

Research Report

Competition among Electronic Markets and Market Quality

WITH THE MARKETS IN FINANCIAL INSTRUMENTS DIRECTIVE (MIFID) IN EFFECT, NEW ELECTRONIC MARKETS EMERGED IN EUROPEAN EQUITIES TRADING. WE ADDRESS THE IMPACT OF MARKET FRAGMENTATION ON STOCK LIQUIDITY BY EXAMINING SAMPLES OF EUROPEAN BLUE CHIP STOCKS BEFORE AND AFTER THE INTRODUCTION OF MIFID.

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Introduction

The rules set out by the Market in Financial Instruments Directive (MiFID) and its implementing measures have harmonized regulation of financial markets on a European level and try to create competition and a level playing field among different types of electronic financial markets. This new regulatory setup has indeed increased competition, and within a short time-frame, incumbent exchanges have lost significant market share to new competitors, so-called Multilateral Trading Facilities (MTF). These new competitors, e.g., Turquoise, Chi-X or BATS Europe, entered the market with a pan-European scope concerning tradable securities, offering similar market models and functionalities as the incumbent exchanges but at lower explicit trading costs. Thereby, the fragmentation of the European securities trading landscape is steadily increasing since early 2008. However, the effects of fragmented trading are ambiguous.

Investors and issuers articulate concerns whether fragmentation might reduce market quality or not. Some market participants try to overcome fragmentation by applying trading software tools such as smart order routing engines (SOR) or liquidity aggregation mechanisms. SOR access multiple liquidity pools, i.e., exchanges or alternative trading systems, to identify the best destination and apply proprietary algorithms to optimize order executions. Against this background, we analyze the impact of fragmentation on home markets and overall European liquidity.

The New European Trading Landscape

Before the applicability of MiFID, in some member states of the European Economic Area, so-called concentration or default rules were in force, which eliminated or at least hindered the possibility to trade aside from Regulated Markets, i.e., the incumbent exchanges.

Furthermore, different national regulations prevented market operators from offering pan-European market venues. Therefore, European securities trading was – on a per security basis – typically concentrated on the home market of the respective security. Since November 2007, with the harmonized regulation set out by MiFID, Regulated Markets and MTFs are competing for investors' order flow. This attracted numerous new entrants to the market for markets and led to the fragmentation of trading among the home market and MTFs.

The MTFs entered the market with significantly lower explicit cost schemes, which forced the Regulated Markets to adapt their fees schedules as well. However, explicit costs are not the only determinant for transaction costs in secu-

rities trading. An even more relevant share of cost is determined by so-called implicit trading costs, which are driven by a market's liquidity. Because liquidity is subject to strong positive network externalities, market venues are eager to attract as much trading interest to their platforms as possible.

The fragmented landscape in European securities trading increases the competitive pressure on all venues. Along with the increasing fragmentation of trading comes an increasing fragmentation of market data, because each venue has its own order book and its own trade reports. The clear picture of trading interest in a security that was given when trading was concentrated on one market is nowadays distorted. Therefore, it became more difficult to assess whether

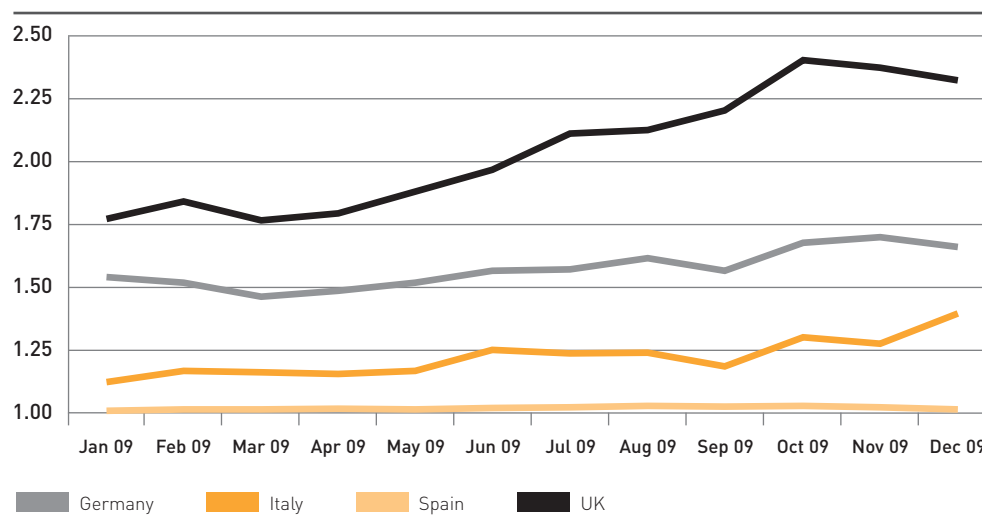


Figure 1: Fragmentation in European markets – Inverse Herfindahl-Hirschman index

market quality in terms of liquidity has improved or worsened with market fragmentation.

Dataset

In order to assess the net effect of competition and fragmentation on liquidity, we make use of one specific exception to the European equities trading landscape: Spain. While in most European countries trading significantly fragmented with the applicability of MiFID, Spanish equities are still strongly concentrated on their home market. Figure 1 quantifies order flow fragmentation for selected European markets in 2009, when eventually all major MTFs had launched their services, with higher index values indicating a higher level of fragmentation.

The sample for our analysis is made up by two distinct groups of equities. The first group of stocks is made up of the constituents of the Spanish IBEX 35 blue-chip index, the second group of constituents of the EURO STOXX index. We select only those securities that were constituents of the respective index during our observation periods. The group of Spanish stocks is restricted to those 24 securities that are present in the EURO STOXX.

We restrict the EURO STOXX constituents to stocks from those countries that are nowadays among the top-fragmented Euro-denominated markets, i.e. the Netherlands, France, Germany, Finland, Belgium and Italy. Within the remaining set of EURO STOXX constituents we identify stocks comparable to the securities

in our Spanish sample by selecting those 24 stocks with the closest free float market capitalization before our observation periods.

Two distinct observation periods are chosen. The first observation period focuses on trading before competition and fragmentation of European securities trading set in and refers to the 60 trading days prior to the applicability of MiFID on November 1st, 2007. This observation period is referred to as *pre-MiFID*. In this period we only refer to the home market, because fragmentation was not present yet. For the choice of the second observation period, a number of constraints have to be met. Particularly, periods directly after the applicability of MiFID are inappropriate, as fragmentation steadily increased: The new competitors gradually expanded the set of securities tradable on their systems and moreover, some new competitors started their operations only several months after the applicability of MiFID, e.g., Turquoise did not start before September 2008. Further, the economic and financial crisis, which had its outburst with the breakdown of Lehman Brothers in September 2008 and thereafter, had significant effects on securities trading. To lessen the impact of this market turmoil on the results of our analysis, we decide to use an observation period which is not close to our pre-MiFID observation period and where the market values in terms of index levels are as close as possible to the values of the first observation period. To avoid impact of the Greece crisis, we select the 60 trading days

prior to May 1st, 2010 as our *post-MiFID* observation period.

Intraday market depth tick data were retrieved from Thomson Reuters Tick History for the securities' home markets, as well as for the three main MTFs Chi-X, BATS Europe and Turquoise.

Methodology

Based on the data's time-stamps, we aggregate order books across the different venues to construct a European consolidated order book. For all securities in the sample, the combined market share for the home market and the three main MTFs lies above 97% during the observation period. For each trading day, order book characteristics are calculated in one minute intervals during the market phases of continuous trading.

In order to measure liquidity, relative spreads and quoted values at best bid and ask limits are computed for both the consolidated order book and a stock's home market. Because relative spreads and quoted values are often considered insufficient to capture liquidity (Irvine et al., 2000), we apply another measure (Exchange Liquidity Measure – XLM) and determine the implicit execution costs of a round-trip transaction by using the information about all the visible orders in an order book and thus capture order book depth (Gomber et al., 2004).

Relative spreads, XLMs and quoted values rep-

resent the dependent variables in our regression model and we estimate the means of these measures for both observation periods, changes in these means, and test for the statistical significance of these changes applying panel data techniques. For testing the significance of changes in the means, we assume that a liquidity measure for a respective stock and day can be expressed by adding up a stock-specific mean, an event effect, control variables and an error term. In the model we account for changes in a stock's traded volume, price level, volatility and minimum tick size by including them as control variables. Rogers standard errors are applied for testing of significances of liquidity changes in the means of pre- and post-MiFID period (Petersen, 2009).

Results

For the EURO STOXX instruments, an increase in liquidity, measured in terms of relative spreads and XLM, can be observed for the consolidated order book. As depicted in Figure 2, for the total sample spreads narrow by 24.66% and the XLM for a round-trip of 50,000 Euros and 100,000 Euros reduces by 30.70% and 43.12% respectively. Nevertheless, the value quoted at the top of the order book reduces by 85.73% and 84.83% for the bid and the ask side respectively, which represents a decrease in the thickness of the order book's top. This finding is primarily driven by a strong reduction of tick sizes that most markets experienced between the pre-MiFID and post-MiFID observation period.

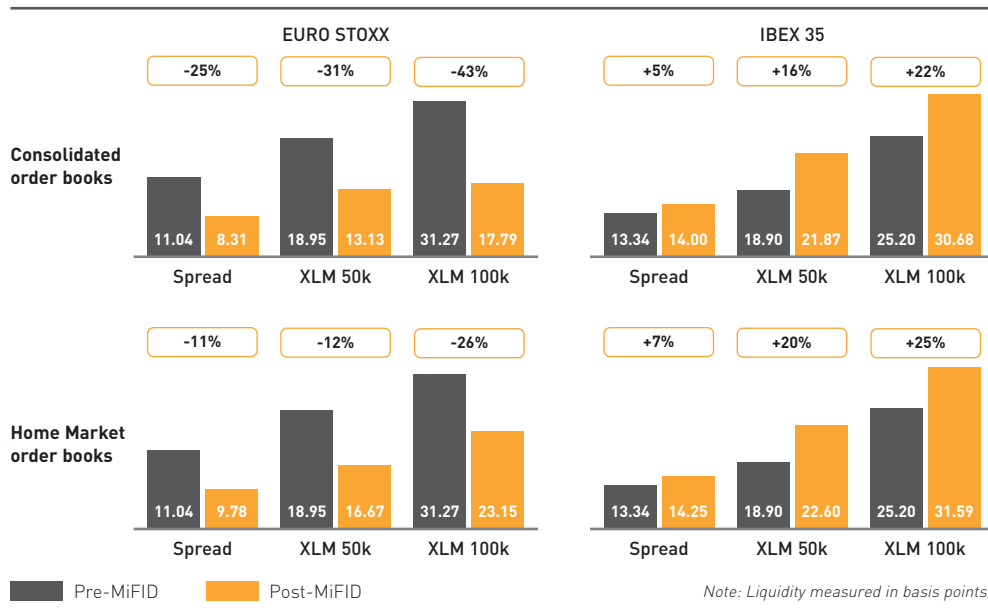


Figure 2: Liquidity measures for consolidated and home markets' order books from pre- to post-MiFID period

As the coefficients of the indicator variable in our regressions are throughout negative, statistical inference suggests a highly significant positive impact of the MiFID induced competition between markets and the consequent fragmentation on overall liquidity for the sample stocks.

Obviously for a stock's home market solely, the increase in liquidity is pronounced less intensively compared to the consolidated order book, but still present. Those findings stress the contribution to overall liquidity of the new competition, which can be attributed to arbitrage between the home market and a more aggressive quotation behavior on the home market. In our regression model, a statistically significant positive impact of market fragmen-

tation on a stock's home market liquidity can be derived.

For the Spanish IBEX 35 instruments, the results are contrary to those for the EURO STOXX. In the consolidated order book, the liquidity measures relative spread and XLMs increase for the entire sample by 4.96%, 15.68% and 21.75% respectively, which translates into a decline in overall liquidity available to investors in Spanish blue chips. Again, quoted values at the top of the order book experience a strong decrease, which can mainly be attributed to tick size reductions.

Since fragmentation in IBEX 35 stocks was shown to be less intense than for EURO STOXX

instruments, differences in the results for the consolidated order book and the home market are less pronounced here.

Conclusion

Our paper addresses the impact that competition and market fragmentation have on a stock's liquidity. For this purpose, two distinct samples of stocks have been examined before and after the introduction of the new competition triggered by MiFID. The main difference in the characteristics of those samples is the degree of fragmentation. Results from panel regression models indicate a contrary development of liquidity in EURO STOXX and Spanish IBEX 35 stocks. For the former, a significant positive liquidity effect in the home market and a virtual order book consolidating multiple markets can be found between the observation periods. In our model, those changes can be attributed to the positive effect of competition. This positive impact of competition and the resulting fragmentation on liquidity can be split up into two parts: First, a direct effect arises from the mere existence of new electronic trading venues in which liquidity is collected. In our sample, those new trading venues contribute to the liquidity improvements in the consolidated order book. The second part can be referred to as an indirect home market effect. As pointed out in some former academic work on fragmentation in the US, the competition for order flow between traders in different markets is one potential explanation for our findings in the home market. In order to attract order flow in form of marketable orders to their market and thus increase the probability of execution, traders

are tempted to post more aggressive quotes in a competitive environment. For the Spanish stocks in our sample, a significant negative liquidity effect is observable. During the same period, those stocks experienced little competition between markets, resulting in a low degree of fragmentation.

Concluding, our study presented empirical evidence that competition and market fragmentation among electronic financial markets in Europe has led to higher market quality in terms of liquidity.

The results provide relevant input for market participants in Europe and the European Commission, given that the Commission is currently in the process of an intensive MiFID Review.

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