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RETAIL TRADING IN EUROPEAN EQUITY MARKETS

Fatemeh Aramian and Carole Comerton-Forde

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RETAIL TRADING IN EUROPEAN EQUITY MARKETS

Abstract

Recent growth in retail trading in global equity markets has drawn considerable attention to the execution of retail flows. European market operators offer diverse retail trading mechanisms: both retail-specific mechanisms and all-to-all trading mechanisms that allow the interaction of all trader types. Retail-specific trading mechanisms are categorized into Single Market Maker and Competing Market Maker mechanisms. Markets also differ on other dimensions such as the way market makers compete, the number of reference markets, order flow segmentation, explicit costs, and Payment for Order Flow (PFOF). Using the findings from the existing literature this paper argues in favor of competition between market makers, the use of a consolidated market view as the reference price and less segmentation. It also raises questions about potential conflicts arising from low or zero explicit costs and PFOF. The paper also recommends that policy makers can improve retail execution quality by requiring additional transparency around retail trades and implementing a consolidated tape.

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Executive Summary

Global markets have experienced significant increases in retail trading activity in recent years. The combination of low or no brokerage commissions, easy access to trading applications, and the Covid-19 crisis have increased retail trading significantly. These factors have motivated existing retail traders to trade more and have also encouraged many new retail traders to enter the market. In European markets, there are a variety of trading mechanisms where retail traders can execute their orders. Retail traders can trade in all-to-all trading mechanisms where they interact with all types of traders or on venues operating retail-specific mechanisms.

The retail-specific trading mechanisms can be divided into Single and Competing Market Maker mechanisms. In the first category, operated by Tradegate, Lang & Schwarz, Gettex, and Quotrix, a single market maker posts quotes and trades with the retail flow. In the second category, multiple competing market makers compete for retail order flow. Venues operating this mechanism include Equiduct Apex, Euronext Best of Book (BoB), and Retail Service Provider (RSP). Turquoise also plans to launch a new mechanism with competing market makers in 2023. It will be named Turquoise Retail Max.

This paper shows that retail-specific mechanisms captured 2.7% and 3.3% of the total number of trades and the total Euro trading volume, respectively, over the period January 2019 to August 2022 for the stocks in the main index in Germany, France, the Netherlands, and the UK. The trading activity on these venues peaked at 4.5% of trades in April 2020 and 4.8% of Euro trading volume in January 2021 (capturing 4.1% of total Euro volume in April 2020 with the start of the Covid pandemic). These figures do not include retail trading activity in all-to-all venues which can not be identified using public data.

The venues operating the Competing Market Maker mechanisms differ in terms of the trade price determination, the number of reference markets, pre-trade transparency, explicit costs, and the level of order flow segmentation. Equiduct Apex creates a consolidated order book from multiple lit venues. Its market makers compete on size/time and must execute retail orders at the Volume-weighted Best Bid and Offer obtained from the consolidated order book. Euronext BoB requires its market makers to offer price improvement relative to the Best Bid and Offer displayed on the Euronext central limit order book. As a result, retail orders are executed at the best price offered by BoB's market makers, which compete with liquidity providers in the Euronext central limit order book. RSP market makers also reference a single venue (the primary exchange) when providing quotes to retail brokers upon their request. Turquoise Retail Max will execute retail orders at prices determined by price competition between all trader types in a frequent batch auction rather than a continuous auction mechanism. These traders also reference a single venue – the stock's primary exchange – when posting quoted prices on the Turquoise Retail Max order book.

All European retail-specific mechanisms offer full pre-trade transparency except for the RSP and Turquoise Retail Max, which are non-transparent and partially transparent, respectively. These mechanisms also differ with respect to explicit costs imposed on retail brokers. For example, while venues operating the Single Market Maker mechanism, Equiduct Apex, and RSP offer zero trading fees, Euronext BoB charges retail brokers a trading fee. These venues also differ in terms of clearing and settlement costs. Except for the RSP, all retail trades executed on the retail-specific mechanisms are subject to clearing costs, which are typically done through Central Clearing Counterparties and Clearstream, depending on the mechanism.

The retail-specific mechanisms are different with respect to the level of segmentation they create between retail and institutional flows. Venues running the Single Market Maker mechanism, Equiduct Apex, and RSP segment the retail flow, with all flow executed by the venues' market makers. This segmentation also exists on Euronext BoB, except that the retail flow will be executed in the limit order book against other trader types when BoB's market makers do not offer price improvement. In contrast, Turquoise Retail Max will allow all trader types to interact with the retail flow, but the market makers only trade with retail traders. There is also a variation in whether the market makers trading on the retail-specific venues use Payment For Order Flow (PFOF). Currently, only the market makers trading on the Single Market Maker mechanism offer direct monetary payments of order flow.

How do the variations in the design of these mechanisms impact the quality of retail executions? Moreover, which mechanism offers the best outcome? Answering these questions requires detailed empirical analysis, which is beyond the scope of this paper. However, the paper draws on the existing academic literature to gain insights about which mechanisms will likely lead to the best outcomes.

Single versus competing market makers: Research shows that price competition between market makers enhances liquidity through lower spreads and higher depth. Therefore, retail mechanisms with competing market makers are likely to lead to better execution prices.

Single versus multiple markets for reference prices: Competition between venues is also an essential factor affecting traders' execution prices. Empirical evidence shows that the primary exchange does not always offer the best prices. Therefore, referencing only the primary exchange's quotes by market makers on the retail-specific mechanisms may not always deliver the best outcome. Hence, retail-specific mechanisms that reference multiple venues might deliver better prices to retail traders.

Explicit costs: Retail brokers usually charge retail traders zero or a flat commission while being responsible for covering all explicit costs, including the trading fee, clearing, and settlement costs. Hence, they are cost-sensitive and constantly seek ways to minimise these costs. As a result, retail-specific mechanisms offering lower explicit costs are attractive to retail brokers, although they might not always result in the best outcomes for retail traders.

Segmenting order flow: The evidence on segmentation of retail order flow is mixed. When market makers have certainty that they are trading with the retail flow, typically considered uninformed, they will be willing to offer tighter spreads to these traders. However, segmenting retail flow increases the probability of trading with informed traders in all-to-all mechanisms. This potentially widens the bid-ask spreads and, in turn, makes the reference prices used by market makers in the retail-specific mechanisms less competitive. This evidence suggests that a mechanism that allows all trader types to interact with the retail flow might lead to better execution prices.

PFOF: Empirical evidence on the impact of PFOF on retail execution quality is also mixed. However, the evidence shows that this practice can create conflicts of interest for brokers and may lead to worse execution quality for retail traders.

This paper makes recommendations for improving our understanding of the retail trading landscape in Europe. These include:

- Undertaking empirical research using transaction-level data to understand the costs and benefits of different retail-specific mechanisms;
- Enhancing public regulatory disclosures to enable retail traders and regulators to assess execution quality and order routing practices more easily; and
- Developing a consolidated tape and requiring venues with retail-specific mechanisms to use the consolidated European Best Bid and Offer as the reference price rather than the primary exchange's best bid and offer.

1. Introduction

Retail trading in U.S. and European equities markets has increased significantly over the last few years. The rapid growth is related to the Covid-19 crisis and the emergence of low/zero-commission brokers which has made trading more accessible and affordable (e.g., [Ozik, Sadka, and Shen \(2021\)](#); [Jones, Zhang, and Zhang \(2022\)](#)). National lockdowns and shutdown of all entertainment and sports activities following the Covid-19 crisis resulted in increased teleworking, leisure time, and disposable income for people worldwide ([Li, Strahan, and Zhang \(2020\)](#)). Government stimulus payments in many countries also boosted incomes in some cases ([Baker, Farrokhnia, Meyer, Pagel, and Yannelis \(2020\)](#)). Easy access to online and mobile trading applications, particularly those offered by low/zero commission brokers, turned people's free time and savings into higher levels of market participation. For instance, retail trading in France peaked during the Covid-19 crisis in March 2020, and the level has remained comparable since then relative to pre-Covid period ([Autorité des Marchés Financiers \(2021\)](#)). Retail orders that once were captured only by traditional banks are now in the hands of various types of intermediaries with different fees and methods for order routing. For example, the market share of zero-commission brokers in retail trading in the French market increased from 8.4% in late 2018 to 21.8% in the third quarter of 2021 ([Autorité des Marchés Financiers \(2021\)](#)).

Regulators have long debated how to protect traders and facilitate best execution. The Markets in Financial Instruments Directive II (MiFID II) requires brokers to guarantee best execution defined as obtaining the best possible result for clients. Best execution relies on various factors, including trade price, explicit costs (e.g., trading fee, clearing and settlement costs), size, speed, and the likelihood of execution (MiFID II Article 27 (1)).¹ For retail clients, MiFID II requires brokers to guarantee best execution by taking total consideration (price and all costs retail clients incur, including the brokerage commissions). The execution rule also emphasises that brokers should avoid routing orders to trading mechanisms where there is a conflict of interest between a broker's interest and its clients' best execution.

Despite the heightened interest of retail traders in equity markets, our understanding of retail trading, particularly in the European markets, is limited. This paper reviews the retail trading landscape in the European equity markets. We describe the structure of retail-specific trading venues, provide details of the level of trading activity on these venues and evaluate their strengths and weaknesses. We also provide comparisons to the retail trading mechanism in the U.S. market. The paper also identifies areas where further research is necessary to better understand the European market landscape, and concludes with some policy recommendations.



¹ The U.S. market also requires brokers to take all actions to execute a client's order at prices "as favorable as possible under prevailing market conditions" (Rule 5310 FINRA).

2. Retail trading landscape in Europe

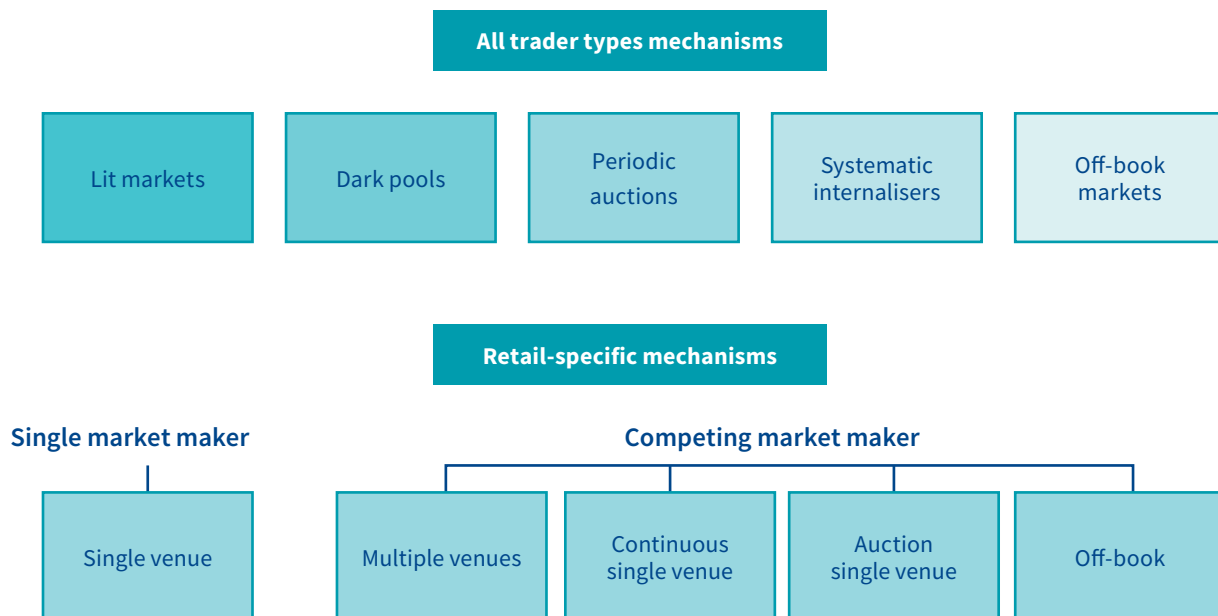
MiFID and Regulation National Market System (Reg NMS) in Europe and the U.S. respectively, aimed to create liquid and efficient markets for traders while encouraging competition across trading mechanisms in a unified trading framework. Despite having similar objectives, the market structures across the U.S. and Europe are different, especially with respect to how retail trading is handled. Much has been written about the U.S. retail trading mechanism, so we do not seek to replicate that work in this paper. However, we provide a brief summary of the U.S. retail trading landscape for comparative purposes in the blue box labeled “[Retail trading in the U.S. market](#)”.

In Europe, there is no dominant trading mechanism for retail trading. Retail orders can be executed using a range of mechanisms. Decisions about retail order execution are

typically made by retail brokers. Once a broker receives a non-directed retail order – an order in which a retail trader does not specify where the order should be executed – the broker decides where to send the order for execution. Brokers can send retail orders to mechanisms that offer trading to all trader types, including lit markets, dark pools, systematic internalisers (SIs), periodic auctions, and off-book markets (i.e., OTC and off-book on-exchange); or brokers can route retail orders to trading venues exclusively designed for retail traders. Figure 1 depicts a retail broker’s order routing options for non-directed orders. The top panel identifies trading mechanisms available to all traders, and the bottom panel identifies different mechanisms exclusively offering retail trading. The retail-specific mechanisms are described in the next section.

Fig. 1. Retail trading landscape in Europe

The figure displays trading mechanisms where retail trading can take place.



Retail trading in the U.S. market

In the U.S. market, almost all non-directed retail orders are sent to wholesale market makers (wholesalers) such as Virtu and Citadel. The wholesalers then have discretion on how to execute orders. Upon receiving a retail order, a wholesaler has three options: (i) the wholesaler can internalise the order against its inventory, (ii) send it to its network of wholesalers for execution; (iii) route the order to public exchanges or Alternative Trading Systems (ATS).^a A small fraction of retail trading also takes place on the retail-specific trading services offered by [New York Stock Exchange](#), [Nasdaq Exchange](#), and [Cboe U.S.](#), which provide price improvement to retail orders.

Wholesalers usually internalise marketable orders (i.e., market orders and marketable limit orders). Since retail traders are generally considered uninformed, internalising marketable orders away from other order flows, such as institutional flow, reduces the risk of adverse selection for retail traders and wholesalers. However, retail non-marketable limit orders are usually sent to other venues.

[Barardehi, Bernhardt, Da, and Warachka \(2022\)](#) show that wholesalers tend to internalise marketable orders, and only a tiny fraction of non-marketable limit orders are internalised since their execution is costly and less profitable. They also document that wholesalers only internalise non-marketable limit orders when institutions have high liquidity demand. In times of high liquidity demand, wholesalers use retail non-marketable limit orders to provide liquidity to institutional traders.

In December 2022, the Securities and Exchange Commission (SEC) approved four [major proposals](#) to reform equity market structure in the US. If these reforms are adopted and implemented they will represent the most fundamental change to US market structure since Reg NMS. Retail execution in particular will be transformed.

^a Alternative Trading Systems (ATS) are electronic trading systems that execute orders electronically and are more loosely regulated than exchanges. ATSs can remain pre-trade non-transparent (i.e. dark) provided their market share in a given security remains below 5%.



2.1 Retail-specific trading mechanisms in Europe

In Europe, some market operators run retail-specific trading mechanisms to facilitate trading for individuals and non-professional traders. We classify these mechanisms into two main categories: Single Market Maker and Competing Market Maker mechanisms. Within these categories, the venues differ on a range of features, including the level of price competition, the number of reference markets for market makers to set execution prices, pre-trade transparency, explicit costs, and the level of order flow segmentation. Table 1 summarises various features of each mechanism.

Table 1: Retail-specific trading mechanisms in Europe

	Single Market Maker	Competing Market Maker			
		Multiple Venues	Continuous Single Venue	Auction Single Venue	Off-Book
Price determination	single market maker	volume-weighted average price	competing market makers	all trader types	market makers on a RFQ basis
Market maker competition	no competition	size/time	price	price	price
Reference market	Xetra or dynamic* reference market	consolidated lit order book	primary exchange	primary exchange	primary exchange
Pre-trade transparency	transparent	transparent	transparent	partially transparent	non-transparent
Trading fee					
– Retail brokers	zero	zero	0.75 bps	zero	zero
– Market makers	a fee based on system usage	0.5 bps	0.25 bps-0.60 bps**	0.10 bps-0.40 bps	zero
Clearing	Clearstream***	CCPs	CCP	CCPs	no cost
Settlement	Clearstream***	Euroclear****	Euroclear	Euroclear	CREST
Order flow segmentation	yes	yes	partial segmentation	no	yes
PFOF practice	yes	no	no	no	no
Operating market	Tradegate, Lang & Schwarz, Gettex, Quotrix	Equiduct Apex	Euronext Best of Book	Turquoise Retail Max (pending)	Retail Service Provider

* All venues operating this mechanism use Xetra as the reference market except for Tradegate, which uses a dynamic reference market approach. Tradegate may use different reference markets for various stock markets and times of the day. For example, for U.S. stocks traded outside the U.S. exchange trading hours, Tradegate chooses the most relevant market for the stocks at that time.

** The trading fee imposed on market makers varies between 0.25 bps to 0.60 bps depending on the period the market makers quote at the top of the Euronext book each month.

*** Clearing and settlement options for trades executed on the Single Market Maker mechanism are not limited to Clearstream, but the process is typically done via Clearstream, particularly for Tradegate trades.

**** Settlement is available through multiple options, including Euroclear, Montetitolì, Clearstream, Iberclear and CREST.

Venues running the Single Market Maker mechanism typically operate with only one market maker, and that market maker's quotes determine execution prices. In the Competing Market Maker Mechanism, multiple market makers compete based on price or on size/time.

A second and related dimension that differs across trading mechanisms is the number of reference markets used for setting prices. In the Single Market Maker mechanism, the market maker always uses only one specific venue as the reference market, except for one venue employing a dynamic approach to determine the reference market. In the Competing Market Maker mechanism, there are two alternative approaches relating to reference markets: multiple venues and a single venue.

Competing Market Maker – multiple venues refers to a mechanism in which the execution price is the Volume-weighted Best Bid and Offer (VBBO) obtained from a consolidated order book constructed from multiple lit venues. In this mechanism, the venue's market makers compete on size/time priority for execution against retail orders. In contrast, Competing Market Maker – continuous single venue mechanism executes retail orders at the best price obtained from price competition between its market makers required to provide price improvement relative to quotes on the primary exchange. Competing Market Maker – auction single venue sets the execution price based on price competition between all trader types providing liquidity on a single venue in a frequent batch auction, not a continuous auction mechanism. Competing Market Maker – off-book allows multiple market makers to compete for retail flow on a Request For Quote (RFQ) basis.

The mechanisms also differ with respect to pre-trade transparency. With the exception of the Competing Market Maker – off-book and the Competing Market Maker – auction single venue mechanisms, all retail-specific venues offer full pre-trade transparency. The market makers in the Competing Market Maker – off-book mechanism offer bilateral quotes on request, and these requests are not pre-trade transparent to the rest of the market. However, these market makers may also be providing quotes in the lit market, which are transparent. The Competing Market Maker – auction single venue mechanism is partially transparent.

Only indicative auction prices, volumes, and orders submitted by market makers are visible to the rest of the market. There is no pre-trade transparency for orders of other trader types, including retail and institutional traders.

Trading costs also differ across the mechanisms. The Single Market Maker mechanism typically does not charge retail brokers a trading fee. The Competing Market Maker mechanism operates different trading fee policies. While the multiple venues, off-book, and auction single venue mechanisms offer zero trading fees, the continuous single venue mechanism charges, retail brokers trading fees. Clearing and settlement costs of trades executed on all mentioned European retail-specific mechanisms are paid by retail brokers. Table 1 shows the clearing and settlement choices on these mechanisms.

Moreover, the mechanisms are different with respect to the level of order flow segmentation. All retail-specific venues separate the retail flow from the institutional flow except for Competing Market Maker – auction single venue and Competing Market Maker – continuous single venue mechanisms. The former has no segmentation because it facilitates the interaction of retail traders with all trader types, while the latter has partial segmentation. Specifically, the retail flow can interact with all order flow types only if the mechanisms, market makers do not offer price improvement relative to the quotes of all trader types on the primary exchange.

The mechanisms also differ regarding their use of Payment For Order Flow (PFOF). In the Single Market Maker mechanism, the market maker, as shown in Table 1, usually engages in PFOF with retail brokers in the sense that they pay retail brokers a fee to route their orders to them for execution. In contrast, none of the market makers in venues operating the Competing Market Maker mechanisms engage in this practice. The remaining part of this sub-section describes each retail-specific mechanism in detail.

2.1.1 Single Market Maker Mechanism

The German regional exchanges Tradegate, Lang & Schwarz, Gettex, and Quotrix, offer retail trading and mainly operate with a single market maker.^{2,3} Tradegate is the biggest market, followed by Lang & Schwarz. Combined, Tradegate and Lang & Schwarz capture around 90% of the total stock trading activities on these four exchanges ([The Federal Financial Supervisory Authority \(2022\)](#)). Hence, we only provide descriptions of the market structures of these two venues.

Tradegate is a Regulated Market designed to provide a transparent (pre- and post-trade transparency) marketplace for retail traders.⁴ Consistent with the renewed interest in retail trading, Tradegate experienced an increase in [the number of transactions](#) from 18.1 million in 2019 to 53.8 million at the end of 2020. On Tradegate, retail brokers can submit orders from 8:00 am to 10:00 pm (Central European Time), and orders are executed mainly against the market maker's quotes.⁵ The market maker posts quoted prices actively during the Tradegate trading hours, and the quotes should be at least as good as those on the reference market ([Tradegate Exchange \(2022\)](#)). The reference market can vary depending on the security, and the exchange "may choose one or several reference markets for each security" ([Tradegate Exchange \(2022\)](#)). Generally speaking, a reference market for each stock is its most relevant market in terms of liquidity. For each stock and for trading at different times of a trading day, Tradegate and/or the market maker typically choose the most relevant market in terms of liquidity for that stock and at that time of the day. For example, for U.S. stocks traded outside the U.S. exchange trading hours, Tradegate chooses the most relevant market for the stocks at that time. However, the precise process for determining the most relevant market and the range of reference markets considered are not transparent to the broader market.

Tradegate offers zero trading fees to retail brokers and charges the market maker a trading fee based on its system usage ([Tradegate Exchange \(2021\)](#)). The market maker does not receive a commission (or any other fees) for its activities on the exchange, but it can profit from its trading by earning the bid-ask spread. Once a trade has taken place, it should be cleared and settled at the expense of the trading participants, namely the retail broker and the market maker ([Tradegate Exchange \(2022\)](#)). There are multiple options to clear and settle trades executed on Tradegate, but the processes are typically done via Clearstream.

Lang & Schwarz is also a transparent retail trading system within the Hamburg Stock Exchange. The market maker, Lang & Schwarz TradeCenter AG & Co.KG, constantly offers quotes from 8:00 am to 8:00 pm (Central European Time) and executes orders against its inventory. Unlike Tradegate, Lang & Schwarz uses only a single venue, Xetra, as the reference market for the market maker to set prices. [The Trade Republic](#), a zero-commission broker, is the primary customer of Lang & Schwarz and routes all its stock and ETF orders to this exchange.

An important and common feature of trading on the four mentioned exchanges is that their market makers usually engage in PFOF, where they purchase retail orders for execution from brokers.

² These venues have market specialists. However, due to the similarities in the roles of market specialists and market makers, we refer to them as market makers in this paper.

³ Tradegate officially has two market makers, of which one is more active and captures most trading activity.

⁴ Since Tradegate is a Regulated Market, it is obligated to provide trading to all trader types. That said, anecdotally, institutional traders are unlikely to trade on Tradegate as it is specifically designed for retail traders.

⁵ On Tradegate, retail traders can also trade with each other, but the trading between retail traders and the market maker captures most trading activity.

2.1.2 Competing Market Maker Mechanism

There are currently three active and one upcoming retail-specific mechanisms where the trade price determination relies on competing market makers and/or venues.

Multiple venues. Equiduct, a segment of the Börse Berlin Regulated Market, is a pre- and post-trade transparent venue exclusively offering retail trading on its Apex trading service. Equiduct was launched in 2009 in response to market fragmentation following MiFID I to facilitate access for brokers to the liquidity of all European lit markets through a single exchange connection without investing in a Smart Order Routing System.

Equiduct Apex executes retail market orders at the VBBO obtained from a consolidated order book constructed from the reference markets when Apex receives the retail order (Equiduct (2022c)). The reference markets are the primary exchanges, Cboe Europe, Turquoise Europe, and Equiduct's central limit order book.⁶ Hence, Equiduct Apex's mechanism relies on market makers referencing prices in multiple lit venues. The market makers on Apex guarantee the execution of retail orders at VBBO at all times. There are currently five market makers operating on Equiduct Apex, of which two account for a large volume of activity. Execution priority for the Apex market makers is based on size/time priority, as the price is determined by the VBBO (Equiduct (2022c)). [Figure A1 in Appendix A](#) shows the price determination process on Equiduct Apex.

An essential feature of Equiduct Apex is the cost reduction it provides to retail brokers. Like Tradegate, Equiduct Apex offers zero trading fees to retail brokers while charging its market makers a trading fee of 0.50 basis points (Equiduct (2022a)). Despite the trading fee, market makers are still willing to be active in the liquidity pool as the benefit of trading with the retail flow, known to be less informed, outweighs the trading fee.

Trades executed on Equiduct rely on Central Clearing Counterparties (CCPs) for clearing, and the process is typically done through General Clearing Members (GCMs) on Equiduct (Equiduct (2022c)). A GCM is a member of Equiduct and a member of one of the CCPs connected to Equiduct. Trading participants (i.e., retail brokers and market makers) choose their GCMs, and the GCMs will be responsible for clearing through their preferred CCPs. Trades are also settled via multiple options, including Euroclear, Montetitolli, Clearstream, Iberclear and CREST (Equiduct (2022b)). The retail broker's GCM ultimately charges the broker a fee or passes the costs to the broker.

Continuous single venue. Euronext Best of Book (BoB) is a pre- and post-trade transparent trading service operating within Euronext central limit order book. It emerged in 2016 in response to brokers' need to comply with MiFID II best execution rule.

Unlike Equiduct Apex, Euronext BoB's mechanism relies on price competition between market makers in its Retail Liquidity Provider (RLP) program (currently five major market makers) and liquidity-providing traders in the Euronext central limit order book (Euronext (2017)). The RLP market makers compete directly with each other and with other traders on the Euronext central limit order book. They have no execution priority over those quoting at better prices in the central limit order book. Hence, at times when the RLPs are not offering price improvement on BoB, retail orders will execute with orders from other traders in the Euronext central limit order book. Submitted retail orders become eligible for execution in Euronext BoB through the Retail Member Organization (RMO) on Euronext (Euronext (2020a)). Although RMO retail orders can trade with any trader type offering better prices on Euronext, the RLP market makers can only trade with RMO retail orders. [Figure A2 in Appendix A](#) shows the price determination process on Euronext BoB.

⁶ Equiduct also runs a central limit order book. In the central limit order book, all trader types can interact with each other, and limit orders are executed based on price/time priority (Equiduct (2022c)).

The RLP market makers are obliged to fulfill specific criteria imposed by Euronext. They should be present at the Euronext Best Bid and Offer (BBO) for a specific amount of time each month, depending on the basket of stocks for which they provide liquidity and the relevant tier ([Euronext \(2021\)](#)). For instance, RLP market makers must be at least 95% of the time each month at Euronext BBO for stocks in the CAC40, AEX25, and BEL20 indexes for tier 1, which lowers to at least 75% for the same stocks for tier 2. Market makers also “must, at the time of emitting quotes, ensure that such quotes are at or better than the European Best Bid and Offer (EBBO) on both sides of the book” ([Euronext \(2021\)](#)).

Unlike Equiduct Apex and Tradegate, Euronext BoB charges retail brokers a trading fee which varies depending on their monthly traded volume ([Euronext \(2022\)](#)). On average, retail brokers incur a trading fee of 0.75 basis points. Similar to the other retail-specific mechanisms, the RLP market makers face a trading fee. The fee varies between 0.25 to 0.30 basis points depending on the time they quote at the top of the Euronext book each month in the basket of stocks they provide liquidity for the relevant tier ([Euronext \(2021\)](#)). However, if they do not fulfill their minimum presence time obligations, the fee rises to 0.60 basis points.

Trades on Euronext BoB are cleared and settled via LCH SA Central Clearing Counterparty and the local Central Securities Depository of Euroclear, respectively ([Euronext \(2020b\)](#)). The process is done through their custodians (clearing members) at the expense of trade participants. The custodian will pay the clearing and settlement fees and pass the cost back to the retail broker.

Auction single venue (upcoming). The London Stock Exchange Group plans to introduce a new retail trading mechanism, Turquoise Retail Max, in April 2023. Unlike the existing retail-specific mechanisms, Turquoise Retail Max will offer trading based on a frequent batch auction mechanism rather than a continuous one. The auction is triggered every time there are executable orders on opposite sides

of the book, and it will take no longer than 100 milliseconds to uncross. Turquoise Retail Max aims to provide a price-competitive trading environment where retail orders can trade against the liquidity of all trader types, including market makers (Retail Liquidity Providers on Turquoise Retail Max) and institutional traders, potentially leading to price improvement for retail orders. When determining the auction price, Turquoise Retail Max considers all submitted orders from all trader types and determines the execution price based on the volume-maximising algorithm (i.e., a price that maximises the number of executed shares).

On Turquoise Retail Max, traders can submit limit orders and “Pegged to the Primary Market Bid, Midpoint, and Offer” orders. For each stock, the submitted limit orders must be at least as good as quotes on the reference market, namely the stock’s primary exchange. Turquoise Retail Max is partially pre-trade transparent. It only displays the indicative auction prices, volumes, and orders submitted by Retail Liquidity Providers. Hence, any order submitted by other trader types, including retail traders and institutions, is not visible to anyone in the order book, including Retail Liquidity Providers. Upon arrival, retail orders are flagged for matching purposes.

Like Euronext BoB, Retail Liquidity Providers on Turquoise Retail Max only trade with retail orders. Specifically, to motivate market makers to be active and offer tight spreads, Turquoise Retail Max’s matching algorithm facilitates a setup in which Retail Liquidity Providers will only trade with retail orders, reducing the risk of being adversely selected by institutions. The main features distinguishing Turquoise Retail Max from Euronext BoB are the matching mechanisms, level of segmentation and trading fee policies. Turquoise Retail Max uses a multilateral auction mechanism while BoB is a continuous auction. On Turquoise Retail Max, retail orders can always interact with all types of order flow whereas on BoB retail orders will only trade with other trader types when the RLPs do not offer price improvement.

Unlike BoB, Turquoise Retail Max will offer zero trading fees to brokers while charging others trading fees. The fee varies between 0.10-0.40 basis points depending on the time they are present at the top of the book of the stock's primary exchange each month and the type of execution. For instance, if their quotes facilitate the execution of retail orders at the midpoint price, they are charged the minimum fee of 0.10 basis points.

Clearing and settlement costs of trades executed on Turquoise Retail Max are at the expense of trade participants. Trades are cleared and settled through trade participants' custodians via Central Clearing Counterparties and the local Central Securities Depository (Euroclear), respectively.

Off-book. The U.K. market offers the Retail Service Provider (RSP) mechanism exclusively for retail trading. The RSP is an off-book (i.e., non-pre-trade transparent) trading mechanism based on an RFQ system. In this mechanism, approximately 10 to 15 equities market makers are connected to the RSP and provide quotes off-order-book to retail brokers on request. They execute orders against their inventories and profit by earning the bid-ask spread. In the U.K. market, 95% of stock retail trading is captured by the RSP ([Financial Conduct Authority \(2018\)](#)). [Figure A3 in Appendix A](#) depicts the trading process on the RSP.

Upon receiving a retail order, the broker submits a request for a quote to the market makers in the RSP. The brokers receive the quoted prices almost instantly and have 15 to 30 seconds to respond by accepting or rejecting the offer. Since RSP offers off-book trading, market makers have no obligation to follow the MiFID II harmonised tick size regime when quoting and executing retail orders. Retail orders in the RSP are usually executed at prices better than those on the reference market, namely the primary exchange ([Financial Conduct Authority \(2018\)](#)). When the order execution is complete, the trade is reported as an off-book on-exchange trade. RSP trades are typically reported to the London Stock Exchange (LSE), but reporting to any Recognised Investment Exchange is acceptable ([APCIMS \(2013\)](#)).

Retail brokers and market makers are not charged trading fees or commissions for their activities in the RSP. Instead, they pay a subscription fee to one of the network software providers operating the RSP (i.e., Fidessa, Proquote, and IRESS) to connect to the RSP. Clearing and settling trades are done through CREST, a Central Securities Depository for markets in the United Kingdom and for Irish stocks, operated by Euroclear ([APCIMS \(2013\)](#)). However, retail brokers do not face clearing costs if they choose to direct settle in CREST, which is typically the case most of the time.

2.2 Trading activity of retail-specific mechanisms

Next, we examine the trading activity for each retail-specific trading mechanism. We examine all trades in DAX30, CAC40, FTSE100, and AEX25 stocks executed on the retail-specific trading venues. We collect data from the Refinitiv Tick History (RTH) database for January 1, 2019, to August 31, 2022. We include only stocks that remained in the index throughout the sample period. Our data for trades executed on the Competing Market Maker – off-book mechanism (the RSP) is reliable only for U.K. stocks (FTSE100), so we remove trades executed on this mechanism for the French, Dutch, and German stocks. [Appendix B](#) describes how we identify trades on each retail-specific mechanism.

Figure 2 displays the market share of retail-specific mechanisms. The market share is the total number of trades (the total Euro volume) executed on retail-specific mechanisms as a percentage of the total number of trades (the total Euro volume) executed on all European trading mechanisms from 2019 to 2022, presented with a solid teal

line (blue dashed line). The figure shows that retail market share, in terms of the number of trades and Euro volume, experienced a sharp increase in March 2020, consistent with the explosion of retail trading following the Covid-19 crisis. Retail-specific mechanisms accounted for around 1.5% of the total number of trades in January 2019, peaking at 4.5% in April 2020 and stabilising at around 2% to 3% for the remainder of the sample. They also captured 2.2% of the total Euro volume in January 2019, peaking at 4.8% in January 2021 (capturing 4.1% of total Euro volume in April 2020 with the start of the Covid pandemic). It is important to point out that these statistics do not capture total retail activity in these markets because retail flow may also be executed on trading mechanisms available to all traders (i.e., all-to-all mechanisms). Public data do not allow us to identify retail activity on these mechanisms, so we cannot report the overall level of retail activity in these markets.

Fig. 2. Market share of retail-specific mechanisms

The figure displays the market share of retail-specific mechanisms. The market share is the total number of trades (the total Euro volume) as a percentage of the total number of trades (the total Euro volume) executed in DAX30, CAC40, FTSE100, and AEX25 stocks on all European trading mechanisms. The sample period is from January 1, 2019 to August 31, 2022.

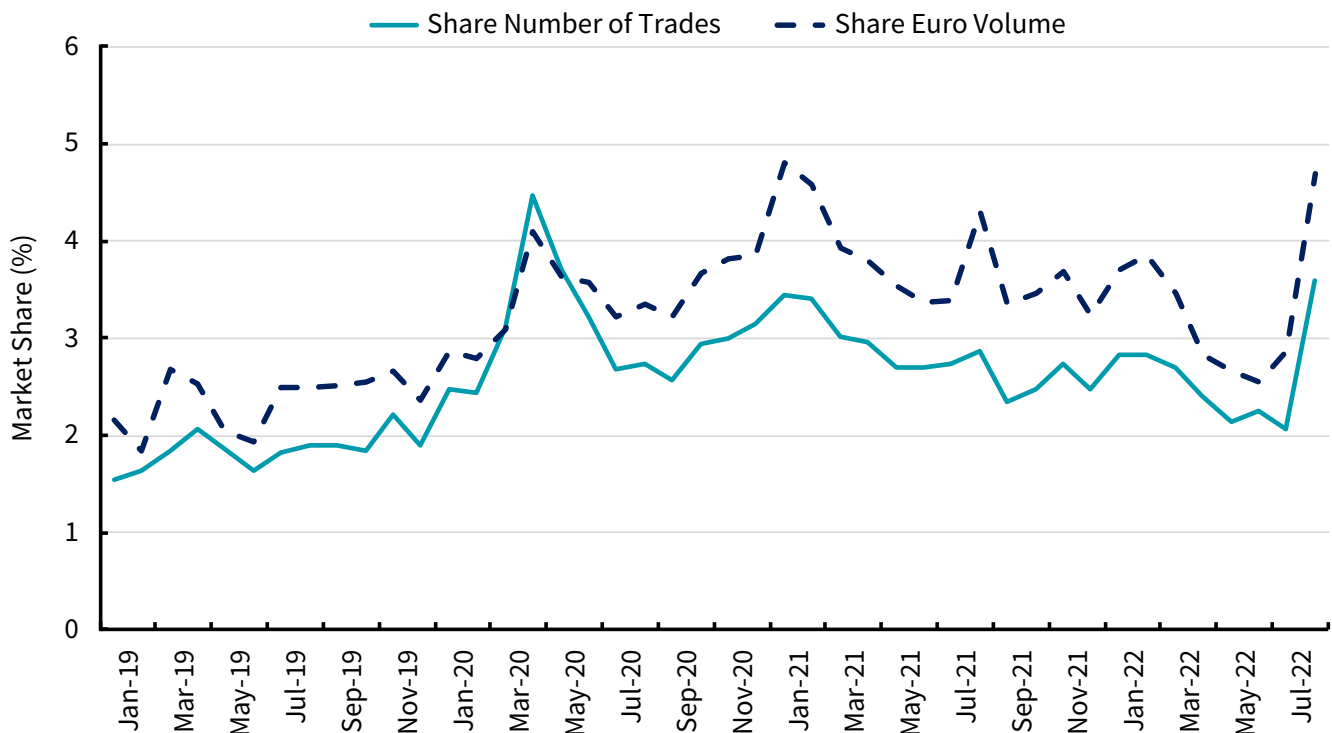


Figure 3 reports the importance of each retail-specific mechanism type by country. There is competition across the mechanisms in the Netherlands and France, although the Euronext BoB accounts for over 50% of the activity in each country. However, in German and the U.K. markets, one mechanism dominates and attracts most retail activity. In the U.K., this is the off-book RSP mechanism, and in Germany, it is the Single Market Maker mechanism. An analysis of the connections of retail brokers to different retail-specific mechanisms is required to understand whether they compete with each other or whether brokers limit competition by choosing not to connect to all venues. This analysis is beyond the scope of this paper.

Table 2 presents trading activity statistics for each retail-specific mechanism across different stock markets in our sample (Panel A). We also report statistics for trading activity in lit markets (Lit markets) in Panel B and in all mechanisms (All mechanisms) in Panel C for comparative purposes. The values reported in Panel C are based on all trades executed on all trading mechanisms, excluding retail-specific ones (i.e., lit markets, dark pools, periodic auctions, SIs, OTC, and off-book on-exchange trades).

The U.K. and Germany have the highest level of retail activity (stock-day average) at €5.3 million and €6.2 million, respectively. The average trade size ranges from around €4,700 to €17,700. The largest average trade sizes are in the U.K. using the Competing Market Maker – off-book mechanism and the smallest are in French stocks using the Competing Market Maker – continuous single venue mechanism.

The table also shows that, for each market, trades executed in lit markets (i.e., visible trades executed in limit order books) have, on average, a smaller trade size than trades on retail-specific mechanisms. This can be an indication of order-splitting strategies by traders, particularly institutions. In contrast, the average trade size of trades executed on all trading mechanisms is about the same or slightly larger than the corresponding average trade size on retail-specific mechanisms except for the U.K. stocks traded in the RSP. The average trade size of trades executed in RSP (€17,700) is larger than the average trade size on all mechanisms (€6,500).

Fig. 3. Market share for retail-specific mechanisms by country

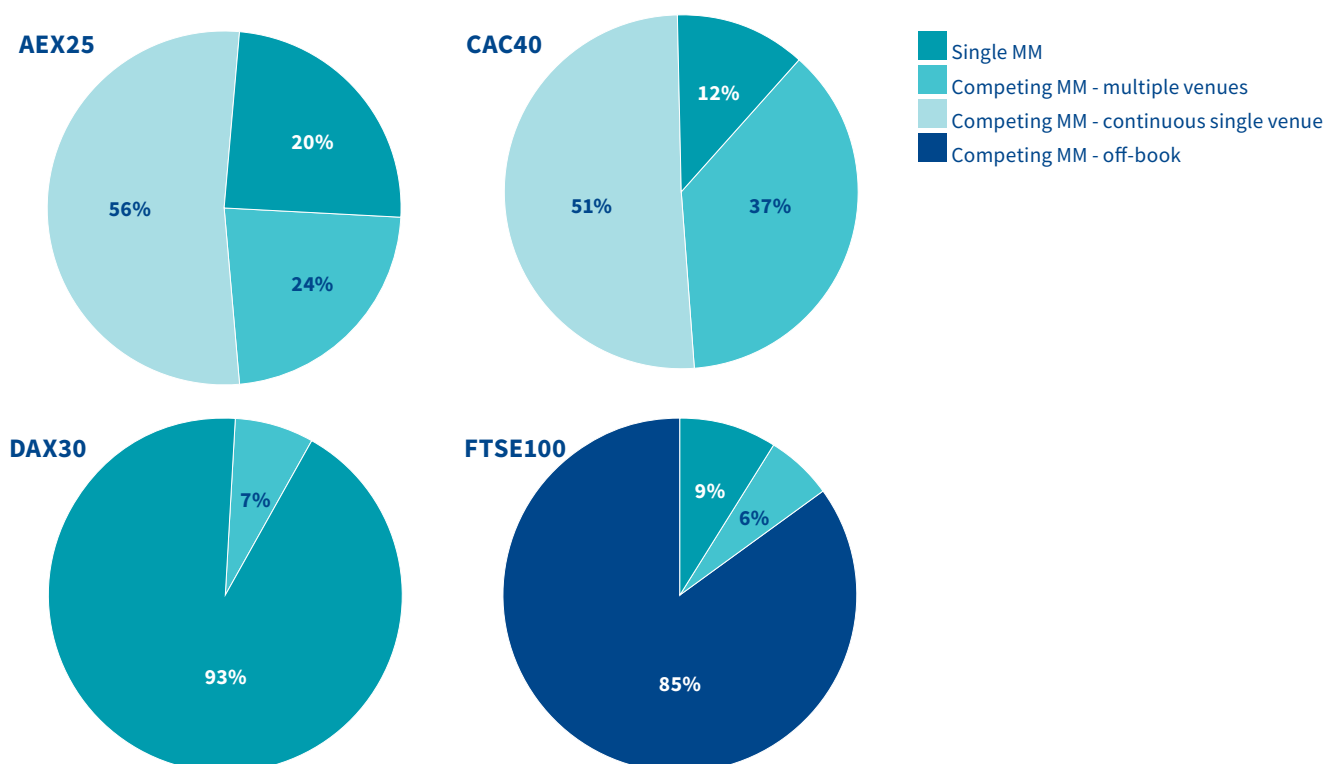


Table 2: Trading activity of retail-specific mechanisms by country

The table reports descriptive statistics for the trading activity of European stocks on different retail-specific mechanisms (Panel A), on lit markets (Panel B), and all trading mechanisms (Panel C). The values reported in Panel C are based on all trades executed on all trading mechanisms, excluding retail-specific ones (i.e., lit, dark pools, periodic auctions, SIs, OTC, and off-book on-exchange). Statistics are stock-day averages from January 2019 to August 2022. The markets are French (CAC40), German (DAX30), Dutch (AEX 25), and the U.K. (FTSE100).

	Volume (Million Euro)	Number of trades	Trade size (Euro)
Panel A: Retail-specific			
Single Market Maker			
French	0.49	65	7,493
German	6.22	594	10,460
Dutch	0.78	96	8,044
U.K.	0.16	26	5,977
Competing Market Maker			
<i>Multiple venues</i>			
French	1.19	205	5,817
German	0.59	43	13,434
Dutch	1.05	127	8,206
U.K.	0.10	6	6,842
<i>Continuous single venue</i>			
French	1.30	278	4,657
Dutch	2.29	272	8,408
<i>Off-book</i>			
U.K.	5.36	303	17,660
Panel B: Lit markets			
French	87.02	17,899	4,862
German	35.52	7,530	4,717
Dutch	89.66	17,517	5,118
U.K.	32.39	10,023	3,231
Panel C: All mechanisms, excluding retail-specific			
French	190.90	20,711	9,217
German	217.32	15,421	14,092
Dutch	164.49	19,973	8,235
U.K.	80.05	12,373	6,469

3. Retail trading and execution quality

Trade execution quality is an essential concept in trading. It is the core of market integrity and can significantly affect traders' profits and losses. When a retail trader submits a buy/sell order, the broker takes a sequence of actions to complete the order execution while making sure the steps guarantee best execution quality for the client. Retail brokers have discretion on where to execute non-directed retail orders, exposing retail traders to a potential conflict of interest. A conflict of interest arises when brokers' private interests are not aligned with their responsibility to put the client's interest first. In this section, we discuss features of the retail-specific trading mechanisms described in Section 2.1 concerning retail execution quality and brokers' routing decisions.

Price competition. Price competition plays an important role in traders' implicit costs. Retail venues running the Competing Market Maker mechanism accommodate price competition in execution prices in different ways.

In today's fragmented market, competitive liquidity providers usually post their bid and ask orders on all venues resulting in the appearance of a higher consolidated depth (e.g., [Foucault and Menkveld \(2008\)](#)) and a lower consolidated quoted spread ([Degryse, De Jong, and Kervel \(2015\)](#)). Therefore, the VBBO execution price obtained from the consolidated order book on Equiduct Apex reflects a high level of price competition across multiple lit venues. Market makers on Apex are obligated to trade at a price set in these lit venues and compete on size/time for execution against retail orders. This process increases the probability of executing at the best price with enough depth for retail orders.

The price competition between market makers within a single venue, such as Euronext BoB and Turquoise Retail Max, also allows traders to execute their orders at the best price and potentially benefit from price improvement. For instance, [Brogaard and Garriott \(2019\)](#) show that an increase in the number of HFT market makers on an exchange intensifies price competition and results in increased liquidity, hence lower transaction costs for traders. Therefore, the presence of five major market makers in the RLP program on Euronext BoB competing with each other and with traders in the central limit order book, and competition between different trader types on Turquoise Retail Max where they quote at least at the best quotes on the primary exchange, provide highly competitive environments that likely benefit retail traders.

The off-book RSP mechanism also facilitates market makers' competition off-order-book. Despite being a non-pre-trade transparent mechanism, the RFQ system on the RSP is a competitive blind quote system between market makers, potentially benefiting retail traders. Research shows that in a competitive RFQ dealer market, dealers are motivated to offer competitive quotes to attract more trading volume, which can result in lower costs for traders ([O'Hara and Zhou \(2021\)](#)). Considering LSE as the reference market, [Financial Conduct Authority \(2018\)](#) documents that 85% of trades executed on the RSP achieved execution prices at least as good as those prevailing on the LSE. In addition, considering the best prices across all venues in the U.K. market rather than only LSE shows that 80% of RSP trades are priced at least as good as prices prevailing in these venues ([Financial Conduct Authority \(2018\)](#)).

Unlike the Competing Market Maker mechanism, the presence of only one market maker on venues operating the retail Single Market Maker mechanism removes any competition on the exchange to provide better prices to retail traders. In addition, even if the market maker provides price improvement, this might not be the level of improvement a venue with highly competitive market makers would provide, nor does it capture any price improvement offered on venues other than the reference market.

The reference market. MiFID resulted in the proliferation of trading venues competing with each other and primary exchanges on various factors, including the trade price, to attract order flows. Today, primary exchanges do not always offer the best quotes ([Comerton-Forde and Zhong \(2021\)](#)). As a result, referencing quotes only on a single venue (i.e., the primary exchange) by some retail-specific venues (i.e., Euronext BoB, RSP, and Turquoise Retail Max) might not lead to the best execution price for retail traders. Using a dynamic reference market may enhance this process, but it is difficult to assess without more transparency about how the reference market is determined.

Explicit costs. Explicit costs are important factors affecting retail brokers' order routing decisions. These costs can create a conflict of interest between brokers and their clients. Brokers charging retail clients a flat commission (or zero commission) while covering all explicit trading costs may seek ways to minimise these costs by, for example, sending orders to a mechanism offering the cheapest execution or the highest rebate, which may impair execution quality ([Battalio, Corwin, and Jennings \(2016\)](#)).

Trading fees are essential elements for venues to compete on to attract order flow. Except for Euronext BoB, other retail-specific trading venues offer zero trading fees intensifying retail brokers' motives to route their orders to them. Clearing and settlement costs are also crucial factors for retail brokers. A zero clearing fee offered by RSP can make it more appealing than other retail-specific venues to retail brokers. Whether and to what extent these three costs affect brokers' responsibility for best execution quality is an empirical question. However, it is challenging to explore due to the need for granular information around these costs.

Order flow segmentation. Retail traders are typically considered uninformed about stocks' fundamental values and are therefore exposed to the risk of being adversely selected by institutional traders. Separating retail flow from institutional orders helps protect retail traders from adverse selection costs and motivates market makers to offer price improvement to retail traders as they trade against the uninformed flow. However, this segmentation leads to the concentration of institutional traders, considered informed traders, in limit order books. This can make market makers posting orders in limit order books less willing to be price-competitive due to the higher risk of adverse selection costs.

Empirical evidence shows that such order segmentation reduces price competition between market makers to supply liquidity on lit markets due to the increased probability of trading with informed traders. The reduced competition leads to larger spreads on lit venues (e.g., [Bessembinder and Kaufman \(1997\)](#); [Hatheway, Kwan, and Zheng \(2017\)](#); [Eaton, Green, Roseman, and Wu \(2022\)](#)). Therefore, retail-specific mechanisms separating the retail flow might not deliver the best execution prices since they use lit venues as the reference markets to set execution prices.

Payment for order flow. PFOF is also a potential source of conflict of interest. It can motivate brokers to route retail orders to a trading platform offering PFOF or the one with the highest PFOF rather than to a trading mechanism facilitating best execution. The market makers of German regional exchanges running the Single Market Maker mechanism, discussed in Section 2.1, usually make payments to retail brokers to attract their retail orders.

PFOF is not a new concept in equity trading and dates back to 1988. However, the introduction of low/zero-commission brokers combined with an increase in retail trading has intensified the popularity of PFOF significantly in the last several years. In some instances, zero commission trading is only possible due to PFOF revenues. Therefore, it is important to understand the association between PFOF and execution quality. Proponents of PFOF argue that it results in price improvement for retail orders, hence execution at prices better than those on the reference market (e.g., [Cifu \(2022\)](#); [Ernst and Spatt \(2022\)](#)). Its opponents, on the contrary, claim that PFOF creates a conflict of interest, motivating brokers to focus on the payment in the PFOF agreement rather than the clients' best execution (e.g., [Gensler \(2022\)](#); [Levy \(2022\)](#)).

PFOF is a common practice for retail brokers in the U.S. market. It has received significant regulatory attention following the growth of retail activity. We provide a brief overview of the link between PFOF and execution quality in the U.S. context in the blue box labeled "[Retail execution quality in the U.S. market](#)". Although the market structure context is very different, PFOF has also started to receive attention in Europe. European markets operate under the uniform regulatory framework of MiFID II, but Europe encompasses countries with different regulatory and supervisory authorities. As a result, there are divergent views about PFOF and the need to regulate it across different European jurisdictions. For example, it is supported by the German regulatory authority ([The Federal Financial Supervisory Authority \(2022\)](#)), while the U.K. Financial Conduct Authority stated that PFOF is unlikely to be compatible with the requirements for best execution, and PFOF is effectively banned in the U.K.

Retail execution quality in the U.S. market

PFOF is a common practice for retail brokers in the U.S. market. Some retail brokers, especially low/zero-commission brokers, enter into a PFOF agreement with wholesalers to sell their retail flow to them for execution. In the agreement, brokers ask wholesalers to provide price improvement relative to the National Best Bid and Offer (NBBO) when executing retail orders to fulfill their best execution obligation. Robinhood is the first zero-commission broker launched in 2015 in the U.S. market, relying extensively on PFOF as a source of revenue. Following Robinhood, some U.S. brokers, including TD. Ameritrade, E*Trade, and Fidelity eliminated their commission fees in late 2019.

The association between execution quality and PFOF in the U.S. market is inconclusive. [Schwarz, Barber, Huang, Jorion, and Odean \(2022\)](#) conduct a trading experiment to examine retail execution quality. They submit identical orders (orders of the same size and stocks) simultaneously to the five major retail brokers ranging from brokers with/without commission fees and brokers with/without a PFOF policy. The authors document that execution prices vary significantly across brokers and that PFOF does not explain the price differences. Along the same lines, [Levy \(2022\)](#) also conducts a trading experiment to investigate the retail execution quality of two major U.S. zero-commission brokers (Robinhood and TD. Ameritrade).

The significant rise in the popularity of PFOF has raised concerns among regulators and some market operators about its impact on execution quality. In response to the concerns, in July 2021, European Securities and Markets Authority (ESMA) issued a [public statement](#) highlighting critical points of MiFID II best execution rule. It also stated that PFOF raises significant concerns about investor protection. However, PFOF or obtaining the retail flow for execution can happen in various forms without any payment being involved. Specifically, any bilateral agreement between market makers and brokers for routing retail orders that benefits brokers is a potential source of conflict of interest and might impair execution quality. For instance, zero-cost trading or post-trade fee discounts offered by market makers is another way of obtaining retail flow without paying retail brokers. Post-trade fee discounts

The author finds that orders of a zero-commission broker accepting a higher payment (i.e., Robinhood) receive negligible price improvement compared to the broker with a lower amount in the PFOF agreement.^a

In response to concerns about the impact of PFOF and retail order segmentation on execution quality, in December 2022, the SEC approved four major reforms relating to retail trading market structure. If implemented and adopted, these reforms will transform the process for executing retail order flow. The proposals will (i) reduce tick sizes; (ii) improve retail order routing and execution disclosures; (iii) establishes an SEC-level best execution rule which is more prescriptive than the existing FINRA rule; and (iv) require orders to be exposed to be executed at mid-point or better or exposed to fair-access auctions before they can be internalised ([Securities and Exchange Commission \(2022\)](#)). While the proposals do not ban PFOF they will make it substantially more difficult and less profitable for wholesalers to internalise retail order flow. These proposals are open for comment until 31 March 2023 and are likely to face significant opposition. Therefore it will be some time before US market structure is resolved.

^a [Ernst and Spatt \(2022\)](#) examines the execution price of retail trades in the U.S. market by identifying retail trades based on the methodology of [Boehmer, Jones, Zhang, and Zhang \(2021\)](#). The authors show that retail traders enjoy, on average, a price improvement of five basis points relative to the NBBO.

refer to situations where a third party (e.g., a market maker) offers brokers to cover post-trading costs (i.e., trading fees, clearing, and settlement costs) in exchange for brokers' retail orders ([Optiver \(2022\)](#)).

Although direct monetary PFOF has attracted the most attention, other forms of PFOF are also important. MiFID II best execution rule emphasises that brokers should not receive "any remuneration, discount, or non-monetary benefit for routing client orders to a particular trading venue or execution venue which would infringe the requirements on conflicts of interest" (MiFID II Article 27 (2)). As a result, in November 2021, the European Commission (EC), as a part of its 2021 Capital Markets Union, proposed a ban on the practice of PFOF in European markets. The proposal prohibits brokers from receiving any fee or non-monetary benefits from a third party in exchange for routing clients' orders.

Understanding of the level of PFOF activities and their association with execution quality in European markets is limited. Unlike the U.S. market, in Europe, there are inadequate obligations for brokers to disclose their order routing practices. This prevents us from knowing how often brokers engage in PFOF practice and the magnitude of the payments.⁷ Nevertheless, some European regulatory authorities have examined the impact of PFOF on execution quality. [The Netherland Authority for Financial Market \(2022\)](#) examines the implicit cost (trade price) of retail trades in Dutch stocks executed on two PFOF venues and a non-PFOF venue during the first quarter of 2021. They use a method based on post-trade data to identify their reference price for comparison.⁸ The authors document that most retail trades on PFOF venues are executed at worse prices than the reference price (67% of trades executed on PFOF venue one and 81% of trades executed on PFOF venue two). In contrast, most of the retail trades on the non-PFOF venue received prices similar to the reference price (74%). Along the same lines, [The National Securities Market Commission \(2022\)](#) addresses implicit costs for retail clients of one prominent broker on one PFOF venue trading Spanish stocks. Following the method proposed by [The Netherland Authority for Financial Market \(2022\)](#), the authors find that 86% (3%) of retail clients' trades face worse (better) execution prices than trades executed on the most liquid trading venues.

Following the same method, [The Federal Financial Supervisory Authority \(2022\)](#) examines retail execution quality on PFOF venues for German stocks. The authors show that PFOF venues offer better execution quality than the most liquid venues for small trades (trades up to €2,000 for DAX and €5,000 for non-DAX stocks). They show that, for a trade size of €2,000, PFOF venues provide price improvement of 3.76 basis points. Since trading venues charge a fee based on order size, brokers might prefer to avoid paying the trading fee for small orders. As a result, they argue that evaluating execution quality for different trade sizes is essential. They document that the price improvement provided by PFOF venues decreases with trade size, and trades with the size of €25,000 experience price deterioration of 0.30 basis points relative to the reference price.

Evaluating execution quality is complex. Since Europe defines best execution based on total consideration, various factors, including trade price, explicit costs, and brokers' commissions, should be accommodated in the execution quality evaluation. However, such evaluation is challenging because it requires detailed data from venues and brokers. Employing a sound method is also essential to assess trade execution. The three studies discussed above consider post-trade data and compare retail trade prices with those on the most liquid venues executed in the same second. This method removes a portion of trades from the analysis since it only evaluates execution quality when the market is liquid. In addition, the studied PFOF venues all operate the Single Market Maker mechanism. Therefore, the worse execution obtained in the studies by Dutch and Spanish regulators may be due to the absence of a competitive trading environment and not just PFOF.

That said, all forms of PFOF potentially create conflicts of interest, result in order flow segmentation, and reduce price competition for retail orders. Therefore, given the regulatory evidence on the significant impact of price competition on execution price, the European Commission's proposal on banning monetary and non-monetary PFOF is likely a necessary step toward improving retail execution quality in Europe. In the absence of a ban, additional regulatory disclosures are essential for further evaluation of the impact of PFOF.

⁷ In contrast, in the U.S. market, Rule 606 requires disclosures about PFOF. For example, we know from these disclosures that Robinhood and TD Ameritrade received more than USD 2.2 billion from wholesalers for equity order flow as a part of their PFOF agreements in 2021.

⁸ They use the ten most liquid trading venues for Dutch stocks and compare retail trade prices to trade prices in the same second on these ten venues.

4. Further research and policy recommendations

This paper provides an overview of European retail-specific trading mechanisms, their features, differences, and their strengths and weaknesses. However, a comprehensive assessment of each mechanism is required to understand the association between each retail mechanism with execution quality. Such evaluation is challenging for researchers, regulators, and market participants. Achieving best execution quality for retail traders is based on total consideration (all costs a retail trader incurs, including the broker's commission fee). Hence, analyzing retail execution quality requires access to granular data providing detailed information about each execution. The assessment is also tricky due to poor data disclosures. Despite the imposed regulatory public disclosures, there still needs to be more sufficient information about the path of an order from submission to a broker until execution. For example, upon receiving an order, the broker might act only as a recipient and transmit the order to another trading desk for execution. In this case, information about the trading desk's actions for execution is needed. However, there is no public access to such information.

That said, even without any empirical research on retail trading in Europe, there are some areas where regulatory policies can be improved to help enhance our understanding of retail trading. Two crucial areas are related to public disclosures and reference prices.

Regulatory public disclosure. Transparency regarding order executions in the form of public disclosure is an essential element that helps regulators and market participants to assess execution quality. Foremost, public disclosures need to be easy to aggregate in a way that third parties, including regulators, can use them to make judgments about execution quality and to initiate/amend regulatory policies. They must be easy to interpret so that non-professional traders (i.e., retail traders) can easily evaluate the quality of their executions. Such assessments cannot rely on retail traders doing extensive work to interpret the disclosures. In addition, public reports must provide meaningful and necessary information about execution quality and refrain from filling the reports with redundant and non-practical data. This way, public disclosures can give a complete and clear picture of how different trading platforms and brokers execute orders.

In Europe, under MiFID II best execution rule, ESMA initiated two regulatory public disclosure reports, RTS 27 and RTS 28, for trading platforms and brokers, respectively. These reports were created to allow market participants to assess and compare the quality of executions across various trading platforms (RTS 27) and across different brokers (RTS 28). RTS 27 requires trading platforms (Regulated Markets, MTFs, and SIs) to provide a quarterly report containing relevant data regarding the quality of executions on their platforms. RTS 28 demands that brokers provide yearly information about their execution efforts on their five top trading platforms in terms of the trading volume.

However, since their introduction, RTS 27 and 28, particularly RTS 27, have rarely been used. This is because their contents have not provided meaningful information for the public, traders, and brokers to judge the quality of executions ([European Securities and Markets Authority \(2021\)](#)).⁹ As a result, in Europe, RTS 27 was suspended for two years, effective from February 27, 2021. Later, the European Commission proposed abolishing RTS 27 permanently in its MiFID II review package. The U.K. also permanently removed RTS 27 and 28, effective from December 1, 2021. In its proposal, the European Commission argues that the future European consolidated tape will be a substitute for RTS 27 reports. However, the consolidated tape will only help traders to identify which trading platform offers better prices, while more data analytics are needed to give a complete picture of execution quality.

Improving RTS 27 instead of removing it by requiring trading platforms to provide uniform metrics about execution quality will benefit traders beyond the consolidated tape. Adopting regulatory disclosures similar to those in the U.S. market (i.e., Rule 605) would be an excellent start for European regulators to increase transparency and to help traders and the public make a judgment about execution quality on different trading platforms. Rule 605 requires market centers (i.e., trading platforms) to provide statistical measures about order execution quality monthly. The measures should include, but not be limited to, information about the spread paid by traders and how different order sizes are executed relative to National Best Bid and Offer. In addition, the SEC recently proposed to make [changes](#) to Rule 605 to further enhance these public disclosures.¹⁰

⁹ Reports contained extensive data not necessarily informative about execution quality rather than having key factors such as direct and indirect costs to help brokers and traders assess executions ([European Securities and Markets Authority \(2021\)](#)). Lack of consistency in reporting across venues has also been an important issue. For instance, some trading venues would provide one report file per day, while others would publish one file for the whole month. This made it difficult for market participants to interpret and compare the information across venues easily. Easy accessibility of reports has also been another issue since, for example, some venues would provide reports upon request ([European Securities and Markets Authority \(2021\)](#)).

¹⁰ Expanding the scope of entities producing 605 reports and requiring more relevant execution quality information and statistics about "covered orders" are among the proposed changes.

Under RTS 28, brokers must provide, for each security class, the proportion of traded volume, number of trades, passive orders, aggressive orders, and directed orders on each of the five trading platforms as a percentage of the total in that class. In addition, brokers should provide information on execution quality, including a list of factors they prioritised to achieve best execution on these five platforms. Due to the issues related to RTS 28, ESMA initiated a consultation paper discussing ways to improve this report. In its final report, ESMA proposed to extend the reporting requirements to investment firms “providing the service of reception and transmission of orders and to portfolio managers that transmit their decisions to deal to other firms for execution” ([European Securities and Markets Authority \(2022\)](#)). ESMA also proposed to remove the requirement to report the percentage of executed passive and active orders. To make RTS 28 more user-friendly, ESMA proposed to require brokers to publish the report in CSV format.

Although the initiation of RTS 28 and ESMA's proposals for improvements have been necessary to increase public disclosure about execution quality, a higher level of transparency is needed. RTS 28 provides some information about executions on the brokers' frequently used platforms, but the report needs to be fully informative about brokers' routing practices. The report must contain complete information regarding any potential conflict of interest (e.g., post-trade cost discounts) involved in the transactions executed on any trading platform. In the absence of a ban on PFOF this should also include disclosures on PFOF. In addition, RTS 28 should extend reporting obligations to all trading platforms used by brokers, not just the top five. This is necessary because brokers' potential conflicts of interest might fall outside the top five platforms.

The U.S. regulatory public disclosure for brokers, Rule 606, can also be a good example for Europe to improve the current RTS 28. Rule 606 requires brokers to publish a quarterly report to disclose their order routing practices on each trading platform. Specifically, brokers must disclose the broker's net money received/paid for executions for each order type (market order, marketable limit order, non-marketable limit order, and other orders), expressed in total dollars and price per share on each trading platform.

They must also disclose any profit-sharing relationship that might affect the broker's routing decisions. RTS 28 can be improved by including the level of price improvement (for example, the average price improvement) when brokers engage in a practice subject to conflict of interest. Brokers in the U.S. do not need to disclose the level of price improvements under Rule 606, but many brokers provide such information on their websites. Traders, particularly retail traders, can also benefit from a more frequent publication of RTS 28. A more frequent publication of RTS 28 allows traders to evaluate their execution quality frequently and make decisions accordingly.

Reference price. Brokers and trading platforms, including retail-specific mechanisms mentioned in Section 2.1, typically use the primary exchange as a reference market to evaluate the quality of execution prices. However, price evaluation requires a harmonised and reliable reference price, such as EBBO, representing the best bid and ask prices across all European lit venues. In the U.S. market, the consolidated tape provides market participants with an essential tool to ensure higher reliability for best execution. Specifically, the National Best Bid and Offer – the best bid and ask prices across all public venues – is an easily accessible reference that can be used to evaluate execution prices.

In contrast to the U.S. market, Europe has yet to adopt a consolidated tape. Adopting a consolidated tape would benefit traders, particularly retail traders, by providing tools to evaluate their execution quality. For instance, a real-time consolidated tape that provides all quotes at the time of each trade can help traders identify venues offering the best prices (e.g., EBBO) and check whether their brokers route their orders to these venues. It helps traders to assess their execution against the EBBO instead of the best quotes of the primary exchange ([Comerton-Forde \(2021\)](#)). Although such execution quality assessment is not practical on an order-by-order level, it can still provide meaningful information on the aggregate level. Specifically, if a broker systematically executes its client's orders outside EBBO, it is unlikely to achieve best execution ([Comerton-Forde \(2021\)](#)).

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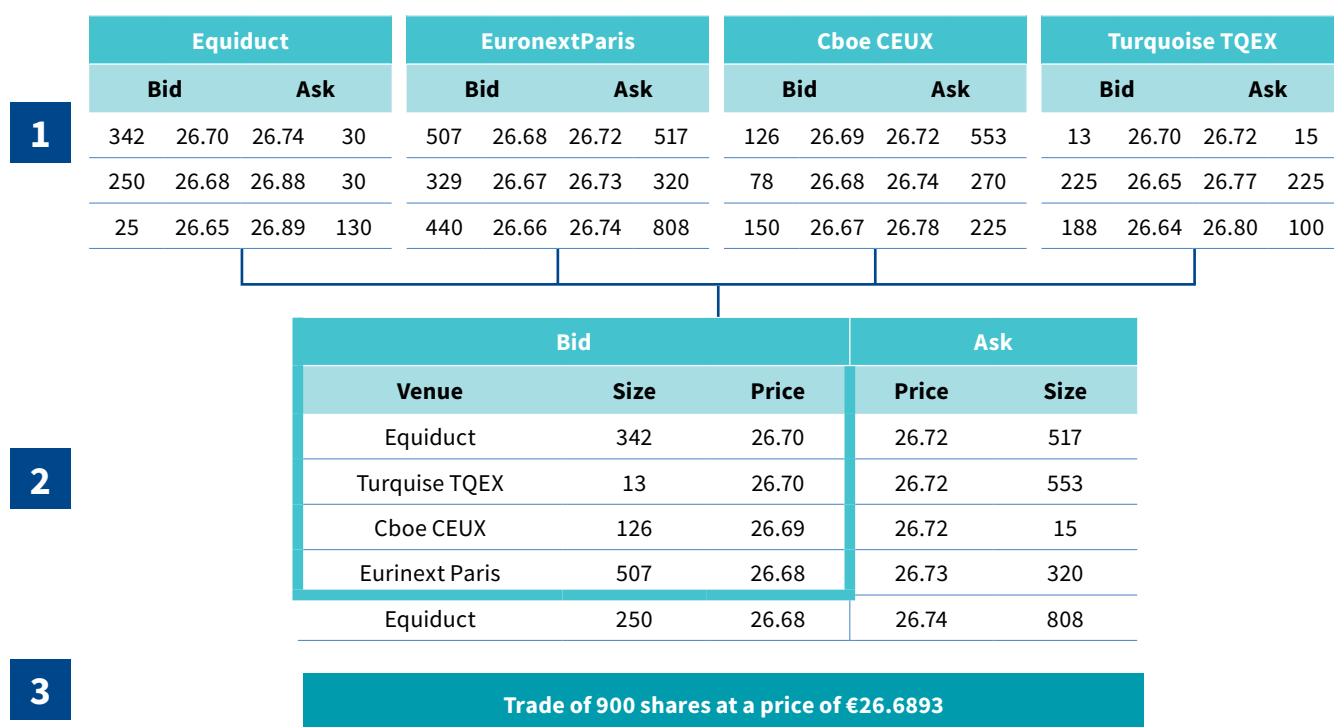
Appendix A

Figures

Fig. A1. Retail trading on Equiduct Apex for a French stock:

The figure provides an example of the price setting process on Equiduct Apex using the French stock Vallourec. The price is set based on the Volume-weighted Best Bid and Offer obtained from a consolidated order book constructed from the reference markets at the instance Equiduct receives the retail order. The best prices on the reference market for this stock at its arrival time belong to Equiduct limit order book, Turquoise Europe, Cboe Europe, and Euronext Paris.

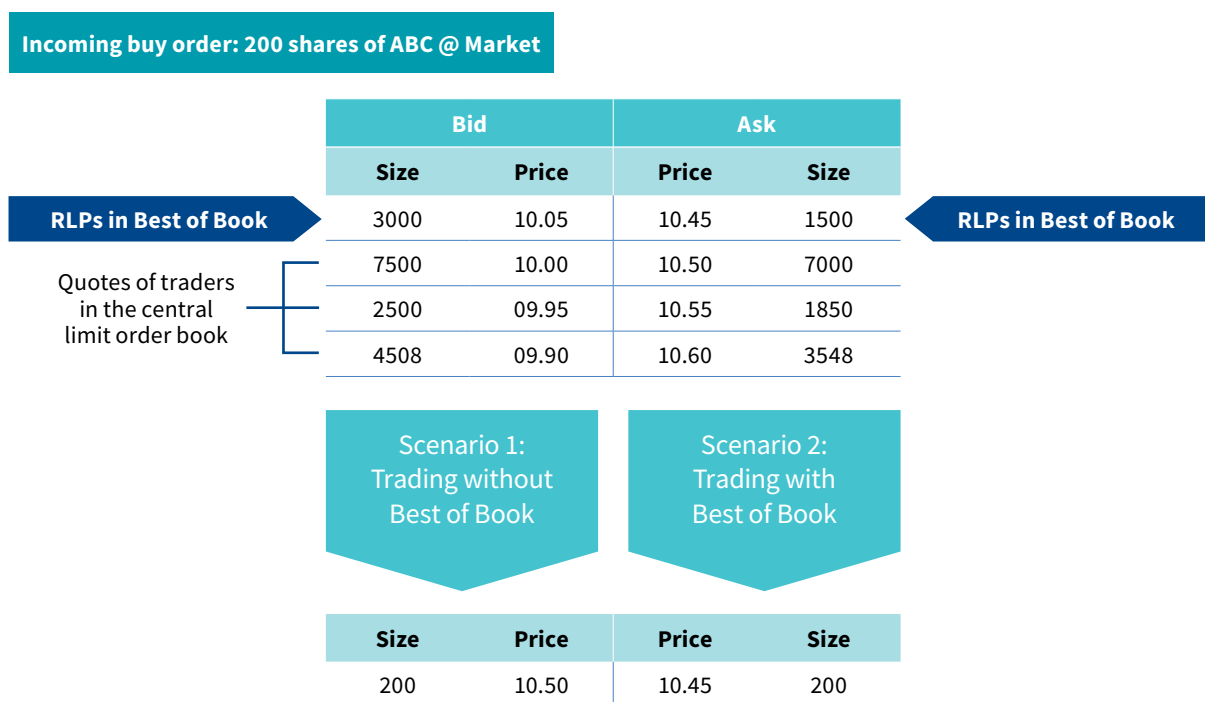
Incoming market order for 900 shares of Vallourec



Source: Equiduct (2019)

Fig. A2. Retail trading on Euronext Best of Book for a French stock:

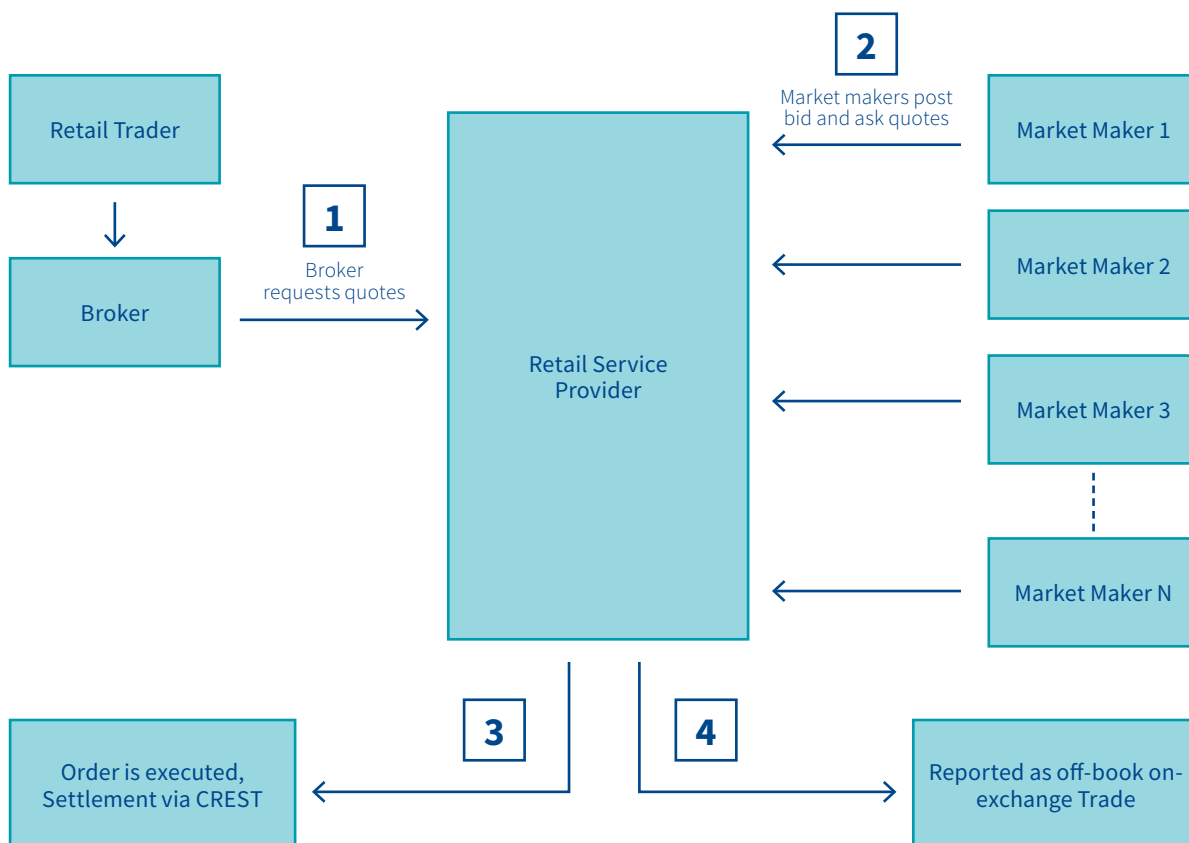
The figure provides an example of the price setting process on Euronext Best of Book for the French stock ABC. The price is set based on the price competition between market makers in the Retail Liquidity Provider (RLP) program of Best of Book and liquidity-providing orders in the Euronext central limit order book.



Source: [Euronext \(2020a\)](#)

Fig. A3. Retail trading on the Retail Service Provider system:

The figure depicts the trading process of the Retail Service Provider from order submission to execution.



Source: APCIMS (2013)

Appendix B

Identifying retail trades

We use trade qualifiers in the Refinitiv Tick History (RTH) database to extract retail trades for our sample stocks on each mechanism.

Equiduct Apex: In the RTH database, trade qualifiers containing the following flags are identified as trades executed at VBBO on Equiduct.

B[LSTSALCOND]: It represents a buyer-initiated trade executed at VBBO.

S[LSTSALCOND]: It represents a seller-initiated trade executed at VBBO.

Euronext Best of Book. Trades executed on Euronext Best of Book are reported on the same data feed as trades executed on Euronext central limit order book. Trade qualifiers containing the following flags are retail trades executed on Euronext Best of Book.

20[LSTSALCOND]

R[TRD IND 1]

R[ACT FLAG1]

Retail Service Provider. RSP trades are reported as off-book on-exchange trades. To identify RSP trades in FTSE 100, we first extract all off-book on-exchange trades reported to the London Stock Exchange, where almost all RSP trades are reported. Trades whose Market Model Topology (MMT) classification in the trade qualifier field is 4 and 5 in the first and the second character's position, respectively, are identified as off-book on-exchange trades. Off-book on-exchange trades whose trade qualifiers contain R[ACT FLAG1] are retail trades.

Tradegate. We do not need a specific flag to identify retail trades on Tradegate.



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