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**Market Dominance and Barriers To
Competition in Financial Trading Venues**

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MARKET DOMINANCE AND BARRIERS TO COMPETITION IN FINANCIAL TRADING VENUES

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Abstract

The Market in Financial Instruments Directive (MiFID) aims to increase competition and to foster client protection in the European financial market. Among other provisions, it abolishes the concentration rule and challenges the market power of existing trading venues. The directive introduces venue competition in order to achieve better execution and ultimately lower trading costs. In this paper I address the question of whether fostering competition between alternative trading venues alone may or not be able to impact actual competition in the market. I consider two reasons for why it may not: direct network effects together with increasing returns to scale, and post-trading constraints. In particular, I (*a*) evaluate the actual degree of competition between trading venues, (*b*) measure the impact of network effects on competition, and lastly (*c*) assess the barriers to competition induced by post-trading constraints. The results imply that financial intermediaries tend to value liquidity more (than total fees) when deciding where to route a given order for execution - implying that being the incumbent venue translates into a competitive advantage. Furthermore, eliminating the mentioned barriers to competition seems to be asociated with a significant decrease (of a similar magnitude) in the assymetry of the industry.

JEL Classification: C13, G10, L11, L84

Keywords: Market Dominance, Network Effects, Financial Trading, Demand, Barriers to Competition

1   INTRODUCTION

The interaction between competition and economic growth is a well established fact in the literature (Porter (1990), Aghion and Howitt (1992), Blundell et al. (1995), Aghion et al. (1999)). Competition impacts economic growth via a more efficient allocation of market resources that contributes to "better economic performance, better prices and better services for consumers and businesses" (Kroes (2007)).

The last years have witnessed a strong and ferocious promotion of competition in a large spectrum of markets and industries and a clear example of this trend is the new Market in Financial Instruments Directive (MiFID) that fosters a fair, competitive, transparent, efficient and integrated European financial market.

To this end, MiFID aims - among other objectives - to harmonize the trading structures across the Member States by abolishing the requirement to concentrate the execution of trading orders by financial intermediaries in a single venue.

The above principle challenges the market power of existing venues and fosters entry by new players. This paper argues that fostering potential competition in the cash trading market may not have an impact on the degree of actual competition. In particular, I consider two reasons for why it may not: (a) direct network effects together with increasing returns to scale and (b) post-trading constraints.

MiFID determines that the choice of trading venue by financial intermediaries must achieve best execution to their clients. Best execution coincides with the venue that achieves the best price at a lower cost, which means that the choice of financial intermediaries must take into account not only factors related to the explicit trading costs (execution, settlement and clearing fees), but also factors connected with the implicit trading costs (price and liquidity).

Implicit trading costs are important as cash trading exhibits direct network effects. The valuation of financial intermediaries for a given trading venue is increasing in the number of other agents that choose the same venue - as it increases the probability of an order find a corresponding counterparty.

This fact raises the problem that in the presence of network effects, fostering competition among alternative trading venues may not be enough. The reason being that venues with high liquidity - typically the incumbent stock exchanges - present lower implicit trading costs and therefore have a clear advantage relatively to their competitors

- limiting the extent of effective competition. In order for competitors to succeed, they need to trade-off this disadvantage with lower explicit trading costs, which for venues with similar technologies may not possible in an industry characterized with increasing returns to scale.
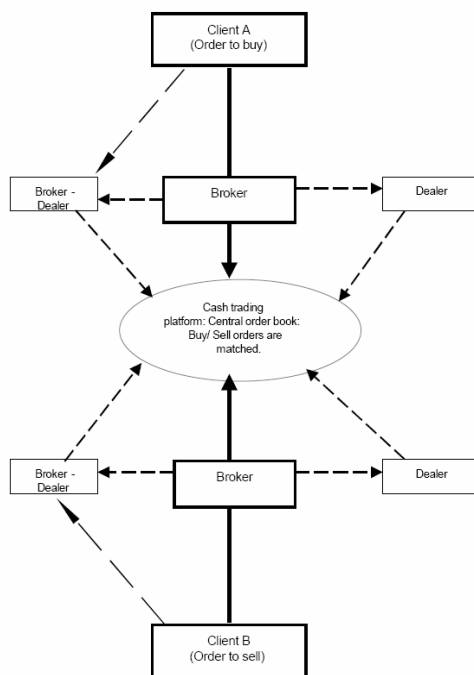
The second justification relates to constraints on post-trading services. Different trading venues can not considered as effective substitutes if they imply different post-trading arrangements - with different clearing and settlement costs. The competition for trading venues is limited by the fact that financial intermediaries can not freely choose post-trading arrangements.

This paper proposes to empirically address the following questions: (a) evaluate the actual degree of competition between alternative trading venues, (b) measure the impact of network effects on competition, and lastly (c) assess the barriers to competition induced by post-trading constraints. Finally, some economic policy implications are proposed.

To this end, I suggest a structural discrete-choice multinomial random-coefficients logit demand model for trading following Berry, Levinsohn, and Pakes (1995) that takes into account the trade-off between explicit and implicit trading costs following Pagano (1989). The model is flexible in the sense that the implied substitution patterns do not suffer from the problem of the Independence of Irrelevant Alternatives (IIA) property characteristic of more standard models. Furthermore, following the demand modelling literature, the error term is structurally embedded in the model and thereby circumvents the critique provided by Brown and Walker (1989) related to the addition of add-hoc errors and their induced correlations. The results imply that financial intermediaries tend to value liquidity more (than total fees) when deciding where to route a given order for execution. For this reason the incumbent venue has a clear advantage relatively to its competitors and can as a result exert market power when setting total fees.

After estimating the degree of substitutability between the different trading venues, I analyze the impact of network effects as a barrier to competition, by computing the counterfactual market shares that would arise if there were no liquidity differences across venues. Lastly I propose a measure of the barriers to competition induced by the bundle of trading and post-trading services by simulating the equilibrium market shares that would arise if the services of different trading services were fungible. In both cases, the results suggest that eliminating the corresponding barrier to competition is asociated with a significant decrease (of a similar magnitude) in the assymetry of the industry.

Figure I - The Trading Mechanism

Client A
(Order to buy)

Broker - Dealer   Broker   Dealer

Cash trading platform: Central order book: Buy/ Sell orders are matched.

Broker - Dealer   Broker   Dealer

Client B
(Order to sell)

Source: Pagano and Padilla (2005).

The paper proceeds as follows. The economics of trading is described in section 2, whereas in section 3 I discuss the relevant literature. Section 4 presents the demand model and establishes estimation issues. In section 5, I introduce the data, discuss identification and present the results. Section 6 discusses network effects and post-trading constraints as barriers to competition. Section 7 concludes.

2   THE ECONOMICS OF TRADING AND MiFID

The process of trade starts with investors sending their buying or selling orders to a broker or a broker-dealer. If investors choose the former, the broker receives the order and can decide by one of two options: (a) can place it directly on a trading venue order book or (b) can decide to go indirectly via a dealer. If the broker opts for option (b) or the investors send their orders directly to a broker-dealer then the dealer (or broker-dealer depending on the case) can match the order from its own inventory, place the order on a trading venue or go to another dealer. The process of trading involving an electronic trading platform is illustrated in Figure I.

TABLE I - MARKET CONCENTRATION

Concentration Ratios	C_1	C_3	C_5
European Equities	31%	58%	75%
UK Equities	63%	87%	89%
FTSE 100 Equities	70%	98%	99%

Source: Reuters Market Share Reports, November 2007.

The paper focuses on trading venue competition and for that reason models the choice of venue to execute an order by brokers, dealers and broker-dealers (henceforth financial intermediaries).

At first sight, the market for trading in Europe seems not to be extremely concentrated for an industry with strong network effects and scale economies - if you consider the set of all European securities, the volume market share of the leading trading venue is roughly 30% with the top 3 venues capturing approximately 60% of the market. However these statistics are somehow misleading as typically trading for a given security is concentrated on a smaller set of trading venues. If you consider the set of the FTSE 100 securities, the market share for the leading trading venue is now roughly 70% with the top 3 venues capturing approximately 98% of the market! Table I presents a range of concentration ratios for different sets of European equities.

On this respect, MiFID tries to promote a significant change in the shape of the industry. It aims to increase competition by creating a common harmonized European market for financial products and to foster client protection through improved transparency, suitability requirements and best execution principles. In particular, it abolishes the so-called "concentration rule" that allowed, in the past, member states to impose that securities admitted to trading on a regulated market have to be traded only on regulated markets. The MiFID allows, in contrast, the provision of trading services to a variety of trading venues, namely Regulated Markets (RM), Multilateral Trading Facilities (MTF) and Systematic Internalizers (SI).

RM or MTF are entities that offer multilateral trading for financial instruments (such as an order book), with slightly different standards applying to each, whereas SI refer to financial firms which, on an organized, frequent and systematic basis, deal on own account by executing client orders outside a RM or an MTF.

A financial intermediary wanting to trade a given security is therefore faced with a choice - it must choose a venue where to route the order from RM like the London

Figure II - Clearing and Settlement Flows
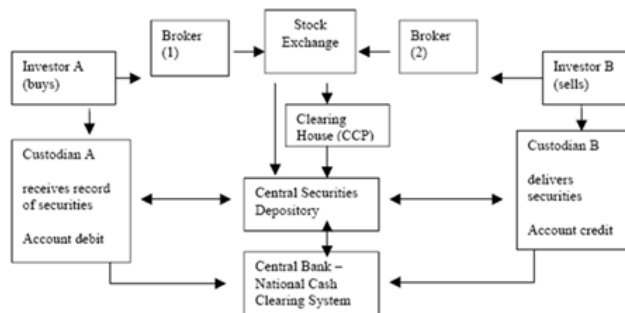

Source: Carvalho (2004).

Stock Exchange, Euronext or Frankfurt Stock Exchange, MTF like Chi-X, or SI like ABN AMRO, Goldman Sachs or UBS. Following MiFiD, the chosen venue must achieve best execution, taking into account a number of factors that include transaction costs, price and liquidity, speed of execution, likelihood of execution, clearing and settlement arrangements, etc.

Transaction costs refer to the explicit trading costs of each venue. These costs can be decomposed into costs of executing an order (trading fees) and post-trade costs (clearing and settlement fees). Clearance refers to the validation of a trade and the subsequent establishment of the obligations of the parties to the trade (what each owes and is entitled to receive). Settlement is the process during which buyer and seller details are matched and the security changes ownership against the appropriate payment. Clearing and settlement services are typically performed by specializing institutions: the transfer of ownership is carried out by a central securities depository or an international central securities depository, whereas the banking/payment system handles the payment of funds. Figure II presents the flows involved in the clearing and settlement of a trade.

Figure III show the explicit trading costs (and the respective decomposition) faced by a typical financial intermediary and it is clear that those vary substantially across trading venues, not only in absolute terms but also in their composition.

The analysis of the figure may suggest an intriguing question: given that competing venues have different explicit trading costs, what prevents trade to concentrate on the venue which offers the lowest fees? Explicit trading costs are not the only factor guiding best execution. Price and liquidity are other important factors in achieving best execution and relate to the implicit trading costs of each venue, which typically include

FIGURE III - DECOMPOSITION OF EXPLICIT COSTS PER TRADE
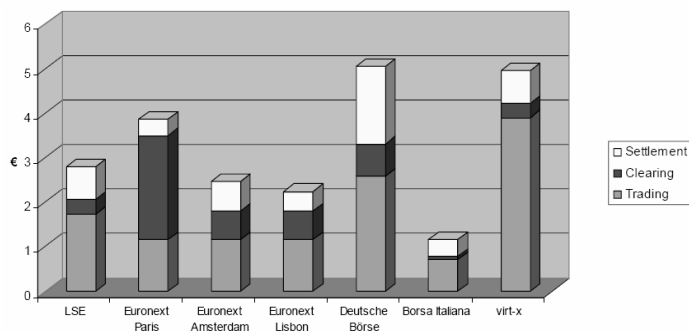
Source: European Commission (2006). Data refers to 2004.

the bid-ask spread, the potential impact of a trade, and the opportunity cost of missed trades.

Implicit trading costs are important as cash trading exhibits direct network effects. Financial intermediary's valuation of a venue is increasing in the number of other agents that choose the same venue as it reduces the costs of finding a counterparty. A more liquid venue translates into lower implicit trading costs as it (a) stabilizes the market price of a financial instrument, and (b) reduces the extent to which placing an order has an adverse effect on the corresponding price.

Pagano (1989) shows that if the explicit trading costs are equal across venues, the direct network effects promote the concentration of trade on only one venue. However, if the low explicit trading costs of a venue are traded-off against higher implicit trading costs, multiple trading venues can coexist in equilibrium.

This fact raises the problem that in the presence of network effects, fostering competition among alternative trading venues may not be enough. The reason being that venues with high liquidity - typically the incumbent stock exchanges - present lower implicit trading costs and therefore have a clear advantage relatively to their competitors - limiting the extent of effective competition. In order for competitors to succeed, they need to trade-off this disadvantage with lower explicit trading costs, which for venues with similar technologies may not possible in an industry characterized with increasing returns to scale.

Underestimating the importance of network effects can often lead to a dismal failure. As an illustration consider the case of Jiway, a pan-European trading platform for

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TABLE II - AVERAGE VOLUME PER ORDER

London Stock Exchange	3,509
Chi-X	1,302
Systematic Internalizers	42,386

Source: Author's calculations, November 2007 - March 2008.

retail investors launched in the last quarter of 2000 by Morgan Stanley and the Swedish company OM. The two companies invested $100 million on the project that promised access to 6,000 European securities, but it turned out to be unable to attract liquidity: in January 2001 it executed 1,996 trades, in February 474 trades, and in March 577 trades. As a result, by the end of 2002, Jiway was shut down.

Another illustration is provided by Chi-X, a multilateral trading facility set up in the first quarter of 2007. Chi-X soon understood that if it wanted to successfully attract trades it needed to balance the high implicit trading costs (due to the low liquidity) with extremely low explicit trading costs. The solution (up to this moment with very optimistic results) has been to offer a fee schedule that reverses the standard in the industry and includes, in certain cases, a negative execution fee - corresponding to a payment from the venue to the intermediary.

In face with a clear disadvantage, alternative competing venues typically avoid direct competition with the incumbent and specialize in attracting intermediaries with niche trading profiles. Table II presents the average volume per order in reference for the 20 most traded FTSE 100 securities for the top 3 trading venues.

The data suggests that segmentation maybe in fact an issue in this market and as a result the concentration ratios presented maybe even higher if certain characteristics of the orders - like size - are taken into consideration. In order to evaluate the actual degree of competition between trading venues, the empirical framework must be able to deal with eventual segmentation of the market.

Network effects do not constitute the only barrier to trading venue competition. The bundling of trading and of post-trading services constitute another barrier. The reason is that even though financial intermediaries can *a priori* choose between a set of competing trading venues to execute an order, the services offered by each venue can not actually be considered real substitutes or fungible as different trading venues may imply different settlement arrangements.

Consider, as an illustration, a financial intermediary with an order to trade Royal Dutch securities. The intermediary can execute the order on a set of alternative venues from Euronext Amsterdam to Deutsche Borse. However because post-trading services are typically bundled with trading services, when the intermediary chooses a venue, she is implicit choosing also the corresponding post-trading provider.

Table III presents the trading venues and associated central securities depositories for Royal Dutch securities. In this illustration, only the securities trading in Euronext Amsterdam, London Stock Exchange and Chi-X are fully fungible as they settle in the same CSD - Euroclear Amsterdam. Trading Royal Dutch in Virt-X or Deutsche Borse may imply settlements across different CSD with associated higher costs. Carvalho (2004) concludes that the costs of clearing and settlement across different CSD within Europe are 42% higher than if using the same CSD. As a result, venues that settle in the same CSD have an advantage when compared with those that settle in different CSD. This advantage may imply the choice for a venue that does not *a priori* offer the best execution fee. In sum, there can not be real competition between trading venues if financial intermediaries can not freely choose post-trading arrangements.

In the discussion above, I present arguments that sustain that barriers to venue competition may exist even after MiFID. As a last note, I would like to point that if actual competition can have a extremely positive effect, it may also have a negative one: a fragmentation effect. When different trading venues coexist, markets become fragmented and the liquidity available in any one setting is reduced, thereby potentially limiting any market's ability to provide stable prices. The bid-ask spreads might be greater and daily securities returns might have a larger variance. Moreover, as liquidity facilitates the crucial price discovery role of markets, as order flow fragments, the ability of prices to aggregate information can be reduced, and with it the efficiency of the market.

MiFID addresses this point by requiring every venue not only to publish the price, volume and time of a transaction as close to real-time as possible, but also to do it in a way that is easily accessible to other market participants. Furthermore, it also consolidates the hitherto fragmented market of European over-the-counter (OTC) securities. For these reasons, the fragmentation issues of increased trading venue competition may be less significant for MiFID.

Table III - Royal Dutch Trading and Pos-Trading (Venue/CSD)

Venue	Central Securities Depository
Euronext Amsterdam	Euroclear Amsterdam
London Stock Exchange	Euroclear Amsterdam
Chi-X	Euroclear Amsterdam
Virt-X	Euroclear Bank
Deutsche Borse	Clearstream Banking Frankfurt

Source: Misra (2007).

3 RELEVANT LITERATURE

The literature on market dominance begins with Gilbert and Newbery (1982) and Reinganum (1983) who show that a monopolist can maintain her dominance due to stronger incentives for preemptive innovation. Other contributions include Budd, Harris and Vickers (1993), Cabral and Riordan (1984), Athey and Schmutzler (2001) and Cabral (2002). Budd, Harris and Vickers (1993) analyze the dynamics of market structure in a duopoly and, in particular, in what circumstances we may see a process of increasing dominance sourced on higher levels of technology. Cabral and Riordan (1984) investigate another source of eventual market dominance, the hypothesis that due to a learning curve, unit costs may decline with cumulative production. Athey and Schmutzler (2001) model an oligopolistic setting to examine conditions under which dominance sourced in ongoing investment may emerge. Cabral (2002) considers a similar setting but where firms choose the amount of resources to invest and how to allocate those resources.

This paper analyzes market dominance sourced on (a) network effects and (b) trading and post-trading bundling. The literature on network effects begins with Katz and Shapiro (1985) and from then on it has developed along two different directions. Katz and Shapiro (1994), Economides (1996), Shy (2001), and Farrell and Klemperer (2006) provide an excellent overview of this literature. One of the strands of the literature tries to empirically measure the effect of network effects, whereas the other studies its implications. In what concerns the second source of market dominance, competition between trading and post-trading services has been modelled by Tapking and Yang (2004) and Koppl and Monnet (2003). The former studies different forms of industry structures between venues and post-trading firms, whereas the latter analyzes the impact of integrating the two services.

A number of papers have explicitly studied venue competition. The seminal work is from Hamilton (1979) who establishes the two opposite effects of multi-venue trading

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and reports empirical estimates of the effect of off-boarding trading on liquidity and volatility of NYSE stocks. Multi-venue trading promotes lower explicit trading costs via higher competition but also has a fragmentation effect. When different trading venues coexist, markets become fragmented and the liquidity available in any one setting is reduced, thereby potentially limiting any market's ability to provide stable prices. The bid-ask spreads might be greater and daily securities returns might have a larger variance. Moreover, as liquidity facilitates the crucial price discovery role of markets, as order flow fragments, the ability of prices to aggregate information can be reduced, and with it the efficiency of the market. Hamilton finds that the competitive effect exceeds the fragmentation effect, and that both effects are small.

In general, followers of Hamilton's legacy use a reduced-form strategy that regress spreads and liquidity on stock and market characteristics that include a competition variable. More recent examples include Weston (2002) and Gresse (2006). Weston (2002) investigates whether the shift towards electronic communication networks leads to tighter bid-ask spreads and greater depths. He finds that this particular competition has a significant negative impact on bid-ask spreads, but no significant impact on quoted depth. Gresse (2006) studies the impact of crossing networks on the liquidity of the dealer market segment of the London Stock Exchange (SEAQ). She finds that spreads decrease due to competition but no fragmentation effect is detected.

In parallel to the above approach, the literature has also evolved towards more structural and micro-founded strategies of modelling financial markets of which Hortaçsu and Syverson (2004) and Cantillon and Ying (2007) are some recent examples. Hortaçsu and Syverson (2004) investigate the role that nonportfolio fund differentiation and information/search frictions play in creating two salient features of the mutual fund industry: the large number of funds and the sizable dispersion in fund fees. Cantillon and Ying (2007) study the determinants of the dynamics of the market for the future on the Bund.

I propose to estimate a structural discrete-choice demand model for trading following Berry, Levinsohn, and Pakes (1995) that tries to reconcile the advantages of Hamilton (1979)'s approach with the desirable features of a micro-founded model, taking into account two eventual barriers to competition, network effects as well as the bundle of trading and post-trading services.

4 DEMAND FOR TRADING

The trading decision can be decomposed in two stages. First, investors decide the order characteristics and send it to an financial intermediaries to be executed. Second, after receiving the order the intermediary decides the trading venue where to execute it, conditional on the order characteristics received. In this paper, I take the first stage as given and propose to model the second stage choice by financial intermediaries. An interesting and natural extension will be the incorporation of the first-stage into the model framework.

Consider that in period $t = 1, \ldots, T$ an investor sends an order with characteristics k (including e.g. the code of the security, the direction and the volume to be traded) to financial intermediary $i = 1, \ldots, I$ for her to execute. After receiving the order, the financial intermediary has choose the trading venue where to execute the order subject to her internal best execution policy that had, under MiFID, to have been previously accepted by the investor.

The best execution policy defines the intermediary's commitment towards the investor to achieve 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. An alternative view for the intermediary's best execution policy is to think of it as an auction where the intermediary allocates the order across the alternative trading venues according to an allocation rule known to the investor but unknown to the econometrician.

I propose to estimate the allocation rule by specifying a structural multinomial random-coefficients logit discrete-choice demand model for trading following Berry, Levinsohn, and Pakes (1995) where in each period t heterogeneous financial intermediaries i consider to execute an order with characteristics k in a trading venue $v = 0, 1, \ldots, V$, where $v = 0$ denotes the outside option of executing the order over-the-counter.

I model financial intermediaries as making myopic decisions or equivalently to have static expectations about the future based on the fact that the best execution policy has to be applied on a trade by trade case. I therefore assume the conditional indirect utility that financial intermediary i obtains from executing an order of characteristics k at venue v in period t to be of the form

$$u_{ikvt}\left(p_{ikvt}, w_{vkt}; \theta_i\right) = u^*\left(p_{ikvt}, w_{kvt}; \theta_i\right) + \varepsilon_{ikvt}, \tag{1}$$

where w_{kvt} represents a vector of attributes for the order, venue and time period, and p_{ikvt} denotes the all-in explicit trading costs faced by the financial intermediary, which include execution, clearing and settlement fees. Because the fees schedules are typically a function of intermediary i's trading profile[1] during a certain time period as well as of subset of order characteristics, the explicit trading costs p_{ikvt} are indexed by i and k. In order to explicitly illustrate the non-linearity of the fees schedules, I will denote $p_{ikvt} = p_{vt}(z_i, k)$, where z_i expresses the intermediary i's trading profile. Lastly, financial intermediaries heterogeneity in their allocation rule for trading venues enters the conditional indirect utility through intermediary-specific valuation θ_i of the different elements included in the best execution policy and an additive preference shock ε_{ikvt}.

Among the attributes of a trading venue, w_{kvt}, that impact the choice of intermediaries are the implicit trading costs b_{kvt} as cash trading exhibits network effects and participants value liquidity. Although there is no uncontroversial definition of liquidity, the negative correlation between liquidity and implicit trading costs is generally accepted. A large installed base of intermediaries trading at venue v promotes lower implicit trading costs as it (a) stabilizes the market price of a security, and (b) reduces the extent to which placing an order has an adverse effect on the corresponding price. As a side note, these network effects can be artificially reinforced by fees schedules that are decreasing in trade volume.

Following Davis (2006) and Chen et al. (2007), $u^*(\cdot)$ is assumed to be of the form

$$u^*(p_{ikvt}, w_{kvt}; \theta_i) = -\alpha_i p_{vt}(z_i, k) - \gamma_i b_{kvt} + x'_{kvt}\beta_i + \xi_{kvt}, \qquad (2)$$

where:

(a) the vector of characteristics w_{kvt} is split between the implicit trading costs b_{kvt}, a K-dimensional vector of observables, x_{kvt}, and a vector of unobserved (to the econometrician) characteristics, whose mean valuation for orders with characteristics k executed in venue v in period t across financial intermediaries is given by ξ_{kvt};

(b) The increasing function $\gamma_i b_{kvt}$ captures the network effects, where $\gamma_i \geq 0$ is the parameter that controls the strength of those network effects;

(c) and θ_i denotes the parameters of estimation: $\theta_i = (\alpha_i, \gamma_i, \beta_i)'$.

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[1]Volume discounts can reflect venue economies of scale that are passed to agents.

For completeness, the financial intermediary can also choose to execute the order over-the-counter. The conditional indirect utility from the outside option is assumed to be $u_{ik0t} = \xi_{k0t} + \varepsilon_{ik0t}$. Following the literature, I will normalize without loss of generality $\xi_{k0t} = 0$ as due to the ordinality of utility, only $\xi_{kvt} - \xi_{k0t}$ matters for the intermediary's choice of venue.

The parameters of estimation α_i, γ_i and β_i are indexed by intermediary in order to capture the fact that the valuations of the different elements in the allocation rule can depend on intermediaries' characteristics. In particular, I will allow those parameters to be a function of the intermediaries' trading profiles z_i

$$
\begin{pmatrix} \alpha_i \\ \gamma_i \\ \beta_i \end{pmatrix} = \begin{pmatrix} 0 \\ \gamma \\ \beta \end{pmatrix} + \theta^o z_i, \tag{3}
$$

where θ^o denote coefficients that will express the heterogeneity of intermediaries in reference with their trading profile. As a result, the parameters to be estimated reduce to $\theta = (\gamma, \beta, \theta^o)'$.

After substituting equation (3) into the conditional indirect utility function (1), it is possible to summarize the financial intermediary's conditional indirect utility as a sum of two terms: a first term that is common across intermediaries, $\delta_{kvt} = -\gamma b_{kvt} + x'_{kvt}\beta + \xi_{kvt}$, and a second term, $\mu_{ikvt} + \varepsilon_{ikvt}$, that introduces intermediary heterogeneity

$$
u_{ikvt} = \delta_{kvt} + \mu_{ikvt} + \varepsilon_{ikvt}, \tag{4}
$$

where

$$
\mu_{ikvt} = \left[p_{vt}(z_i, k), b_{kvt}, x'_{kvt} \right] \theta^o z_i.
$$

As p_{ijvt} will typically vary by the financial intermediary's trading profile, so will μ_{ijvt}. Following European Commission (2006), the following profile could be considered: (a) typical volume and value trades' intermediary, (b) large volume of low value trades' intermediary, (c) large volume of high value trades' intermediary, and (d) small volume of low value trades' intermediary.

Given the heterogeneity of the financial intermediaries specified in the model, the solution to the maximization problem of the indirect conditional utility over all the different venues will vary from one intermediary to another, depending on their specific

attributes (z_i, ε_{ikt}) where $\varepsilon_{ikt} = (\varepsilon_{ik0t}, \dots, \varepsilon_{ikVt})$. As a result, conditional on the order characteristics, the set of financial intermediaries that execute the order to trade at venue v in period t is then

$$A_{kvt}(x_t, p_t, \delta_t; \theta) = \{(z_i, \varepsilon_{ik0t}, \dots, \varepsilon_{ikVt}) \,|\, u_{ikvt} > u_{ikgt} \forall g \text{ s.t. } v \neq g\}, \tag{5}$$

where x_t, p_t and δ_t are the vectors of observed characteristics, explicit trading costs and deltas. If the preference shock ε_{ikvt} follows an i.i.d. extreme value distribution, the probability that intermediary i opts for venue v to execute order with characteristics k in period t is then given by the following multinomial logit type expression

$$P_{ikvt}(x_t, p_t, \delta_t; \theta, k) = \frac{e^{\delta_{kvt}+\mu_{ikvt}}}{1 + \sum_q e^{\delta_{kqt}+\mu_{ikqt}}}. \tag{6}$$

Integrating over the distribution of intermediaries' specific attributes and order characteristics (z_i, k) yields market-level share for venue v in each period t

$$s_{vt}(x_t, p_t, \delta_t; \theta) = \int_{A_{vt}} \frac{e^{\delta_{kvt}+\mu_{ikvt}}}{1 + \sum_q e^{\delta_{kqt}+\mu_{ikqt}}} dP^*(z, k), \tag{7}$$

where $P^*(z, k)$ denotes the population joint distribution function of the intermediary types and order characteristics (z_i, k), not necessarily independent.

4.1 Identification and Estimation Procedure

I now proceed with a description of the procedure to estimate the parameter vector $\theta = (\gamma, \beta, \theta^o)'$. The data available to the researcher is crucial for the estimation procedure. In what follows, I will assume that a know joint distribution of the intermediary types and order characteristics is available. However, the procedure can easily be modified for the case where that distribution is unavailable and one distribution needs to be assumed, incorporating into the utility specification its unknown parameters, to be estimated jointly with the other parameters of the model.

The estimation algorithm encompasses four steps that I now describe.

Step One Set initial values for the mean utilities, δ_t, and for the parameters of estimation, θ.

Step Two Approximate the predicted market-level shares. The key difficulty with the random-coefficients multinomial logit model has to do with the fact that no closed form expression exists for the integral that defines those predicted shares

$$s_{vt}\left(x_t, p_t, \delta_t; \theta\right) = \int_{A_{vt}} \frac{e^{\delta_{kvt}+\mu_{ikvt}}}{1+\sum_q e^{\delta_{kqt}+\mu_{ikqt}}} dP^*\left(z, k\right). \tag{8}$$

As the computation of the above expression is, in general, problematic, the literature follows Pakes (1986), Pakes and Pollard (1989), and McFadden (1989) and approximates that intractable integral by a simulation estimator. In what the particular choice of the simulation estimator is concerned, the smooth simulator has been the prevailing approach. To compute it, ns pseudo-random vectors of unobserved intermediary attributes $(z_1^r, \ldots, z_{ns}^r)$ and order characteristics $(k_1^r, \ldots, k_{ns}^r)$ are drawn from $dP^*\left(z, k\right)$, and, given the initial values of δ_t and θ, used to obtain $\delta_{kvt} + \mu_{ikvt}^r$ where

$$\mu_{ikvt}^r = -p_{vt}\left(z_i^r, k^r\right) + \left[b_{kvt}, x_{kvt}^{'}\right]\theta^o z_i^r. \tag{9}$$

The smooth estimator that simulates the aggregate market shares is, then, given by

$$s_{vt}\left(x_t, p_t, \delta_t; \theta, P^{ns}\right) = \frac{1}{ns}\sum_{i=1}^{ns} \frac{e^{\delta_{kvt}+\mu_{ikvt}^r}}{1+\sum_q e^{\delta_{kqt}+\mu_{ikqt}^r}}, \tag{10}$$

where P^{ns} denotes the empirical distribution of the simulation draws. Please note that this estimator, in contrast with other simulation estimators[2], by integrating the ε's analytically, circumvents the need to draw them and, consequently, limits the simulation error to the sampling process. It is also instrumental in obtaining simulated market-level shares that are smooth functions, positive and sum to one.

As a final note I would like to stress, as Berry, Linton, and Pakes (2004) point out, that the introduction of simulation error influences the asymptotic distribution of the estimator and, therefore, needs to be explicitly taken it account. On this subject please see step four below.

Step Three Estimate the econometric error, ξ_{jvt}, as a function of the parameters of estimation θ. The mean utility δ_{jvt} can not be solved for analytically, but Berry,

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[2]Please see Berry, Levinsohn, and Pakes (1995) for a detailed survey on the optimal importance sampling simulator, and the appendix to Nevo (2000) for an analysis on the naive frequency estimator.

Levinsohn, and Pakes (1995) proved that, for a given θ, the mapping of values of δ_{jvt} into themselves is a contraction mapping with modulus less than one, and therefore that it is possible to solve for the unique δ_{jvt} that matches the simulated market-level shares, $s_{jvt}(x, p_t, \delta_t; \theta, P^{ns})$ with the observed ones, s_{jvt}^n, for all j and t, recursively,

$$\delta_{jvt}^k(\theta) = \delta_{jvt}^{k-1}(\theta) + \ln\left[s_{jvt}^n\right] - \ln\left[s_{jvt}\left(x_t, p_t, \delta_t^{k-1}; \theta, P^{ns}\right)\right], \tag{11}$$

as the iterations converge geometrically to the unique fixed point, where the simulated market-level shares $s_{jvt}(x_t, p_t, \delta_t; \theta, P^{ns})$ have to be computed at every new iterated δ_t^k. Denote the fixed point by $\delta_{jvt}(s_t^n, \theta, P^{ns})$ where s_t^n represents the vector of observed aggregate market shares.

Given the unique fixed point, it is relatively straithforward to obtain an estimate of the econometric error as a function of the data, x, p_t, s_t, the parameters of estimation, θ, and the simulation process, P^{ns},

$$\xi_{jvt}(s_t^n, \theta, P^{ns}) = \delta_{jvt}(s_t^n, \theta, P^{ns}) + \gamma(b_{jvt}) - x_{jvt}'\beta. \tag{12}$$

Step Four Estimate the parameters θ. Typically, the estimation procedure relies on an identifying restriction over the distribution of the true econometric error, obtained by evaluating equation (12) at $n = ns = \infty$, that is, $\xi_{jvt}(s_t^\infty, \theta, P^\infty)$.

An econometric issue with the above estimation procedure relates to an eventual correlation between trading costs and the econometric error term. This correlation is expected as trading costs typically incorporate some information that the econometrician does not possess and, thereby, has to include in the econometric error term. Due to this eventual correlation, instrumental variables techniques are, therefore, required. I assume, however, as it is standard in the literature, the unobserved characteristics to be mean independent of the observed ones (please see Berry, 1994).

I follow the literature and aim to identify the parameters of the model by applying GMM to the below population moment condition,

$$E\left[\xi_{jvt}(s_t^\infty, \theta, P^\infty) | Z_{jt}\right] = 0, \tag{13}$$

where ξ_{jvt} denotes the unobserved (to the econometrician) valuation of instrument j at venue v in period t. Please note that other identifying restrictions would also enable the estimation of the model. In particular, given the typical panel structure of the data,

an alternative assumption could incorporate the likelihood of the econometric error and the set of instruments to be more similar for a given brand across time, than for those of different brands. Please see Berry, Levinsohn, and Pakes (1995) and Davis (2006) for a more detailed analysis on this subject.

The above population moment conditions can be used, akin to Hansen (1982), to render a method of moments estimator of θ^*, by interacting the estimated econometric error with the set of instruments, and search for the value of the parameters, θ, that set the sample analogues of the moment conditions as closed as possible to zero. Let $G_{n,ns}(\theta)$ denote the sample analogues of the moment conditions,

$$G_{n,ns}(\theta) = \frac{1}{n} \sum_{t=1}^{T} \sum_{v=1}^{V} \sum_{j=1}^{J^{vt}} \xi_{jvt}(s_t^n, \theta, P^{ns}) Z_{jvt} = \frac{1}{n} \sum_{t,v,j} \psi(\theta). \tag{14}$$

Formally, the method of moments estimator, $\hat{\theta}$, is therefore the argument that minimizes the weighted norm criterion of $G_{n,ns}(\theta)$, for some weighting matrix A_n with rank at least equal to the dimension of θ,

$$\hat{\theta} = \arg\min_{\theta} \quad \|G_{n,ns}(\theta)\|_{A_n} = G_{n,ns}(\theta)' A_n G_{n,ns}(\theta). \tag{15}$$

The strong non-linearity of the objective function requires a minimization routine. The standard practice in the literature has been to use either the Nelder-Mead (1965) nonderivative "simplex" search method or a quasi-Newton method with an analytic gradient (see Press at al., 1994). The latter has the important (computational) advantage of being two orders of magnitude faster than the former. However, because the first method is more robust and less sensitive to starting values, I will perform the search using the Nelder-Mead (1965) nonderivative "simplex" search.

The non-linear search over θ can be simplified by making use of the fact that the first order conditions for a minimum of $\|G_{n,ns}(\theta)\|_{A_n}$ are linear for the subset $\theta_1 = (\gamma, \beta)$ of the parameters of estimation, $\theta = (\theta_1, \theta^u)$. Consequently, it is possible, given the standard instrumental variables results, to express θ_1 as function of θ^u, and limit the non-linear search over θ^u,

$$\theta_1 = \left(Q'ZA_n^{-1}Z'Q\right)^{-1} Q'ZA_n^{-1}Z'\delta(\theta^u). \tag{16}$$

where Q denotes the matrix of trading costs and observed characteristics, Z denotes the

matrix of instruments, and, finally, δ denotes the matrix of mean utilities, expressed only in terms of θ^u after concentrating out θ_1.

5 EMPIRICAL APPLICATION

5.1 Data Description

I apply the model outlined above to a set of 16 of the most traded securities in the FTSE 100 following the list of liquid securities published (and updated regularly) by CESR after the implementation of MiFID. Information on those securities was obtained for the top trading venues following the REUTERS Market Shares Reports. I followed Pinkse and Slade (2004) in what the criterion of which venues to include in the sample was concerned, and included those that accounted for at least one percent of the market in volume: the London Stock Exchange, Chi-X and the systematic internalizers aggregated in Markit Boat.

For each security and trading venue, daily information was collected from DATAS-TREAM on the official price, the ask and bid prices, the number of trades, and the number of shares traded. For both Chi-X and the systematic internalizers aggregated in Markit Boat information on the number of trades and the number of shares traded was obtained directly.

Market size was assumed to be the total number of shares traded per security across all possible trading venues and was collected via DATASTREAM. Trading venue market shares were then computed as the ratio of the corresponding number of shares traded over market size.

Information on execution, settlement and clearing fees was obtained directly via the published fee schedules. In what concerns the systematic internalizers in Markit Boat, these information was obtained from JP Morgan MiFID Report II that discriminates the average execution, settlement and clearing costs of a systematic internalizer. Given that typically (although not always) those fee schedules are a function of each financial intermediary trading profile in what concerns the volume and value, I considered the fees that would arise for the four intermediary's types in European Commission (2006): (a) typical volume and value trades' intermediary, (b) large volume of low value trades' intermediary, (c) large volume of high value trades' intermediary, and (d) small volume of low value trades' intermediary.

TABLE IV - SUMMARY STATISTICS

Variable	Venue	Mean	Std	Min	Max
	CHX	0.03	0.03	0.00	0.14
Market Share	LSE	0.70	0.06	0.47	0.92
	SI	0.04	0.03	0.00	0.19
	CHX	13.14	10.05	1.50	40.87
Price (£)	LSE	13.14	10.05	1.49	40.90
	SI	13.06	9.97	1.50	40.90
	CHX	0.09	0.56	0.00	6.87
Effective Spread (£)	LSE	0.05	0.02	0.00	0.30
	SI	0.06	0.11	0.00	0.77
	CHX	1.36	1.22	0.20	5.30
Volume per trade ('000 shares)	LSE	3.75	4.24	0.39	26.70
	SI	42.67	78.75	0.25	852.04

In what the implicit trading costs is concerned, effective spreads were computed. The effective spread is defined as the difference between the transaction price and the current mid-quote for time period t) ,

$$es_{jt} = |P_{jt} - M_{jt}|, \tag{17}$$

where M_{jt} is the quote mid-point, i.e. $(A_{jd} + B_{jd})/2$, A_{jt} denotes the ask price, B_{jt} the bid price, and P_{jt} the effective transaction price of instrument j in period t. This measure takes into account the fact that trades can occur either inside or outside the quoted spread. Therefore, it incorporates both the impacts of market spreads and market impact on trading costs, even if it does not allow the separation of the two effects. Microstructure literature has shown that the effective spread reflects expected losses to informed traders (Glosten and Milgrom(1985), Copeland and Galai (1983)), inventory costs (Stoll (1978), Amihud and Mendelson (1980), Ho and Stoll (1981)) and order processing costs (Stoll (1985)).

I follow Stoll (2000) and Jain (2001) and median the different variables at a weekly frequency to reduce measurement errors due to random daily fluctuations.

Table IV presents some general statistics for the resulting dataset ranging from the first week of November 2007 to the last week of March 2008. Several interesting trends are evident. The incumbent venue - LSE - clearly dominates the industry with an average market share of 70% - against 3%-4% for each of the competing venues. There is no

FIGURE IV - DECOMPOSITION OF TOTAL FEES PER TRADE
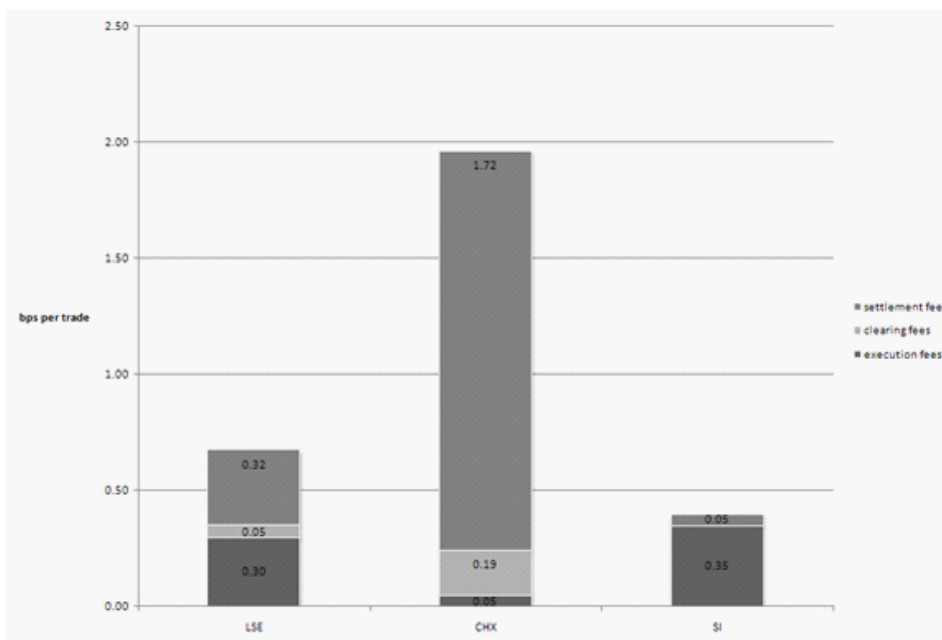
significant difference in the price securities are traded, but the bid-ask spread is clearly lower at LSE with an average effective spread of £0.005 against £0.06-£0.09 on the competing venues. The statistics on the volume per trade suggest a clear segmentation of the industry, with the different venues attracting distinct type of orders. Chi-X attracts the lowest average volume per trade, the SI attract the highest average volume per trade, and LSE positions itself between those two. As there is no significant difference in the price securities are traded, the heterogeneity in volume per trade carries to the turnover per trade.

The total fees are a function of each financial intermediary trading profile in what concerns the volume and value. For this reason they are not presented in the summary statistics table. For illustration purposes, Figure IV plots the total fees (and corresponding decomposition) that would arise for the typical financial intermediary following the European Commission (2006) classification. It is clear that Chi-X offers the lowest execution fee, but its competitiveness is penalized due to high clearing and settlement fees.

5.2 Demand Identification

Total fees are typically set taking into account some information that the researcher does not possess and, thereby, has to include in the econometric error term. Furthermore, effective spreads are the outcome of unobserved information to the researcher. As a result, those fees and spreads are expected to be correlated with the error term and instrumental variables techniques are required. The use of securities- and venue specific dummy variables decreases the requirements on the instruments needed for a consistent estimation. However, it does not eliminate completely the need for them, as both fees and spreads are likely to still be correlated with unobserved time-specific deviations from the overall mean valuations.

In the lines of Arellano and Bond (1991), and Arellano and Bover (1995) I use lag liquidity values as instruments for both total fees and effective spreads under the assumption that those lags are uncorrelated with the error term and, at the same time, correlated with the endogenous variables that needs instrumenting. Please see the endogenous liquidity section for more details.

5.3 Demand Function Estimates

The first set of results, presented in Table V, correspond to the random-coefficients multinomial logit demand model. The demand specification includes total fees and effective spread variables as observed attributes whereas unobserved attributes were partly taken into account by the inclusion of security, venue and week dummy variables. The log transformation of the total fees variable was used to reduce skeweness.

The coefficients on fees and liquidity are allowed to be intermediary specific in order to capture the fact that the valuations of the different elements in the allocation rule can depend on intermediaries' characteristics. In particular, I will allow those parameters to be a function of the intermediaries' trading profiles z_i

$$\begin{pmatrix} \alpha_i \\ \gamma_i \\ \beta_i \end{pmatrix} = \begin{pmatrix} 0 \\ \gamma \\ \beta \end{pmatrix} + \theta^o z_i^e = \begin{pmatrix} 0 \\ \gamma \\ \beta \end{pmatrix} + \Pi o_i + \Sigma v_i, \qquad (18)$$

where o_i is a denotes the log transformation of order size from intermediary i - drawn[3] from the Chi-X, LSE and SI order books, v_i is a 3×1 vector of random-variables drawn

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[3]I sampled 500 intermediaries per week and security.

TABLE V
RESULTS FROM FULL MODEL[a]

Variable	Means (γ,β's)	Standard Deviations Σ	Interactions with log (Order Size) Π
Constant	0.666	0.000	-0.096
	(0.165)	(0.006)	(0.001)
log (total fees)	—	0.000	-0.017
	—	(0.000)	(0.021)
Effective Spread	1.552	0.357	-1.109
	(0.128)	(0.001)	(0.000)
Chi-X dummy	-1.429	—	—
	(0.098)	—	—
SI dummy	-1.320	—	—
	(0.099)	—	—

[a] Regression based on 1008 observations. Security, venue and week dummy variables are included as controls. Asymptotically standard errors in parentheses.

from a normalized multivariate normal distribution, Π is a 3×1 matrix of order size coefficients, and Σ is a 3×3 diagonal matrix that scales the effect of v_i.

Table V reports the estimated GMM results. The first column reports the estimates of the different coefficient's means, whereas the other columns present estimates of their heterogeneity.

The results suggest that the coefficients are of the expected sign with market shares reacting negatively to total fees and liquidity as we can infer from the corresponding predicted distribution of the institution-specific valuations plotted in Figure V. Most of the heterogeneity is due to order sizes as the magnitude of the coefficients on the unobserved intermediary' characteristics (v_i) are of a small magnitude. Furthermore, intermediaries with higher order sizes tend to be more sensitive to both fees and liquidity.

In order to evaluate the impact of both fees and spreads on market shares, own- and cross-price elasticities were computed for both variables. Table VI reports those estimated elasticities computed according to the estimates in Table V.

In the top part of the table, the results suggest that all venues enjoy a certain degree of market power as intermediaries tend to have a low price sensitivity - for the given set of bid-ask spreads in the market. A one percent decrease in the total fees of the venues are estimated to impact only marginally the respective market shares. A

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FIGURE V
FREQUENCY DISTRIBUTION FOR TOTAL FEES COEFFICIENT
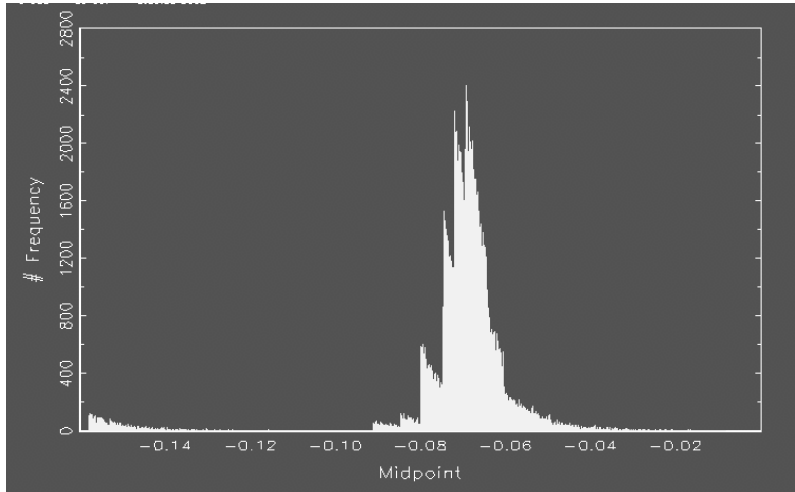
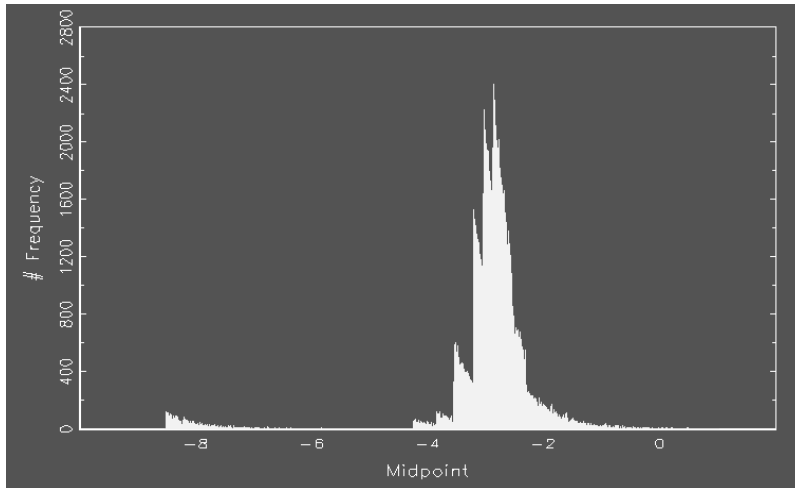FREQUENCY DISTRIBUTION FOR LIQUIDITY COEFFICIENT

TABLE VI - MEDIAN ESTIMATED ELASTICITIES[a]

	CHX	LSE	SI
Market share with respect to Total Fees			
CHX	-0.069	0.067	0.003
LSE	0.001	-0.021	0.002
SI	0.001	0.037	-0.067
Market share with respect to Effective Spread			
CHX	-2.877	0.031	0.001
LSE	0.000	-0.891	0.000
SI	0.002	0.042	-2.812

[a] The elasticity in a cell gives the percent change in market share of the row's
venue with a one percent change in the variable of the column's venue.

possible justification may lie on the network effects that characterize the industry. As intermediaries value both low cost and high liquidity, a decrease in the total fees of a given venue may not be sufficient to induce a change of venue.

In the bottom part of the table, the results point to the important role of liquidity on the choice of venue. For the given set of total fees in the market, a one percent increase in the effective spread of CHX or SI is estimated to decrease the corresponding market share by around 3%. The result is intuitive as intermediaries are willing to trade-off lower liquidity for lower total fees - if that liquidity decreases, then we would expect to see a high number of intermediaries switching towards a lower cost venue.

In sum, the results seem to suggest a greater importance of liquidity in comparison with total fees when deciding the venue where to route a given order.

5.3.1 Endogenous Liquidity

Liquidity and fees are clearly not exogenous relatively to each other - one would expect venues to take into consideration liquidity when setting fees, as well as liquidity to be a funtion of the fees schedules. Given the highly endogenous nature of liquidity, a modelling of such outcome is required. Micro-finance theory implies that liquidity may be potentially a non-linear function of a series of factors that affect both the demand and supply for trading. I follow Goolsbee and Petrin (2004) and introduce a reduce-form approach that estimates a liquidity equation as a function of those factors. These include, in line with Stoll (2000), Wahal (1997) and Weston (2002), venue market share,

TABLE VII
LIQUIDITY EQUATION[a]

Explanatory Variable	Effective Spread	
Market Share		
CHX	-3.645	(1.092)
LSE	-1.271	(0.378)
SI	-4.512	(1.142)
$\log{(\text{volume})}$	0.019	(0.005)
Price	0.006	(0.001)
Volatility	1.886	(0.165)
Unobserved Characteristics		
CHX	0.274	(0.069)
LSE	0.688	(0.340)
SI	0.187	(0.063)
R^2	0.350	

[a] Regression based on 1008 observations.
Standard errors in parentheses.

share volume, price, and share volatility[4]. In addition demand side estimates were also exploited to include unobserved venue characteristics, computed as follows,

$$\xi_{kvt} = \delta_{kvt} + \gamma b_{kvt} - x'_{kvt}\beta, \tag{19}$$

where δ_{kvt}, γ and β were obtained at the demand estimation stage.

Table VII presents the IV results of the liquidity equation regression[5]. The coefficients are mostly of the expected sign with an increase in the market share lowering the effective spread, while an increase in price and volatility are associated with an increase in spreads.

The liquidity equation is instrumental in understanding the impact of total fees on effective spreads as total fees influence relative market shares which in turn determine venue liquidity. In order to evaluate the total impact impact of fees on spreads, own-

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[4]Share volatility is defined, following Ding and Charoenwong (2003), as the standard deviation over the average of the quoted mid-point within each time period,

$$SV_{jt} = \frac{sd\,[M_{jd}]}{mean\,[M_{jd}]},$$

where $sd\,[\cdot]$ represents the standard deviation taken over the days included in period t.

[5]Log transformation of the volume variable was used to reduce skewness.

Table VIII - Median estimated Elasticities[a]

	CHX	LSE	SI
Effective Spread with respect to Total Fees			
CHX	0.351	-0.342	-0.018
LSE	-0.221	3.766	-0.391
SI	-0.009	-0.304	0.558

[a] The elasticity in a cell gives the percent change in the liquidity of the row's venue with a one percent change in the total fees of the column's venue.

and cross-price median elasticities were computed as follows,

$$\frac{\partial b_{kvt}}{\partial p_{qt}} \frac{p_{qt}}{b_{kvt}} = \frac{\partial b_{kvt}}{\partial s_{kvt}} \varepsilon_{vq}^{p} \frac{s_{kvt}}{b_{kvt}}, \tag{20}$$

where ε_{vq}^{p} denotes the cross-total fees elasticity between venues v and q. Table VIII reports the estimated elasticities.

6 Barriers to Competition

After estimating the degree of substitutability between the different trading venues, I address the question of evaluation the barriers to competition induced by the network effects and the post-trading constraints.

6.1 Network Effects

In order to analyze the impact of network effects as a barrier to competition, I propose to compute the counterfactual market shares that would arise if there were no liquidity differences across venues (although still allowing for heterogeneity across the securities traded). In particular, I considered the case where the effective spread for each security-week pair is the same across venues and equal to the median of the actual observed spreads. The results - presented in Table IX - suggest that eliminating the liquidity advantage of the incumbent venue contributes to a less assymetric industry. Chi-X would benefit less than the SI because of the disadvantage from a post-trading perspective - a point I address in the next sub-section.

TABLE IX - LIQUIDITY AS A BARRIER

	Medians	
	Current Market Shares	Counterfactual Market Shares
CHX	0.021	0.094
LSE	0.703	0.426
SI	0.037	0.118

6.2 Post-Trading Constraints

The competitiveness of a given venue can be penalized by higher post-trading costs. I propose to evaluate the barriers to competition induced by post-trading constraints by simulating the equilibrium market shares that would arise if the securities traded in the different trading venues were fungible and intermediaries could choose the post-trading arrangements with the lowest clearing and settlement fees.

Being allowed to freely choose post-trading arrangements is equivalent to an effective decrease in the total fees paid by some intermediaries (those that switch from current arrangements).

A decrease in the total fees has a direct impact on relative markets shares and consequently on effective spreads which in turn also influence market shares. Table X presents the counterfactual results, descriminating the different effects that would arise.

Conditional on the maintenance of the same level of clearing and settlement fees after eliminating the post-trading constraints, the results suggest that eliminating the post-trading constraints and allowing intermediaries to choose the most competitive post-trading arrangements would also induce less asymmetric industry - of the same order of magnitude as of eliminating the network effect.

7 CONCLUSION

The Market in Financial Instruments Directive (MiFID) aims to increase competition and to foster client protection in the European financial market. Among other provisions, it abolishes the concentration rule and challenges the market power of existing trading venues.

TABLE X - POST-TRADING AS A BARRIER

	Medians				
	Current		Counterfactual		
	Market Shares	Eff. Spreads	Direct Impact Market Shares	Direct Impact Eff. Spreads	Total Impact Market Shares
CHX	0.021	0.015	0.022	0.009	0.094
LSE	0.703	0.005	0.702	0.006	0.445
SI	0.037	0.020	0.037	0.020	0.107

The directive introduces venue competition in order to achieve better execution and ultimately lower costs of trading. However, the fostering venue competition may not be enough. In this paper I address the question of whether fostering competition between alternative trading venues alone may or not be able to impact actual competition in the market. I consider two reasons for why it may not: direct network effects and post-trading constraints.

I empirically address the following questions: (a) evaluate the actual degree of competition between trading venues, (b) measure the impact of network effects on competition, and lastly (c) assess the barriers to competition induced by the bundle of trading and post-trading services.

The results imply that financial intermediaries tend to value liquidity more (than total fees) when deciding where to route a given order for execution. For this reason the incumbent venue has a clear advantage relatively to its competitors and can, as a result, exert market power when setting total fees. Furthermore, eliminating the mentioned barriers to competition seems to be asociated with a significant decrease (of a similar magnitude) in the assymetry of the industry.

It is known that in general competition impacts economic growth via a more efficient allocation of market resources that contributes to "better economic performance, better prices and better services for consumers and businesses"(Kroes (2007)). This paper argues that fostering potential competition in the cash trading market may not have an impact on the degree of actual competition as both direct network effects and post-trading constraints act as barries to actual competition. The results presented here indicate that policies promoting competition on the post-trading after market is instrumental in boosting the effectiveness of MiFID.

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APPENDIX - DATA

Securities Used in Demand Estimation

Anglo American
Barclays
BG
BHP Billiton
BP
Glaxosmithkline
HBOS
HSBC
Lloyds TSB
Prudential
Reckitt Benckiser
Royal Dutch Shell B
Standard Chartered
Tesco
Vodafone
Xstrata