures

Figure 3.1 Distribution of market-traded volumes by primary exchange	16
Figure 5.1 Comparison of quoted spreads, by venue pre- and post-MiFID	28
Figure 5.2 Comparison of effective spreads, pre- and post-MiFID	29
Figure 5.3 Average effective spread (expressed as % of stock price), July 2006-December 2009	30

