



Fragmentation, price formation and liquidity of Spanish equities in a European context

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Working paper
No. 87



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December 2024

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ISSN (digital edition): 1989-8711

Layout: Cálamo y Cran

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Abstract

This article examines the evolution of trading fragmentation in Spanish equities over recent years, alongside the price formation process across various trading venues and the associated liquidity conditions. Most of the indicators and metrics used in this study, derived from the BMLL database,¹ are also presented for five other European countries and the United States to enable meaningful comparisons. This study, which partly builds on a previous CNMV study on the evolution of trading fragmentation published several years ago,² aims to explore the changes that may have occurred in trading structures and price formation since the introduction of MiFID I and II regulations. The added value of this study, compared to previous work by the CNMV and other institutions, besides providing evidence for the most recent period (2018-Jun.-2024), lies in two main areas: i) combining the analysis of trading fragmentation with important metrics on price formation and the liquidity of trading venues and ii) extending the scope of the analysis to include six significant European economies and the United States. The key findings of this study are as follows:

- **The fragmentation of equity trading in Europe – defined as the relocation of trading activities to venues other than the stock’s home market – has persisted over the period analysed. However, it appears to have eased in recent quarters, particularly concerning on-book trading.³ BME has not escaped this trend. Although it joined the process later than other European exchanges, likely due, among other factors, to specific characteristics of the securities clearing, settlement, and registration system, its development mirrors that of other European exchanges.**
- **There is a significant difference in the market shares of the home markets depending on whether the calculation is based solely on on-book trading or on total market trading.⁴ Total trading includes, in addition to on-book transactions (lit trading), block trading (and applications) and all trades conducted under various transparency waivers such as NTW (Negotiated Trade Waiver), RPW (Reference Price Waiver), LIS (Large in Scale), or within dark pools. This aggregate trading is referred to as off-book trading. The market shares of home trading venues are much higher for on-book trading than for total market trading. During the period analysed, these percentages in on-book trading have decreased, although less sharply in recent quarters, as noted earlier. In the first half of 2024, market shares ranged from 63% for the Spanish home venue, BME, to 71% for the German one. In France and**

1 Data was sourced from BMLL Technologies using their Vantage application.

2 See Gil de Blas, C., González Redondo, J., and López Blanco, E. (2017). “Trading of Spanish equity securities on other European platforms”. *CNMV Bulletin*. July, pp. 31–59. Available at: https://www.cnmv.es/DocPortal/Publicaciones/Boletin/Bulletin_July_2017en.PDF

3 Includes auctions.

4 See diagram in Annex A.1 on the structure of market trading.

the Netherlands, the on-book market share is estimated at 65%, while Italy stands out with a market share exceeding 75% for most metrics. However, when considering total market trading, these shares have also been declining, with signs of stabilisation appearing more clearly only in Spain and Germany. They range from 38% in France to 56% in Italy. At BME, the market share was 44% (down from 62% in 2018), around which it has fluctuated, with some ups and downs, since mid-2022.⁵

- **The changes in trading volumes have varied across European jurisdictions during the period analysed.** Spain has seen declines, while France and Germany have experienced more stability, and Italy, the Netherlands, and the United Kingdom have shown gains. This situation contrasts sharply with the United States, where trading volumes have grown by nearly 50% since 2018.
- **The structure of total trading, both market and non-market, and within these areas between on-book/off-book for the former and over-the-counter (OTC)/systematic internaliser for the latter, reveals some common trends across countries, along with certain differences.** In relative terms, market trading is the most significant for all the EU countries analysed, with proportions ranging from 60-70%, except for Italy, which exceeds 90%. For Spain, this proportion has hovered around 70% in nearly every quarter, though this trend has not been as pronounced as in other countries. Within off-market trading, there has been a decrease in the relative importance of trading via systematic internalisers, alongside an increase in pure OTC trading. Several factors may explain this trend, including reporting errors in identifying these types of transactions and some changes in the market structure among traders. Despite the reasons for this shift, it is clear that the anticipated movement from OTC trading to environments governed by market rules has not taken place.
- **Price formation indicators⁶ show that home markets play the most significant role in price setting.** More than 40% of the instances where prices are improved⁷ occur in these home markets, with percentages rising to nearly 60% or more in certain cases, such as in France and Italy. In Spain, BME improves market prices almost 50% of the time on average over the period. Besides the significant proportion of instances where these venues lead the price formation process, there has been an increase in this share since the end of 2022, with further intensification by mid-2024. As of the most recent data, these proportions ranged from 55% in the United Kingdom to 68% in Italy, with Spain at 57%. All these venues also hold a more favourable position in terms of liquidity (in euros) around the best prices, often several times higher than the next largest venue. In the case of Spain, BME's liquidity around the best prices is three times greater than that of CBOE, or even more in certain quarters.

5 The market shares of home trading venues decrease to 25-30% in most cases when off-market trading is included, such as trading by systematic internalisers and purely OTC transactions. These figures should be interpreted with caution, as OTC data, which has been compared across different sources, tends to be of lower quality due to reporting issues and, in some cases, data duplication.

6 The price formation and liquidity metrics consider only trades executed within the order books, i.e., on-book transactions.

7 "Price improvement" is defined as a situation where an investor's buy or sell order is executed at a better price than the available market ask or bid at that moment.

- **Other metrics related to price formation and market liquidity indicate a more balanced situation between the home venues and CBOE, which is their main competitor.** Among these metrics are worth noting those that assess the percentage of time a trading venue displays better prices, whether exclusively or not. In both cases, it is observed that home trading venues show better prices for a similar proportion of time as CBOE, generally speaking. This means that competitor venues, particularly CBOE, have been able to offer competitive market prices for extended periods, even if they do not play a leading role in setting those prices – they tend to follow the prices set by the home markets.
- **The examination of fragmentation, price formation, and liquidity in the United States reveals similarities with European countries, but also some differences.** Firstly, trading fragmentation in the United States is just as high as in Europe, indicating that a high degree of fragmentation is not necessarily an indicator of poorer market performance. Secondly, the significance of OTC trading in the United States is equal to or greater than that in European countries, suggesting that the percentages seen in Europe are not unique to the region. However, a notable difference is observed in market trading practices; in the United States, trading is almost entirely on-book, with off-book trading being minimal. In terms of price formation and liquidity, Nasdaq leads across all assessed metrics, followed by the NYSE.
- **In conclusion, the analysis highlights the following findings:** i) the shift of Spanish securities trading to other venues is neither an isolated phenomenon nor more pronounced in Spain than in other European economies; ii) there appears to be a recent slowdown in this process; iii) on-market, off-book trading has gained relative importance in Europe; iv) there is no significant movement of OTC trading towards venues governed by non-discretionary rules; v) home venues continue to dominate the market price formation process, although the percentage of time that they and some competitors offer better prices is similar.
- **In light of the main findings of the study, it would be worthwhile to reflect on elements such as the competitiveness of European markets compared to others and the competitive conditions among trading venues within the European Union.** It might also be relevant to consider the high proportion of off-market trading and the suitability of the composition of on-book and off-book trading, as these are key factors in the price formation process.

1 Introduction

In recent years, the development of European securities markets has been shaped by the conditions set out in the MiFID (I and II) regulations, as well as the European Union's initiative towards a Capital Markets Union. MiFID I brought significant changes to European markets by introducing relevant elements such as, for example, the promotion of competition among trading venues, which facilitated the entry of new participants like multilateral trading facilities (MTFs) and systematic internalisers (SI).⁸ Building on MiFID I, MiFID II placed a stronger emphasis on investor protection and financial stability, extending transparency and competition measures to non-equity markets. The regulations aimed to shift securities trading from being predominantly OTC to venues governed by non-discretionary rules.

In recent years, there has been a growing argument that the MiFID regulations have resulted in the fragmentation of securities trading, which may, in turn, have negatively impacted liquidity. It is also suggested that home markets still retain the ability to set prices, while other venues tend to follow rather than lead in price formation.

This paper has two main objectives: first, it follows up on the article published in the *CNMV Bulletin* in the second quarter of 2017, analysing the fragmentation of Spanish equity trading to determine whether the trends identified in that study have persisted in recent years. Second, it provides metrics on equity price formation and liquidity to evaluate these issues further.

The study published in 2017 highlighted the significant fragmentation of equity trading brought about by the introduction of MiFID, shifting transactions to venues other than the regulated markets of origin where securities are listed. It also noted the increasing prevalence of trading in less transparent systems, such as the dark segments of regulated markets, MTFs, and OTC trading. This trend was evident in Spanish markets as well, albeit with some delay compared to other European markets. This delay was likely due, in part, to specific characteristics of the securities clearing, settlement, and registration systems.⁹ The study attributed this fragmentation to several factors, including potential disadvantages in the fee structures of the home regulated markets, as well as the ease of trading through dark segments and the use of execution venues as a single access point to major European execution venues.

⁸ MiFID II later introduced a new type of participant, the organised trading facility (OTF).

⁹ Until the end of April 2016, the Spanish securities clearing, settlement, and registration system posed a cost disadvantage for institutional investors and intermediaries with European investment strategies when compared to other countries. After that time, the system began to operate in a manner similar to other European markets.

In the specific area of price formation, two analyses present differing perspectives: one by CBOE on French stocks¹⁰ and another by Euronext¹¹ on Italian stocks. The CBOE analysis argues that CBOE Europe has become a leader in price formation and liquidity for European stocks. This conclusion is based on an evaluation of indicators for a selection of French stocks between 2021 and March 2023. These indicators include the proportion of time that CBOE offers superior bid and ask prices, the likelihood of an order being filled and executed within a certain timeframe, and the proportion of cancelled orders. The Euronext study, conducted on FTSE MIB shares between January and September 2023, concludes that Borsa Italiana's migration to the Euronext Optiq® system¹² has significantly improved the quality of this trading venue. It has become a leader in both price formation and liquidity compared to other venues. These improvements have led to a substantial increase in its market share in lit trading (continuous market and auctions), reaching 80%. However, drawing clear conclusions about the issues this paper aims to analyse is challenging, as most of the indicators used in these studies largely differ.

This study, based on data from the BMLL database, seeks to address some of the limitations of earlier research. Firstly, it spans a longer period, from 2018 to June 2024, thus covering the entire duration of MiFID II. Secondly, while the focus is on Spanish equities, comparisons are made with other countries for most of the metrics. Lastly, the study includes the widest possible range of indicators, particularly in the areas of price formation and liquidity, to enhance the analysis. The article is organised into two main sections: the first deals with the trading of Spanish equities by type and venue, and the second examines the price formation process across different trading venues, alongside various liquidity indicators. The article concludes with the findings.

10 The TRADE (2023). "Cboe Europe now the leading exchange for European equities liquidity and price formation".

11 Euronext (2023). "Equity trading 'Made in Italy': From migration to price formation".

12 Euronext (2023). "Optiq: technology solutions for exchanges and venue operators".

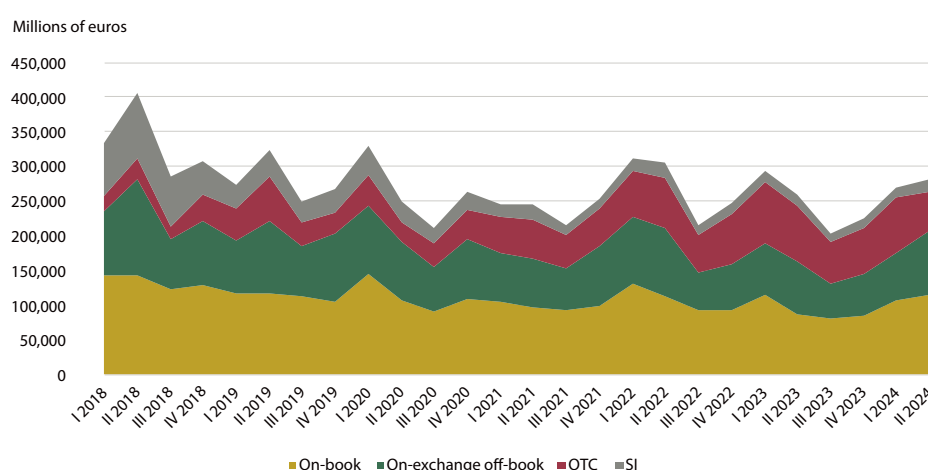
2 Analysis of trading fragmentation

This study begins by examining the absolute value of Spanish equity trading over the most recent period. As illustrated in Figure 1, there has been a declining trend over several years, although with some irregularities. The volumes depicted in this figure encompass all types of trading, including OTC trading, to provide the broadest possible aggregate before delving into specific segments. The irregularities in the data can potentially be explained by two factors: i) the inherent seasonality of the trading series, which typically sees declines in the third quarter, and ii) the temporary surges often observed during periods of market turbulence, characterised by increased volatility, reduced liquidity, falling prices, and rising trading volumes. The figure highlights the spikes in trading volumes during the early stages of the pandemic (Q1 2020), Russia's invasion of Ukraine (first half of 2022), and the issues faced by certain US and European banks (Q1 2023).

The downward trend in trading volumes is not consistent across different European economies (see Figure A.1.4 in Annex A.1) and stands in contrast to the sharp increase observed in other jurisdictions. This decline may be attributed to various factors, which could indicate that equity assets have become somewhat less appealing compared to other financial and non-financial assets, equities in non-European jurisdictions, or possibly due to purely idiosyncratic reasons.

Trading of Spanish shares by type of transaction

FIGURE 1



Source: BMLL and CNMV.

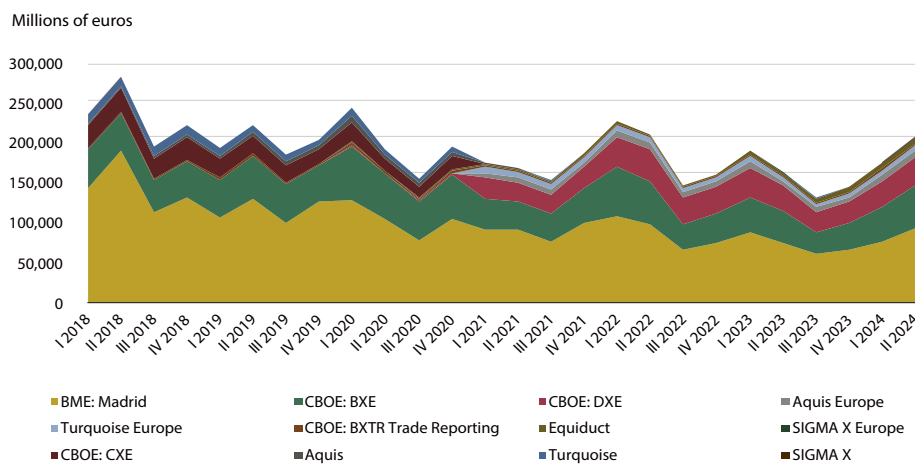
2.1 Analysis by trading venue

2.1.1 On-exchange trading

This section examines the overall trading of Spanish shares in the markets (see Figure 2), divided into on-book and off-book trading.¹³ On-book trading is where the initial asset price formation occurs through the matching of the buy and sell orders received. In contrast, off-book trading involves certain types of transactions, such as block or application trades, executed under pre-transparency waivers allowed by MiFID regulations.

Market trading of Spanish equities by trading venue

FIGURE 2



Source: BMLL and CNMV.

Whether the analysis focuses on purely on-book trading or total market trading, it is clear that the implementation of MiFID and MiFID II has brought significant changes to the structure of financial markets across Europe. There has been a general trend towards the delocalisation of equity trading away from the main regulated markets of origin to other MTFs. Consequently, the market share of these home venues has declined sharply in recent years. In Spain, BME, which, as noted earlier, adopted this trend somewhat later due to specific national factors, now shows figures comparable to those of other leading European countries. However, the relative importance of the markets of origin varies significantly depending on whether only on-book trading is considered – where these markets remain stronger – or whether off-book trading is included, where competing venues are more dynamic.

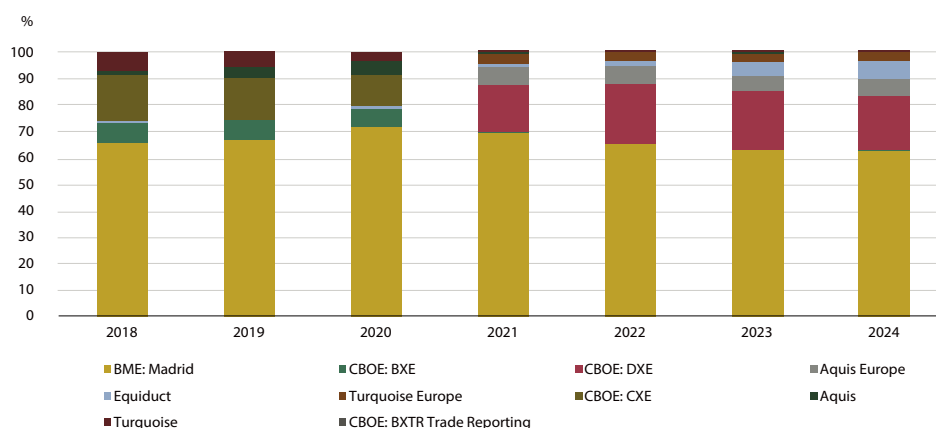
Figure 3 illustrates the distribution of book trading in Spanish equities among the most significant trading venues since 2018. It is evident that BME holds by far the largest share, ranging between 60% and 70% during the period under consideration (62.9% in the first half of 2024). There was a slight increase in this share in the initial years, followed by a minor decrease, which has since stabilised in the most recent period. Overall, the figures confirm the strength of the Spanish

13 Off-book trading encompasses all transactions outside the order book but still within a trading venue. This includes trading that meets pre-trade transparency requirements, as well as those conducted under LIS, NTW, and RPW transparency waivers.

trading venue in this area, as the variations have been minimal over a relatively long timeframe. Figure 4 displays BME's market share alongside those of other European home markets, highlighting several interesting trends: i) all European home trading venues exhibit high market shares in book trading, with percentages ranging from approximately 60% to 80% over the sample period; ii) a downward trend in market share was observed in all of them until the second half of 2022, after which there was stabilisation, and even an increase in certain countries; iii) BME follows this European trend, with a market share comparable to that of France and the Netherlands; and iv) Italy stands out for having the highest market share among the countries analysed, a trend also reflected in other indicators.

Market share by trading venue (on-book trading)

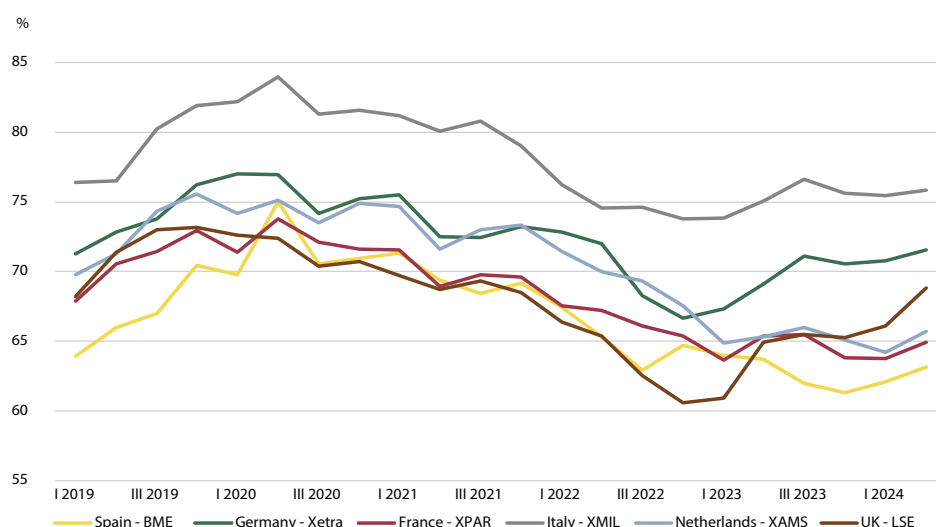
FIGURE 3



Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

Market share of home markets in European countries (on-book trading)

FIGURE 4



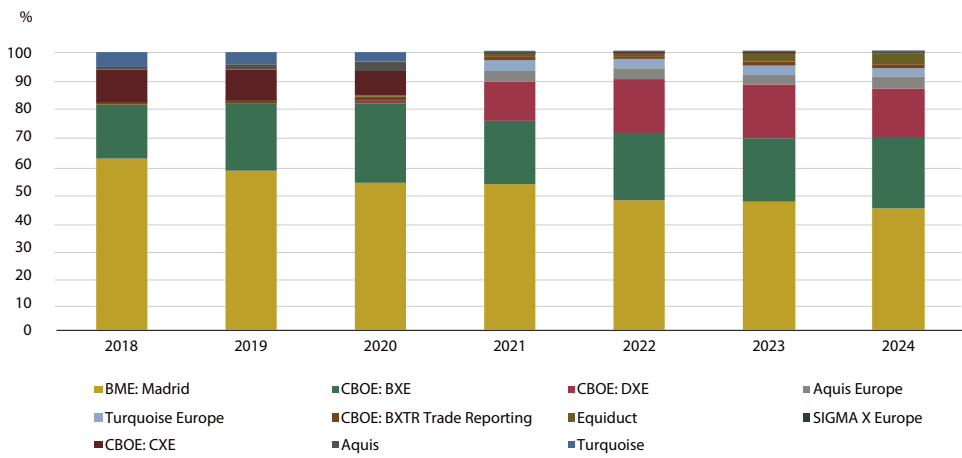
Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

When off-book market trading is factored into the analysis, the prominence of the originating venues notably declines, due to the strength of competing venues in this off-book mode. In the case of BME (see Figure 5), its market share decreased from 62% in 2018 to 44% in the first half of 2024, although this downward trend seems to have slowed over the past two years. In contrast, other trading venues have been emerging, notably CBOE,¹⁴ which, with slightly less prominence than BME (around 40% of the total on-exchange), has become BME’s main competitor, as well as a key player among other European trading venues.

CBOE experiences substantial trading volumes in off-book/on-exchange transactions, meaning trades that occur outside a market’s order book system. This type of trading typically involves high transaction volumes and is driven by institutional investors. The strength of CBOE in this area can be attributed to its competitive fees and its extensive range of tradable assets, both in terms of asset variety and geographical coverage. This appeal may stimulate activity from large institutional investors who typically build highly diversified asset portfolios.

In addition, the increasing significance of other trading venues is notable. While they currently hold relatively small market shares, they are expanding steadily. Equiduct and Aquis, for example, have captured approximately 4% and 4.5% of on-exchange trading in the first half of 2024, respectively, at the expense of markets like Turquoise, which was more prominent in previous years.

Market share by trading venue (on-exchange trading)¹⁵ FIGURE 5



Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

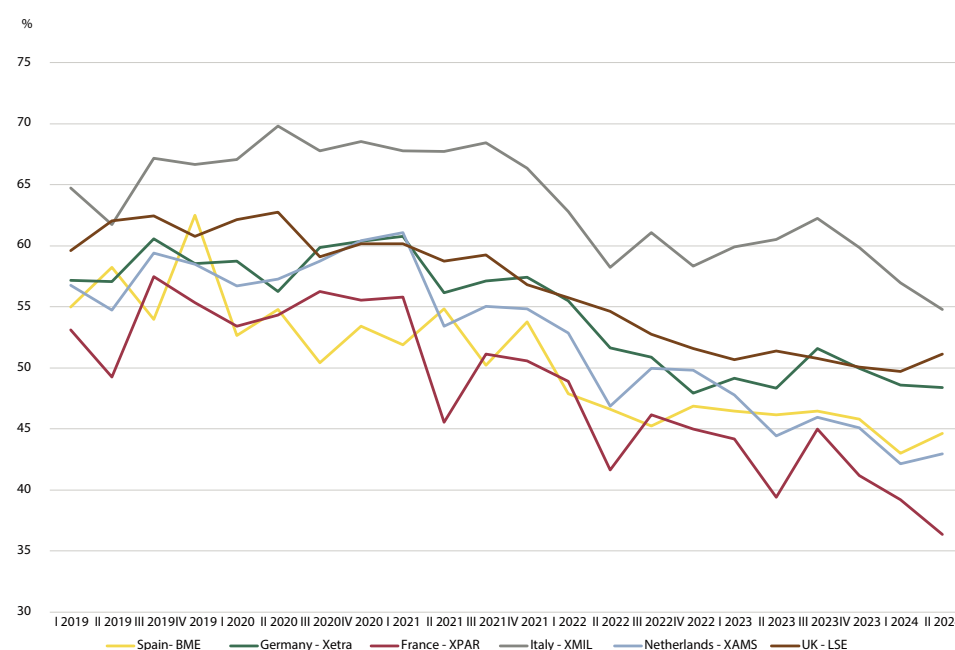
14 The Chicago Board Options Exchange (CBOE) entered the European market in 2017 by acquiring the MTF BATS Global Markets.
 15 Includes trading on trading venues, both on and off book.

Examining the market shares of the home markets in the six European countries analysed (ES, UK, DE, FR, IT, NL) reveals that Spain's trend is similar to that of other neighbouring countries, except for Italy. Despite having lost market share in recent quarters, Italy's home market still accounts for around 55% of market trading. As illustrated in Figure 6, the estimated share for Spain's home market falls within an intermediate range compared to other countries, spanning from just under 37% in France to nearly 55% in Italy. Spain's estimated share is similar to that of the Netherlands and slightly lower than Germany's. Meanwhile, the United Kingdom is positioned as the jurisdiction with the second highest share from its home market.

Preliminary analysis of US trading (see Figures A.1.1 and A.1.2 in Annex A.1) shows that US equity trading is also highly fragmented across different trading venues, with Nasdaq and NYSE standing out. Together, they account for between 60% and 70% of book trading, as well as total market trading, given that off-book trading volume is virtually non-existent in the United States. It is also important to note that the relative prominence of these trading venues has remained stable since 2018, even as trading volumes have increased, as discussed in a later section.

Market share of home markets in European countries (on-exchange trading)

FIGURE 6



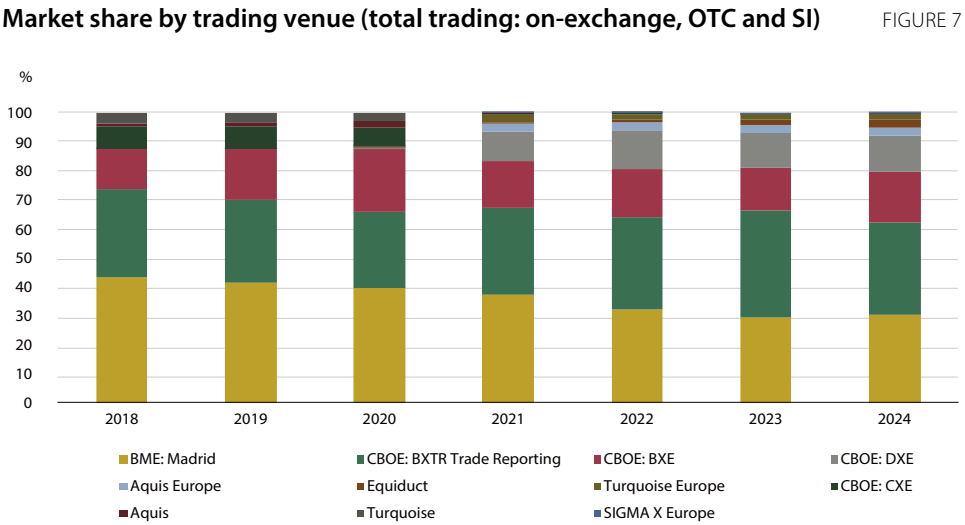
Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

2.1.2 Total trading: on-exchange, OTC, and systematic internalisers (SI)

A final step in analysing the fragmentation of trading across competing venues involves considering all types of trading, including off-exchange activities which, according to current EU regulations, fall into two categories: trading via systematic internalisers and, more broadly, all OTC trading. It is important to note that the quality of data for off-market trading is lower than that for on-market trading. In this area, it is worth highlighting ESMA's work in recent years to clarify the

reporting of information, gradually improving the quality of the data in this area. Off-market transactions meet post-trade transparency requirements through approved publication arrangements (APAs).¹⁶ For this article, information from various commercial databases was examined, and BMLL was identified as having a higher level of data consolidation. Therefore, data from this source was used for the analysis. However, it is important to consider the limitations mentioned, so both the figures and percentages for off-market trading should be interpreted cautiously, as they are more indicative of a trend over time.

The analysis of total trading in Spanish shares is shown in Figure 7, with a comparison to other markets in Figure 8. Figure 7 indicates that the decline in the market share of Spain’s home market for equities persists even when off-market trading is considered. This share decreased from 43% in 2018 to 30% in both 2023 and the first half of 2024. The figure also highlights the significant role of CBOE: BXTR Trade Reporting, which includes the APA function and mainly covers off-market trading, accounting for over 35% of total trading in 2023. A comparison with other European economies shows a similar pattern between Spain, France, Germany, and the Netherlands in terms of trends and market shares of home venues. Italy also exhibits a downward trend, yet it maintains a higher share than the other major exchanges. Meanwhile, the United Kingdom demonstrates a much greater level of stability. Notably, since 2023, the declining trend in market shares of home trading venues appears to have halted in most of the countries analysed, stabilising at around 30% (see Figure 8).

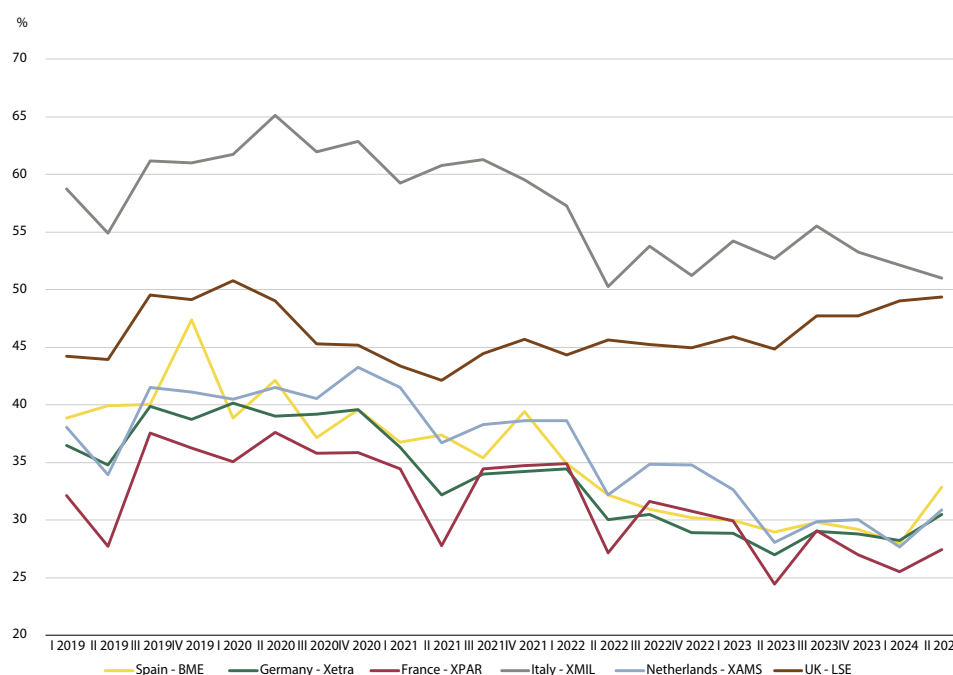


Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

16 An APA is an entity authorised under European MiFID II regulations to publish transactions executed in financial markets. Its primary role is to help market participants comply with post-trade transparency requirements by ensuring that transaction information is made public and available to the market.

**Market share of home markets in European countries
(total, including OTC and SI)**

FIGURE 8



Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

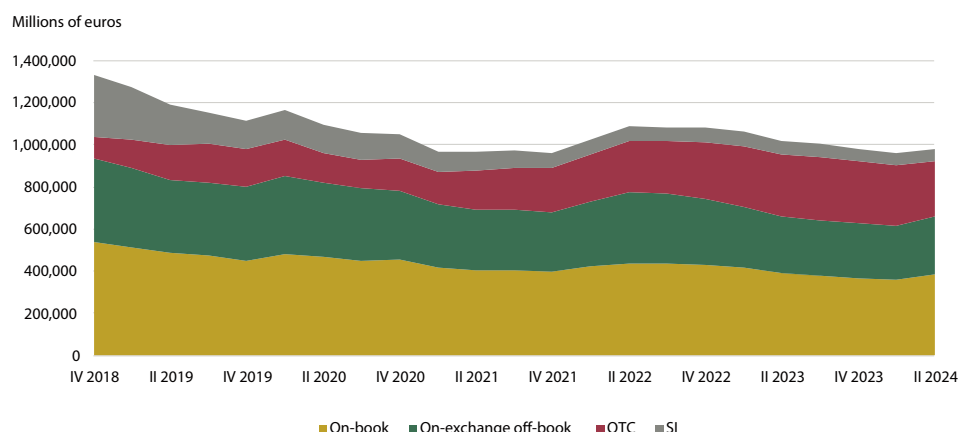
2.2 Analysis by trading type

This section focuses on the mode of trading rather than the trading venue associated with it, as was the focus in previous sections. The aim here is to evaluate how different trading modes – on-book, off-book, SI, and OTC – have changed over time to identify any shifts in trading between these modes, particularly between market trading and OTC. This analysis aligns with one of the objectives of MiFID II, which is to encourage trading towards venues with non-discretionary market rules. However, any conclusions drawn in this area should be approached with caution due to the previously mentioned poor quality of OTC data.

As noted at the beginning of this article, total trading in Spanish equities has been declining over the period considered. Figure 9, which shows cumulative figures for four quarters to highlight annual volume trends, indicates that trading has decreased from over €1.3 trillion in 2018 to €980 billion in 2024 (cumulative from June 2023 to June 2024). The drop has been more pronounced in on-exchange trading (-30% over this period) compared to OTC trading, including SIs, which fell by 19%. This significant decrease in trading volumes has not been observed to the same extent in the other European countries in the sample for the period analysed. Trading volumes have remained relatively stable in France and Germany, while Italy, the Netherlands, and the United Kingdom have seen notable increases (see Figures A.1.4 in Annex A.1). Trading figures for longer periods and from other databases indicate that some countries, like Italy and the United Kingdom, have also experienced declines in trading, particularly in on-exchange transactions. However, there are some similarities in the shift between different types of trading, which are discussed further below.

**Spanish equity trading volume (four-quarter cumulative data)
(on-exchange, OTC and SI)**

FIGURE 9



Source: BMLL and CNMV. The data show the volume accumulated over four quarters.

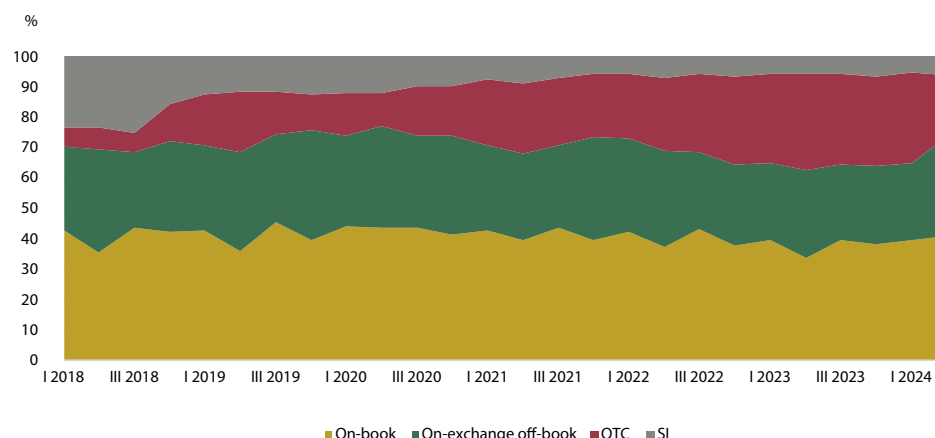
Figure 10 illustrates the distribution of trading in Spain across the four types considered for each quarter since 2018.¹⁷ It can be observed that, despite some fluctuations, market trading consistently accounted for 70% of the total during the period studied, while the remaining 30% was made up of SI and OTC trading. Within market trading, there is relative stability between its two main components, with the 70% split into 40% for on-book trading and 30% for off-book trading. In off-market trading, which represents 30% of the total, there has been a shift between trading via systematic internalisers and other OTC trading. Thus, the relative importance of trading via systematic internalisers has decreased from over 20% to less than 6%, while pure OTC trading has increased from 8% of total trading in 2018 to 25% in the first half of 2024.

The reasons for the changes within off-market trading are varied. One factor is the potential shortcomings in data quality – previously discussed – which may have led to misclassification of some trades. According to the European Securities and Markets Authority (ESMA) guidelines, these issues are expected to have improved over time. In addition, there may have been structural shifts in the market, with institutions that initially reported as systematic internalisers either discontinuing this activity or moving it to another segment, such as fixed income. Lastly, Brexit could have contributed to incorrect reporting of transactions in certain cases.

¹⁷ This data does not aggregate information from the previous four quarters as was done in Figure 9, which is used to observe the temporal evolution of annualised trading.

Spanish equity trading by type of trade, quarterly

FIGURE 10

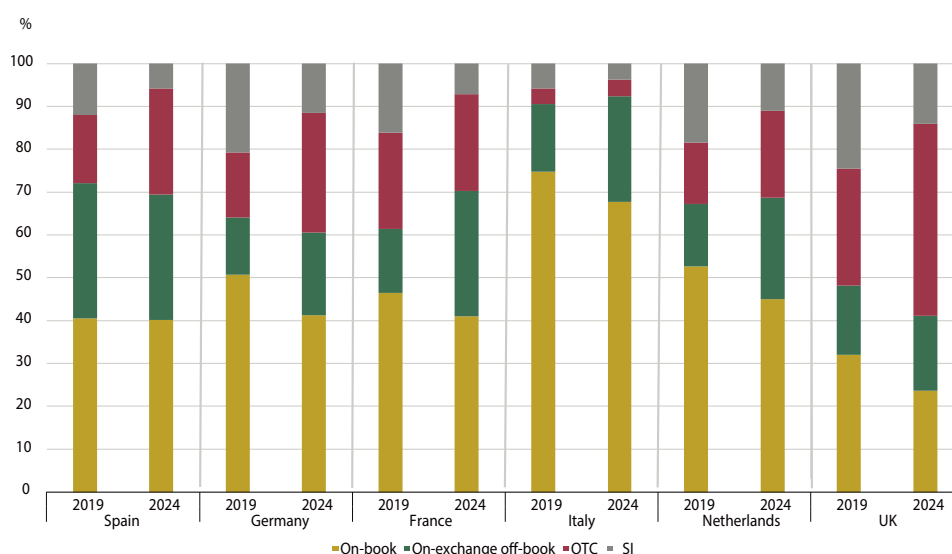


Source: BMLL and CNMV.

The pattern of total trading distribution in other analysed European countries reveals both similarities and differences with the Spanish case. For instance, a commonality is that market trading is more significant in Spain, France, Germany, and the Netherlands, ranging between 60% and 70% (see Figure 11). Once again, Italy has the largest market trading in relative terms, with percentages exceeding 90%, while the United Kingdom has the lowest figures, between 40% and 50%. Within on-market trading, there has been a decline in the significance of book trading between 2018 and 2024 – this does not apply to Spain – with France experiencing a drop of 5 percentage points (pp) and Germany 10 pp. In off-market trading (SIs and OTC), a similar trend to that previously noted for Spain can be observed, characterised by a decline in trading through systematic internalisers and a rise in purely OTC trading. The factors cited in the Spanish context could also be applicable to other EU countries.

Equity trading in Europe by type of transaction

FIGURE 11



Source: BMLL and CNMV. The 2024 results correspond to the first half of the year.

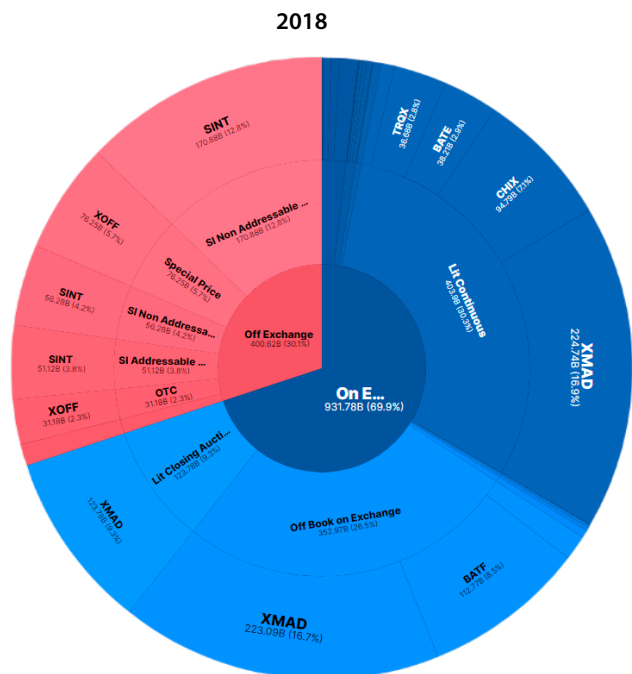
In the United States, trading volumes are on the rise, with a much steeper upward trend than observed in the European countries analysed¹⁸ – likely due to the prominence of the technology sector and its appeal. The share of book trading has slightly decreased from 66% to 58%, while OTC trading has correspondingly increased from 34% to 42% (see Figures A.1.4 and A.1.5). These figures suggest that OTC trading in the United States is somewhat more prevalent than in Europe (except in the United Kingdom), and there are differences in market trading composition, with Europe having a higher proportion of off-book trading.

2.3 Analysis by type of trade and trading venue

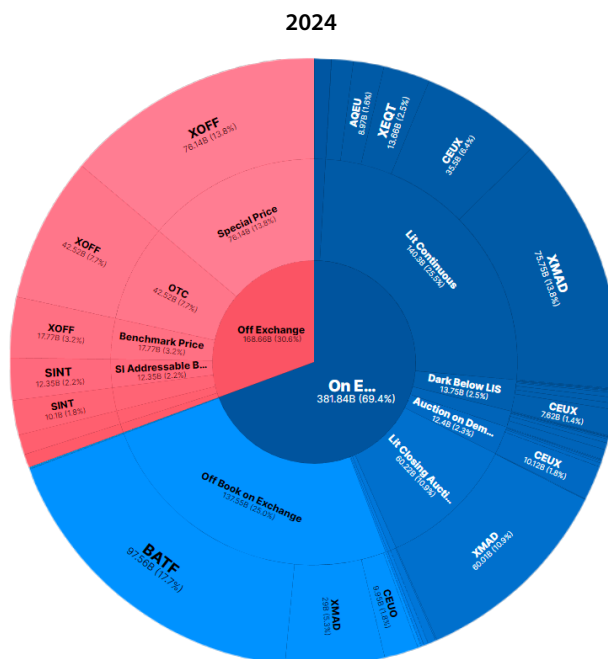
Before assessing liquidity and price formation on trading venues, it's valuable to conduct a final analysis that combines trading data by type of trade and trading venue. The results of this analysis for 2018 and the first half of 2024 are illustrated in the figure below. These combined figures demonstrate the relative stability in the proportion of market trading compared to OTC and SI (blue areas versus red areas). Additionally, within each area, there's a noticeable shift in the significance of the most relevant markets. For instance, in market trading, BME remains the leader in book trading, despite a loss of over 5 pp of total trading during the period under review. It retains its importance in book trading but loses ground in off-book trading, which is largely dominated by CBOE. In off-market trading, there's also a noticeable decline in the significance of trading via systematic internalisers, alongside a relative increase in purely OTC trading, as mentioned earlier.

Spanish equity trading by type of trade and trading venue

FIGURE 12



18 Trading volumes in 2024 (cumulative data for the four quarters to June) are nearly 50% higher than in 2018.



Source: BMLL and CNMV. The 2024 data correspond to the first half of the year.

3 Price formation and market liquidity

The quality of price formation across different trading venues supports the claims made by most European home regulated markets that share prices are actually determined through their operations, while other venues merely follow these prices. To further clarify these assertions, a series of metrics¹⁹ evaluated around the European Best Bid and Offer (EBBO) prices are presented. Specifically, four different metrics are provided regarding the price formation of Spanish stocks, with two of these metrics also applied to other European stocks for comparative purposes. All metrics are calculated by the information provider BMLL:

- i) **EBBO price formation (EBBO setting):** This indicator measures the percentage of times a trading venue improves prices relative to total improvements, thereby indicating the venue's price formation capability.
- ii) **EBBO joiner:**²⁰ This metric reports the percentage of times a trading venue displays the second-best price relative to the total number of second-best improvements.
- iii) **Exclusive time at EBBO:** This indicator reports the percentage of time a trading venue exclusively offers better prices in the market.
- iv) **Time at EBBO:** This indicator shows the percentage of time a trading venue offers better prices in the market without requiring exclusivity as the previous indicator, meaning other venues may also be offering better prices simultaneously.

Figures 13, 14, 15, and 16 illustrate the trends of these four indicators for Spanish equities over the most recent period available and across the most relevant trading venues, as identified in the previous section.²¹ Among these, several noteworthy trends can be observed:

- **BME significantly outperforms its competitors in terms of better price formation (EBBO setting indicator).** Since the end of 2021, on average, 48% of the instances where an asset's price has been improved have occurred at BME. This proportion decreased towards the end of 2022 but has since risen sharply to 57% in the second quarter of 2024, representing very high percentages (see Figure 13). Trailing behind are the CBOE trading venue, Aquis, and Turquoise, with average shares over the period of 19%, 20%, and 4%, respectively.

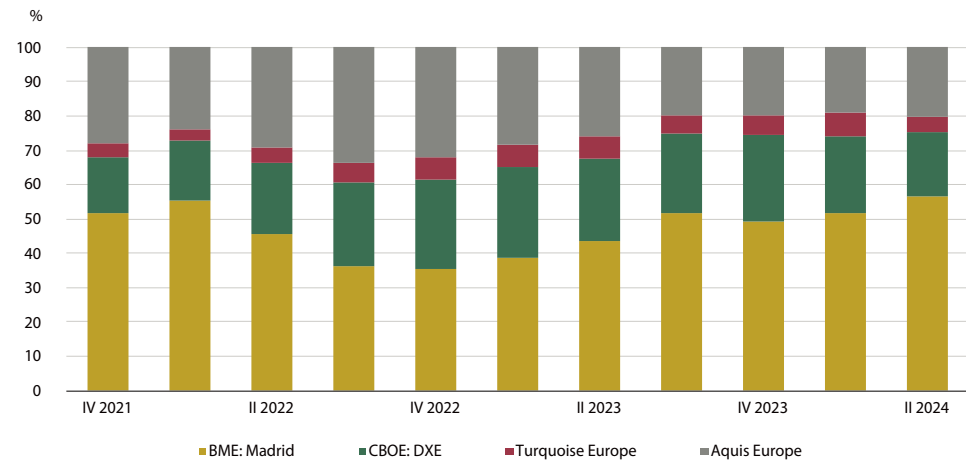
19 Calculated by BMLL based on order book information.

20 Since the information is derived from order books, trading under RPW is not considered.

21 Metrics are presented for BME, CBOE, Turquoise, and Aquis, and partially for Equiduct, depending on the information available.

Formation of best Spanish share prices (EBBO setting)

FIGURE 13

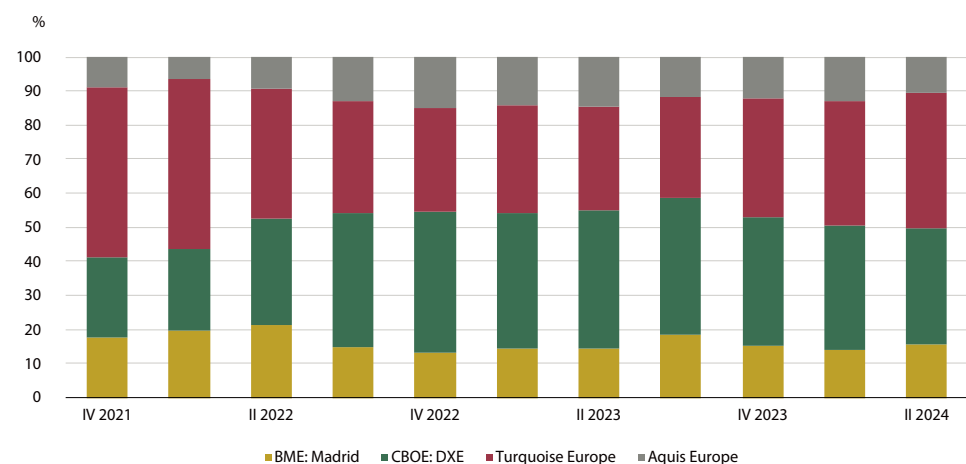


Source: BME and CNMV.

- In connection with the previous point, it is evident that the **main price follower venues** (as indicated by the EBBO joiner indicator) are CBOE and Turquoise, whereas BME and Aquis have much lower percentages. As shown in Figure 14, both CBOE and Turquoise have average percentages exceeding 35% in the most recent period, indicating that these venues were most often the ones to present the second-best prices. By contrast, in the home market, BME, and on Aquis, this proportion is significantly lower, averaging around 16% and 11%, respectively, over the period, and has remained relatively stable over the time considered.

Best price follower (EBBO joiner)

FIGURE 14



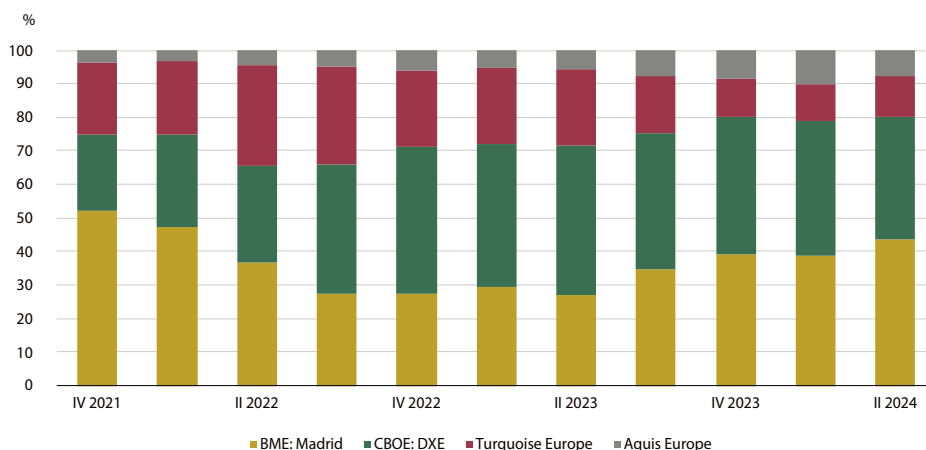
Source: BME and CNMV.

- The metric that measures the percentage of time a trading venue exclusively offers better prices shows a relatively similar pattern for BME and CBOE in the latest data. As depicted in Figure 15, the trends in this indicator have varied for different venues. For BME, there was a downward trend in the early part of the period until mid-2023, followed by an upward trend. Initially, in the first quarters of the period, BME provided better prices exclusively for nearly 50% of the time. This percentage dropped to below 30% between late 2022 and early 2023, but has since rebounded to nearly 45%, averaging 37%

over the period. Conversely, the time CBOE exclusively shows the best prices has progressively risen to over 40% in 2023 before decreasing, yet it remains significant at 38% in the first half of 2024. Turquoise and Aquis follow, each with percentages close to 10% in the early months of 2024, but with opposite trends: declining for Turquoise and increasing for Aquis. This suggests that while BME leads the price formation process in the market, its main competitor, CBOE, manages to offer better prices exclusively for a substantial proportion of the time, similar to BME.

Proportion of time with exclusive best prices (EBBO)

FIGURE 15

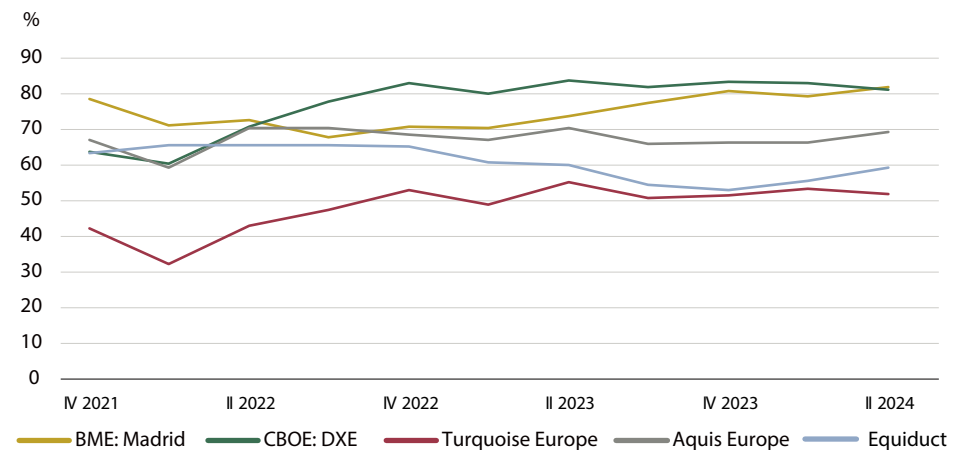


Source: BME and CNMV.

- Finally, it is worth examining the trend of the indicator that measures the proportion of time trading venues display better prices in the market, but not exclusively. This metric allows for multiple venues to offer better prices simultaneously. As shown in Figure 16, this indicator reflects a similar scenario for BME and CBOE in the most recent period, with values close to 80%. Although BME's proportion was slightly lower than CBOE's during parts of 2022 and 2023, the metric has remained stable throughout, consistently ranging between 70% and 80% for BME – indicating that BME offered better prices in the market 70% to 80% of the time, albeit not exclusively. The sustained level of around 80% for CBOE from mid-2022 is also evident, as is the consistency of Aquis, with its figures maintaining between 60% and 70% since 2021. Lastly, Equiduct's order book shows figures around 60%, while Turquoise is slightly lower, with figures exceeding 50% in recent quarters.

Proportion of time with best prices (EBBO)

FIGURE 16



Source: BME and CNMV.

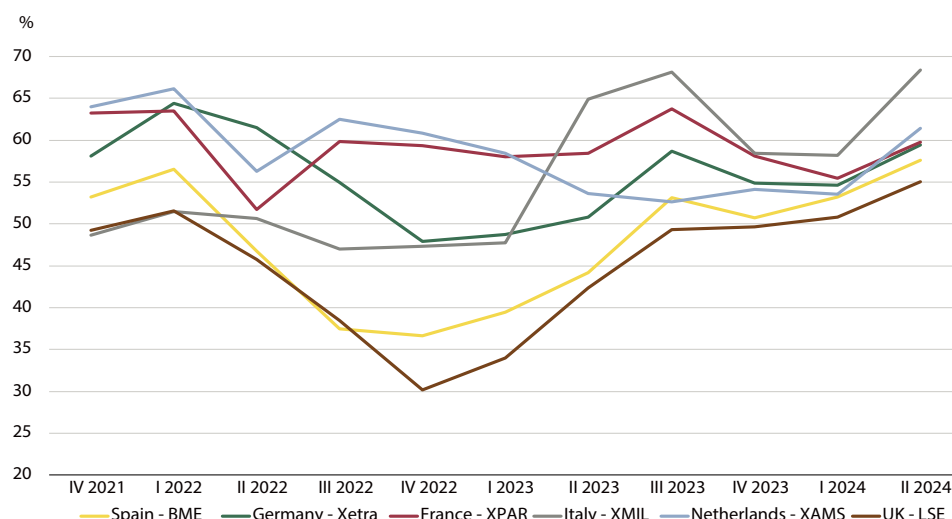
It is important to note that the studies referenced in the introduction of this report evaluated only some of these price formation metrics. For instance, with CBOE, “time at best prices” (alongside other indicators) was used to support the superiority of CBOE for French stocks. Similarly, for Euronext, the “EBBO setter” and “time at best prices exclusively” (again with other indicators) were used to reach the same conclusion regarding the Italian home market.

In the context of Spanish share price formation across various trading venues, it is evident that BME, the home market, clearly takes the lead in the price formation process. However, a more balanced scenario emerges when considering other factors, such as the proportion of time these venues offer better market prices, both exclusively and non-exclusively, with respect to CBOE. The data presented in the next two panels (17 and 18) for other European home trading venues lead to conclusions similar to those in the Spanish case: i) these home markets are leaders in price formation for their respective securities, and ii) the time they offer better market prices is high and comparable to that of their main competitor, CBOE (see Figures A.2.2 in Annex A.2). Information on the duration CBOE offers better prices in these European markets is not shown in Figure 18 to avoid overcrowding the chart, but it is similar to the time home markets offer better prices, except in the Italian case, where the home market shows higher percentages. This demonstrates CBOE’s ability to offer better prices over extended periods across Europe without playing a dominant role in price formation. This, combined with factors such as its fees and the broad range of products available for trading, explains the increase in its market share in recent years.

Regarding the first piece of evidence, it is important to highlight the prominent role of home markets in price formation across all analysed countries. In practically every quarter of the analysis, more than 40% of the instances where prices are improved occur in home markets, with percentages rising to nearly 60% or more in some cases, such as France and Italy. In addition to these venues frequently improving prices, there has been a notable increase in this proportion in most of the venues assessed since the end of 2022, with further intensification by mid-year. As of the most recent data, the proportions ranged from 55% in the United Kingdom to 68% in Italy (57% in Spain).

Percentage of times it sets the best price (EBBO Setter)

FIGURE 17

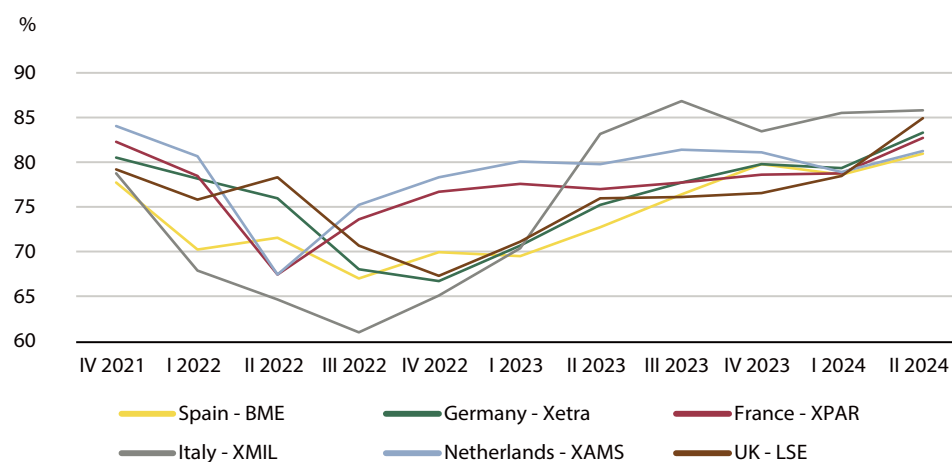


Source: BME and CNMV.

Concerning the second piece of evidence, it is particularly striking that European home markets showed better prices for a significant proportion of time, ranging between 80% and 85% in all cases by mid-2024. This marks an increase over recent quarters, compared to proportions that occasionally fell below 70% during some quarters of 2022.

Percentage of time at best price (EBBO)

FIGURE 18



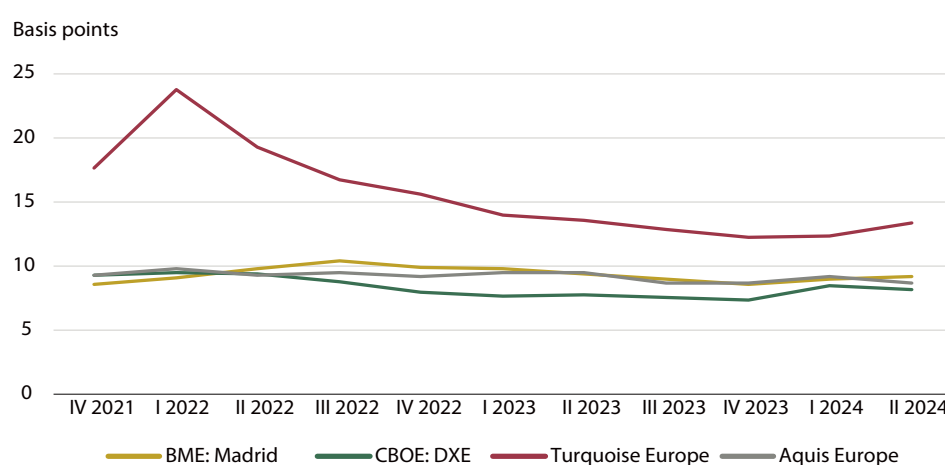
Source: BME and CNMV.

The final part of this section examines the development of other indicators derived from order book data across different trading venues. These indicators provide insights not only into price formation, which has already been assessed, but also into the liquidity conditions at each venue. The following figures (19, 20, and 21) present information on bid-ask liquidity spreads (measured in basis points [bp]), liquidity (in euros) around the best market prices, and the likelihood of executing an order.

As shown in Figures 19 and 20, the indicators most directly related to market liquidity suggest a more favourable position for BME compared to its competitors, particularly concerning the liquidity volumes around the best prices. In BME's case, these volumes are three times higher than those of its main competitors, and even more in some quarters. The assessment is more balanced when considering the bid-ask spreads (weighted by volume), which remain around 10 bp during the period analysed, showing relative stability at BME, CBOE, and Aquis. In contrast, the probability of executing an order²² is significantly higher at CBOE compared to the other competitors. Although this difference has slightly narrowed over time, it remains notable. As shown in Figure 21, in the most recent period, this probability was 7.7% for CBOE, close to 5% for BME and Turquoise, 2% for Aquis and less than 1% in the case of Equiduct.

Volume-weighted bid-ask spread

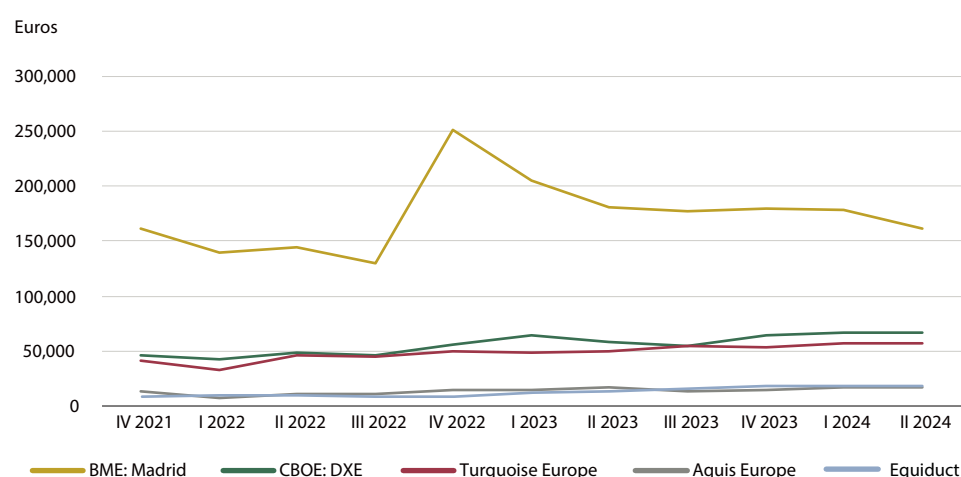
FIGURE 19



Source: BME and CNMV. Data in basis points.

Liquidity around the best price

FIGURE 20

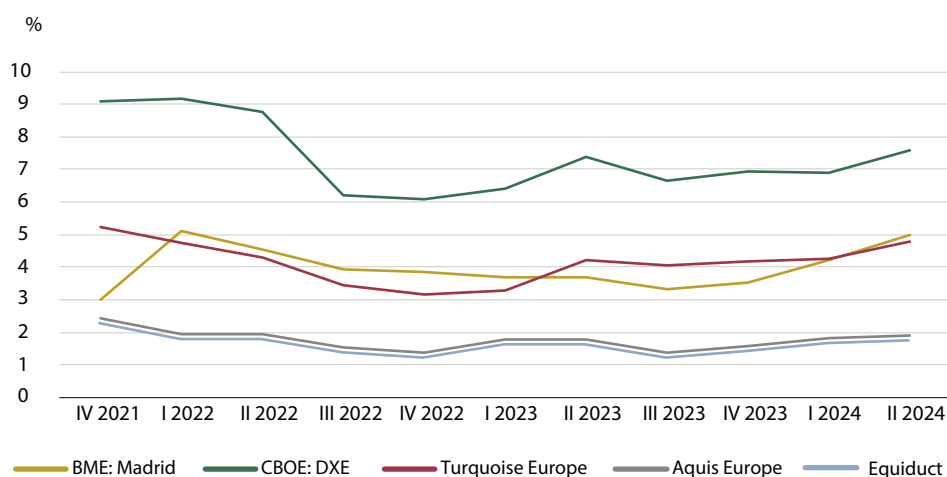


Source: BME and CNMV. In ask 1.

22 The probability of execution is calculated as the likelihood that an order placed at a specific level (e.g., ask 1/ask 2/ask 3, etc.) is executed within 60 seconds. This is determined by dividing the number of relevant executions of such orders by the number of orders placed.

Probability of execution of orders

FIGURE 21

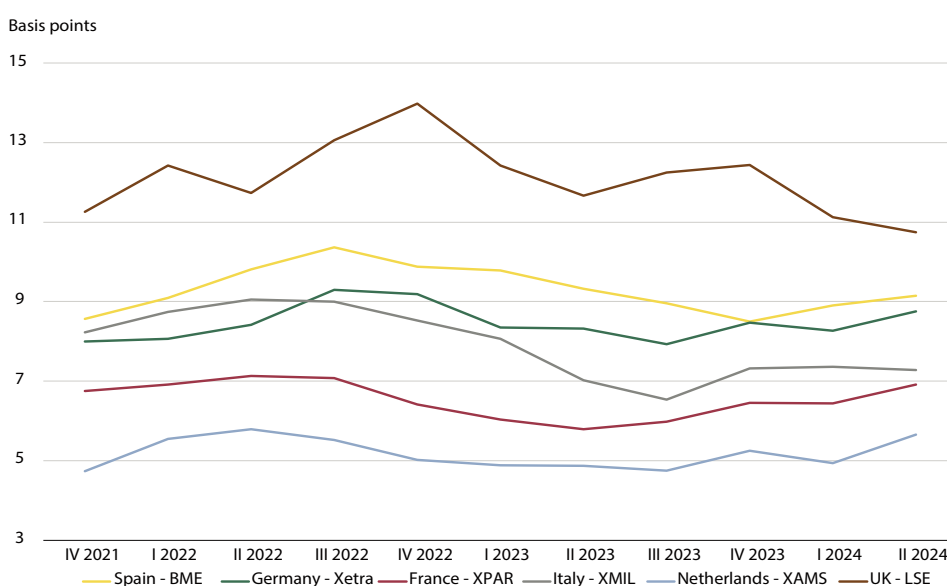


Source: BME and CNMV. In ask 1.

The analysis of these two indicators for other countries yields similar results: i) the bid-ask spreads of home trading venues are fairly stable over time and align with those observed for their main competitor (see Figure A.2.3 in the Annex A.2), and ii) the probability of executing an order is generally somewhat lower, except in Italy and the United Kingdom, where it remains comparable (see Figure A.2.4 in the Annex A.2). As shown in Figure 22, spreads for the main EU home trading venues range from 5 bp in the Netherlands to 9 bp in Spain. In the most recent period, the spread in Germany is similar to that in Spain, while those in Italy and France are slightly lower, around 7 bp. Regarding the probability of executing an order (see Figure 23), there was a decline until mid-2023, followed by a general recovery across different venues. This probability now ranges from 5% in Spain to 6% in Germany, with France and Italy falling in between.

Volume-weighted spread

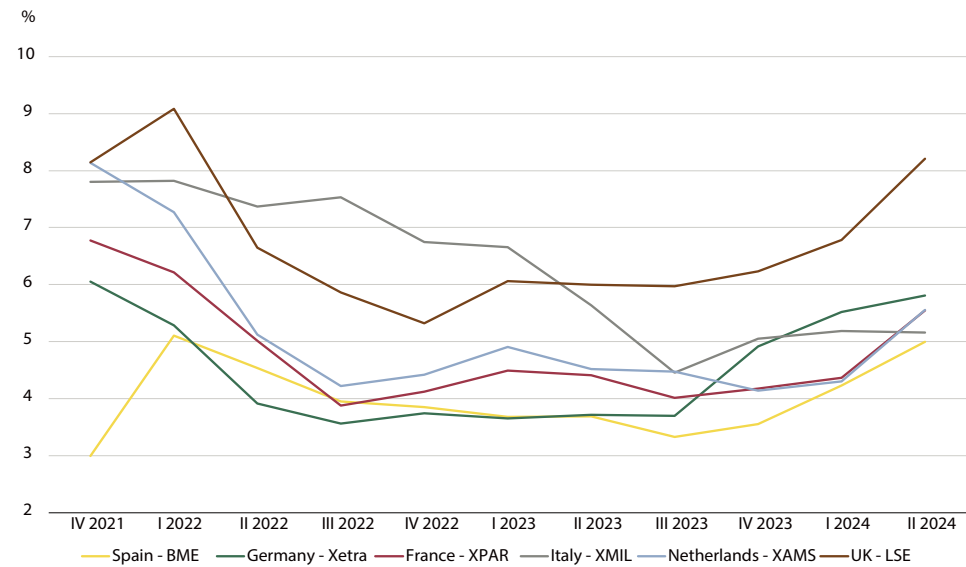
FIGURE 22



Source: BME and CNMV.

Probability of execution of an order

FIGURE 23



Source: BME and CNMV. In ask 1.

Similar to the case of trading fragmentation, various indicators on price formation and liquidity conditions in US trading venues are discussed (see Figures A.2.1 to A.2.4). These indicators have been calculated for S&P 500 stocks and are only available from January 2023. The most significant finding is the superiority of the Nasdaq in all the metrics considered: it is the venue that improves prices a higher percentage of the time and shows better prices, both exclusively and non-exclusively. It also offers the best spreads in the market around the best prices (4 bp) and has the highest probability of order execution. NYSE ranks as the second-best venue in all these metrics, with a few exceptions.²³ This evidence contrasts with that of European venues, where home venues tend to be stronger in certain aspects, such as price formation and liquidity around the best prices. Meanwhile, some competitors may be stronger in the probability of executing an order and are on par with home venues in the percentage of time they offer better prices.

²³ For example, in the metric that evaluates the probability of executing an order.

Equiduct is among the trading venues that have been gaining significant attention in recent periods. It is a Berlin-based multilateral trading platform that commenced operations in 2009, shortly after the implementation of MiFID.

This venue has distinct characteristics compared to other European markets. Its primary focus is on retail investors, allowing them to place limit orders through its XEQT order book or market orders through its APEX system. The APEX system executes orders at the best available price in Europe at the time, using a network of liquidity providers. This best price is referred to as either EBBO (European Best Bid Offer) or VBBO¹ (Volume Best Bid Offer) and is derived from orders on all European regulated markets, as well as CBOE, Turquoise, and the XEQT order book itself. APEX liquidity providers are required to provide a counterparty for all orders placed at the VBBO price (see Figure E1.1). Limit orders are traded on their order book and can be executed against other participants in the market. These participants also include the liquidity providers within the APEX system, who offer counterparties at the EBBO/VBBO prices. All orders traded in this market contribute to forming the APEX price.

APEX price formation process

FIGURE E1.1

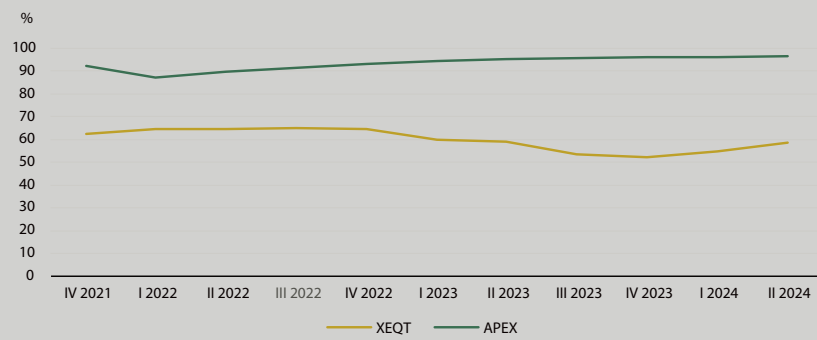


Source: Equiduct.

Equiduct's business model, aimed at offering a fixed price to retail clients, means that its order book displays lower liquidity and price formation metrics compared to other European markets of a similar size. However, APEX, which is designed to source prices from other markets and provide the best available price at any given moment, outperforms in some of the pricing metrics covered in this paper. Despite the challenges in comparing APEX metrics with those of other trading venues due to its unique design, it can be useful to highlight the prices available to retail investors. For instance, Figure E1.2 demonstrates that APEX offers the best price available in the market for a significantly longer duration (around 95%) compared to the XEQT order book.

Time in EBBO

FIGURE E1.2



Source: CNMV with BMLL data.

- 1 VBBO is the best individualised price for each client, determined by the volume of their order and the volume traded at that time across 16 European markets.

4 Conclusions

This article analyses the degree of fragmentation in Spanish equity trading over recent years, extending the analysis to other European trading venues and other important aspects of market functioning, such as the price formation process and liquidity conditions. The analysis period largely overlaps with the implementation of MiFID II, which aimed, among numerous objectives, to steer securities trading towards market environments. It is worth noting that in 2007, MiFID I established the conditions necessary for different trading venues to compete with each other, with the goal of increasing efficiency and transparency in European markets.

The paper has examined all the main types of trading, initially classifying them into on-market and off-market trading. Within each of these categories, there are two further subgroups: i) on-market trading includes on-book and off-book trading, with the latter primarily involving block and application systems and, in general, any negotiation conducted in dark pools; and ii) off-market trading encompasses trading through systematic internalisers (a category created by European regulation) and purely OTC trading.

The analysis of Spanish share trading has revealed several noteworthy trends. Some of these trends were already identified in a previous CNMV study and are shared by other European markets, while others present more novel evidence. A swift consequence of implementing the MiFID regulation was the gradual loss of market share experienced by home trading venues due to increased competition. The Spanish trading venue, BME, joined this trend a few years later than venues in other countries, owing to specifics related to the settlement system. However, BME ultimately shared this pattern with the other countries analysed. This trend, previously identified in the aforementioned study, has persisted in recent years. The analysis indicates that BME's market share is in a mid-range compared to estimates for other countries and, notably, the downward trend seems to have significantly slowed in recent quarters.

There are substantial differences in market share calculations when the analysis focuses solely on book trading versus considering all market trading. In all the EU countries analysed, it is consistently found that home markets have a much greater dominance in book trading compared to their competitors. However, their prominence is considerably reduced when all market trading is taken into account. The strength of the competitors of the home venues, particularly CBOE, in their block and dark book trading systems, likely explains this difference.

One of the most significant contributions of this paper concerns the evaluation of price formation in different trading venues and their liquidity conditions. It is important to highlight that home trading venues have frequently asserted their leading role in price formation, claiming that competing venues merely follow these prices and do not contribute to the price formation process. The various indicators related to price formation and the liquidity conditions of the trading venues seem to support these assertions. It is evident that home trading venues,

both in Spain and in other countries, continue to lead in the share price formation process, with between 55% and 70% of price improvements being made by a home venue. Notably, these percentages have increased in the most recent period. However, it is also true that the most significant competing venue in the European union, CBOE, can offer better prices in the market for a considerable amount of time, similar to that of the home venues. This means it can provide better prices very quickly, even if those prices were not formed in its own market. Other indicators derived from order book information offer further interesting insights: for instance, the amount of liquidity (measured in euros) around the best prices is significantly higher in the home venues compared to the competitors. Nevertheless, the competitors, especially CBOE, may have a somewhat higher probability of executing an order.

Based on the information collected, it can be argued that CBOE stands out as a major competitor to all the home trading venues in the countries analysed. This venue holds significant market shares, particularly in off-book trading (block trading), and is gaining increasing importance in book trading. Part of CBOE's strength could be attributed to several factors: i) a wide pan-European range of assets available for trading, which may appeal to institutional investors; ii) competitive fees; and iii) an ability to offer market prices comparable to those of the home venues, as previously mentioned.

Information gathered on the US markets shows that their level of fragmentation is similar to that of European countries, and the proportion of OTC trading is even higher than in Europe. However, there are distinguishing factors, such as the significantly larger market size, measured by trading volume, which has also grown much more in recent years, and the fact that most market trading is conducted on-book. The evaluation of the metrics does not highlight different strengths for each market, as is the case in Europe. Instead, it consistently places Nasdaq at the top across all metrics, followed by NYSE.

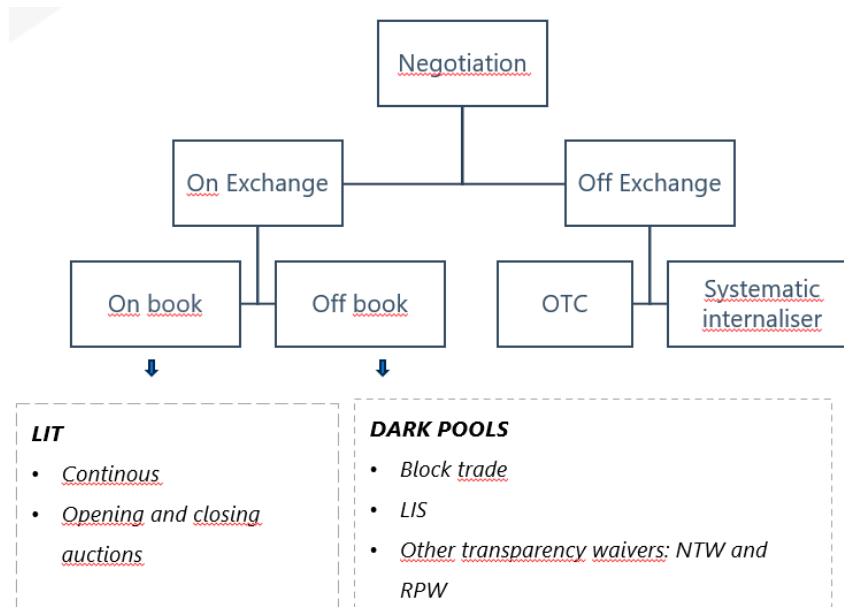
The evidence presented in this paper prompts broader considerations in two areas: the competitiveness of European securities markets and the competition among trading venues. Regarding the competitiveness of European financial markets, it is evident that trading figures, and capitalisation figures (not shown in this paper), are lower than those of other key economic regions. This suggests that these markets are less attractive. This could be due to various factors, including cultural, regulatory, fiscal, and business environment issues. In this context, the role of the Capital Markets Union could be crucial in addressing some of these challenges.

Regarding the competition observed between different trading venues in Europe, it may be beneficial to start a debate on whether the objectives of MiFID regulation are being met and if additional objectives should be considered. Although the regulation is still in its early stages, there does not appear to be a shift from OTC trading to market environments generally. Moreover, it is worth considering whether it would be preferable to increase the focus on book trading within market trading, as it plays a crucial role in the price formation process.

ANNEX A.1 Trading fragmentation

Market trading structure and main market participants at European level

DIAGRAM A.1.1



MAIN EUROPEAN PARTICIPANTS:

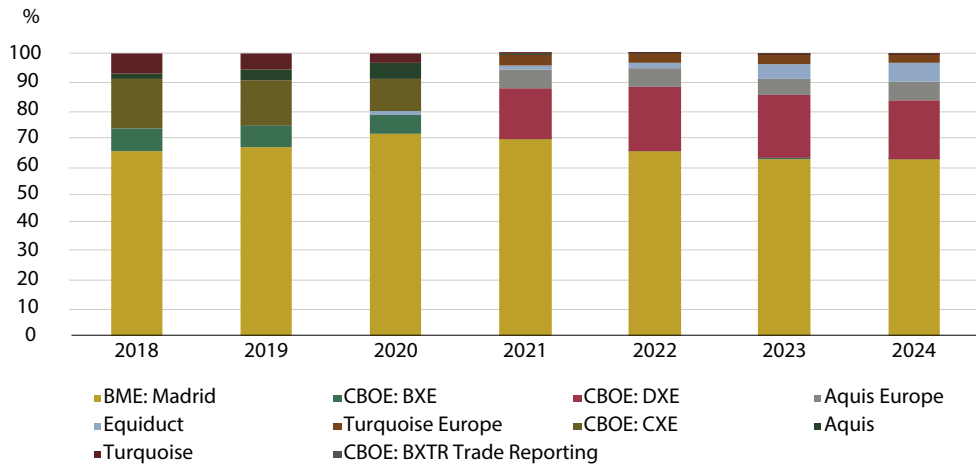
- **Stock exchanges:** Bolsas y Mercados Españoles (BME), Xetra, Euronext Milan, Euronext Paris, Euronext Amsterdam, London Stock Exchange
- **Multilateral Trading Facility:** CBOE Europe (BXE, CXE and DXE), Aquis Europe, Turquoise Europe, Equiduct and Sigma
- **Negotiation Off Exchange:** collected from CBOE APA: BXTR Trade Reporting

Source: CNMV. As shown in the diagram, trading is divided into on-exchange and off-exchange activities. On-exchange trading is further divided into lit or on-book trading, which occurs through the order book, and off-book trading, also known as dark trading. On-book trading encompasses auctions and is considered trading that contributes to price formation. Off-book trading includes block trades and match/cross trades, as well as any trading conducted under various pre-transparency waivers, such as NTW (negotiated trade waiver), RPW (reference price waiver), LIS (large in scale), or in dark pools. Off-exchange trading refers to trading that occurs without non-discretionary rules, encompassing both over-the-counter (OTC) trades and trades by systematic internalisers.

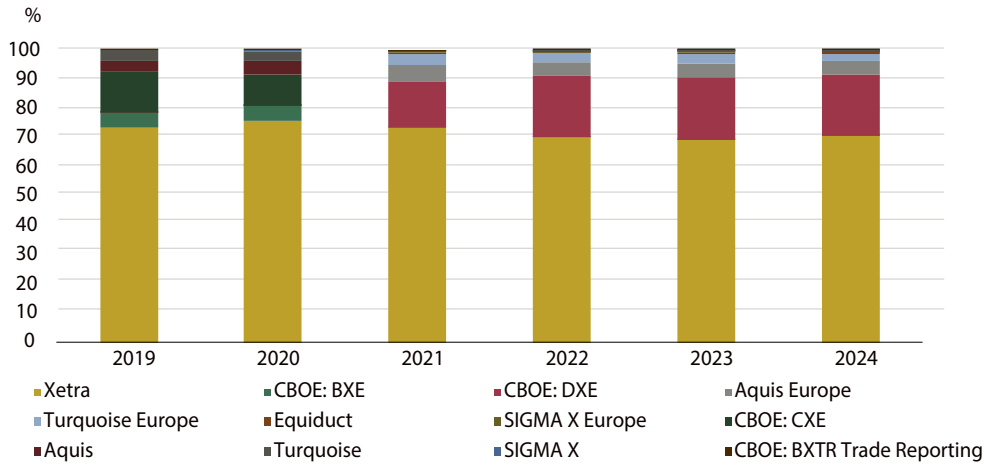
Analysis by trading venue: on-book trading

FIGURE A.1.1

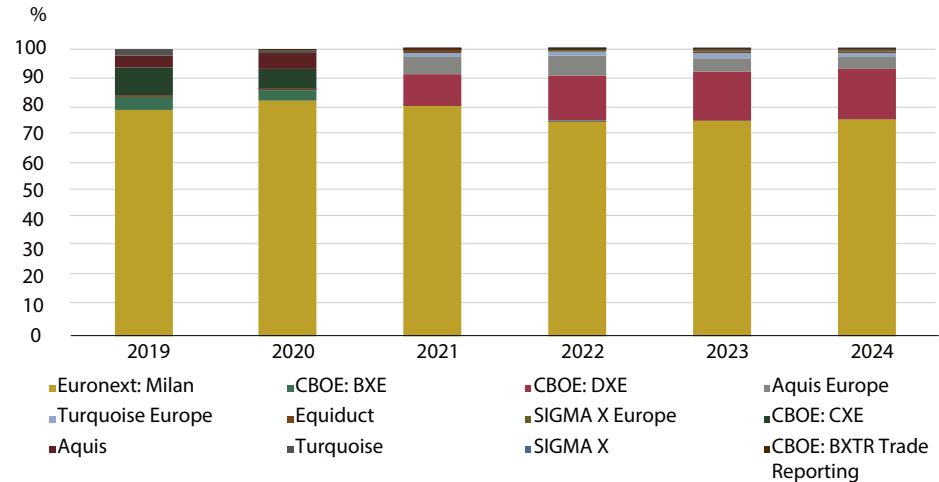
Spain



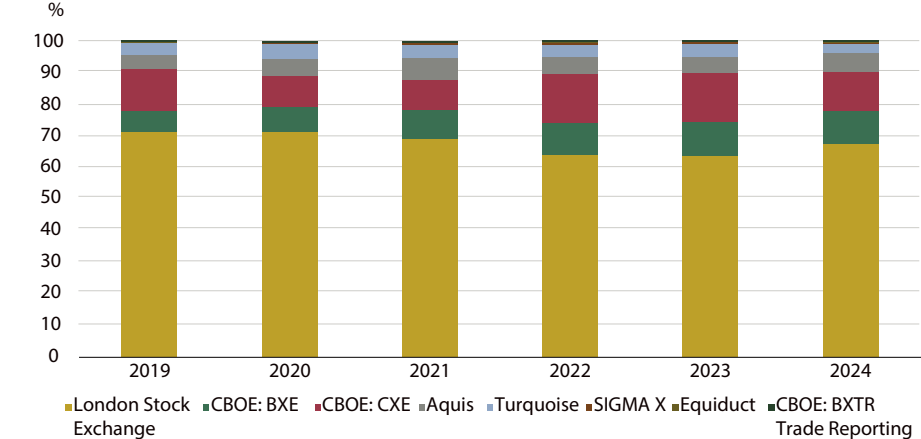
Germany



Italy



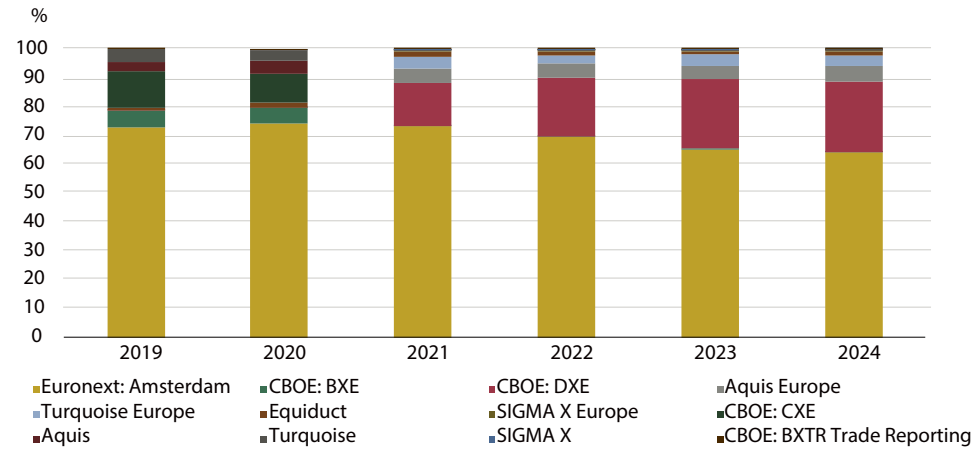
United Kingdom



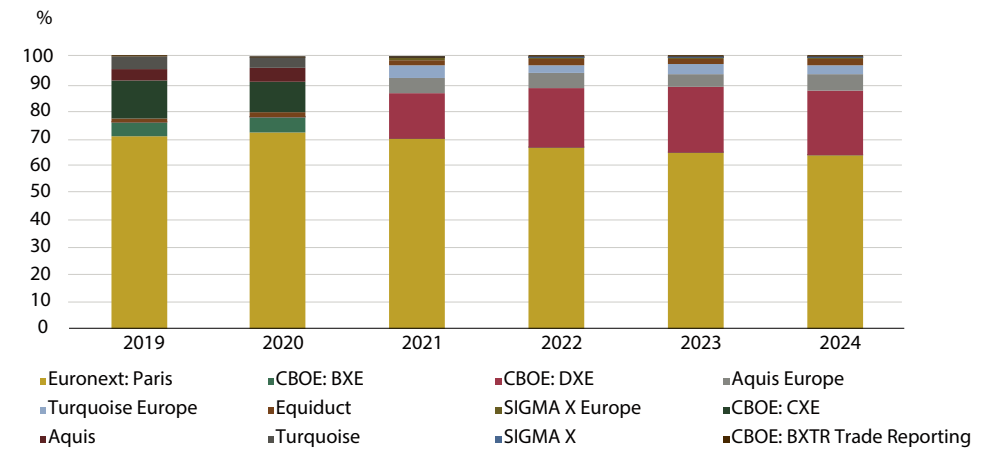
Analysis by trading venue: on-book trading (continuation)

FIGURE A.1.1

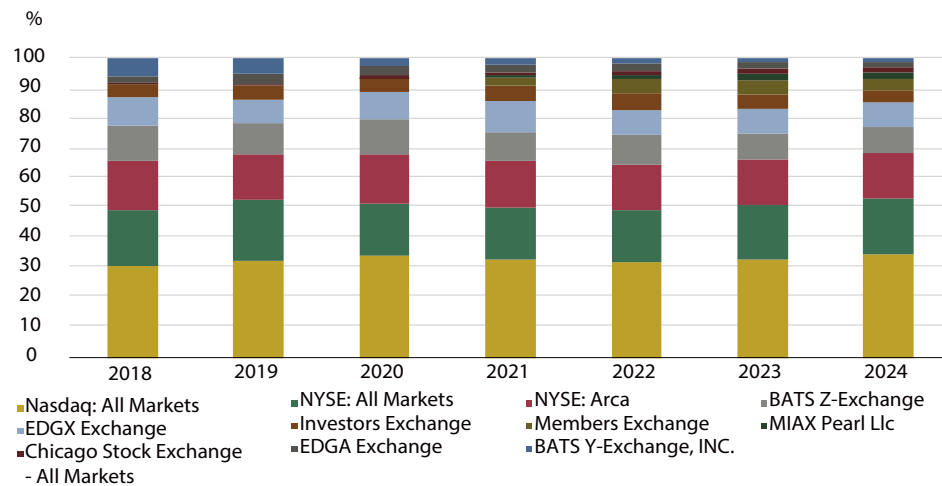
The Netherlands



France



United States

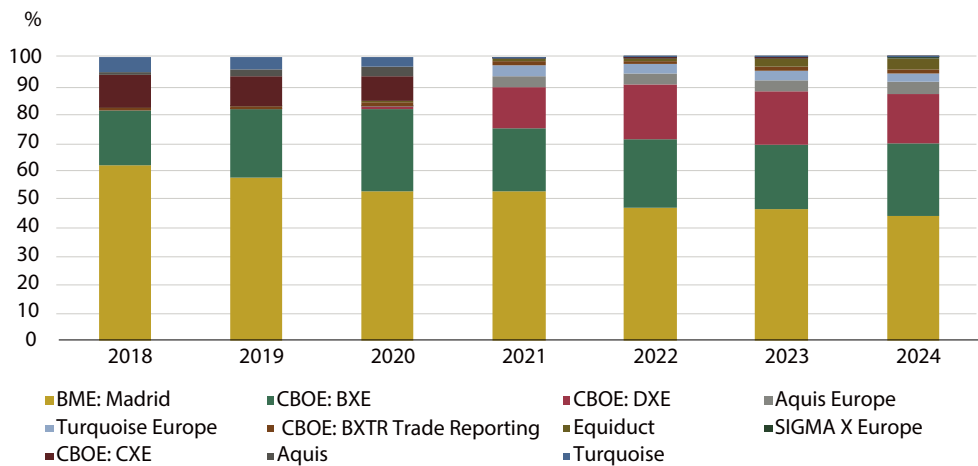


Source: BMLL and CNMV.

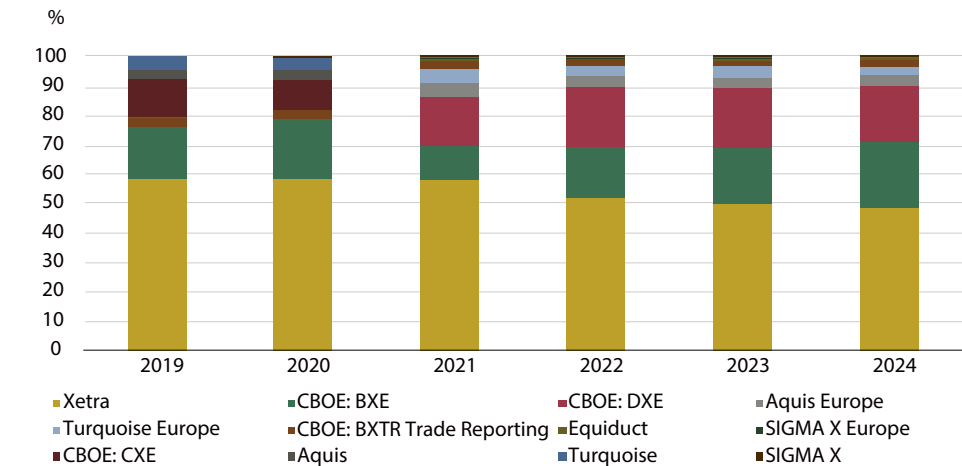
Analysis by trading venue: on-exchange trading

FIGURE A.1.2

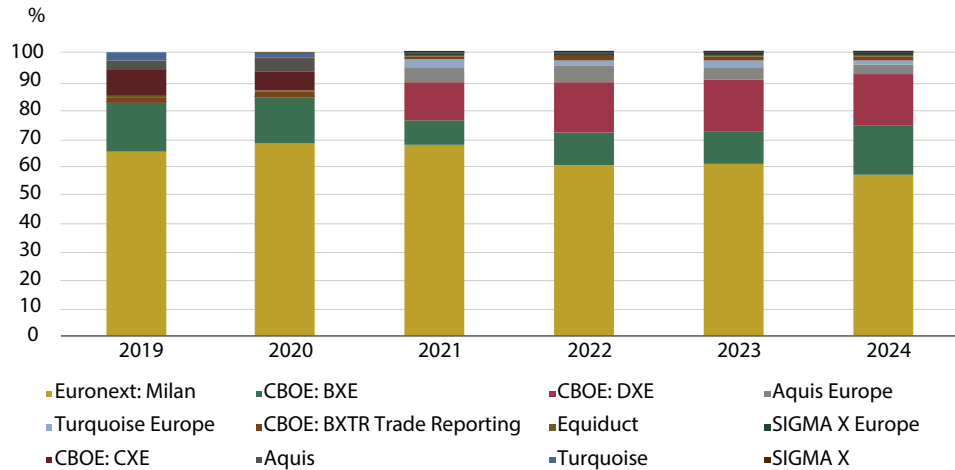
Spain



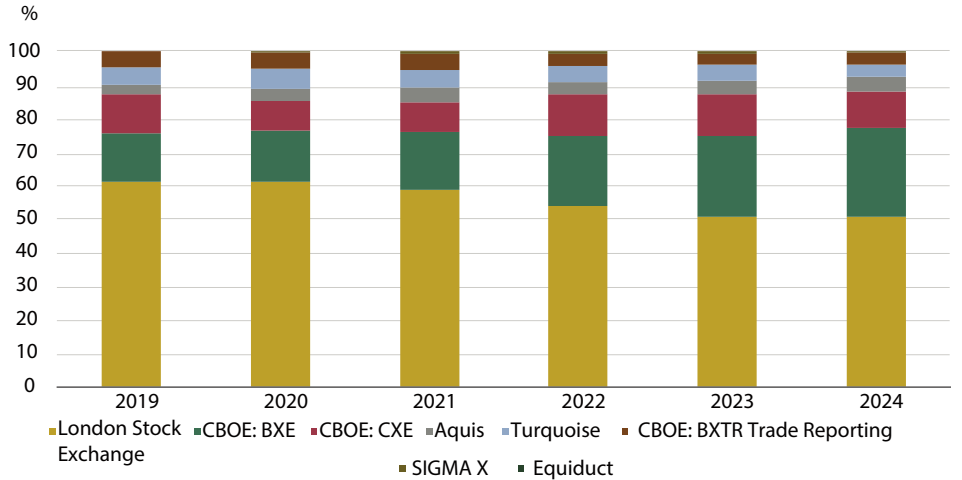
Germany



Italy



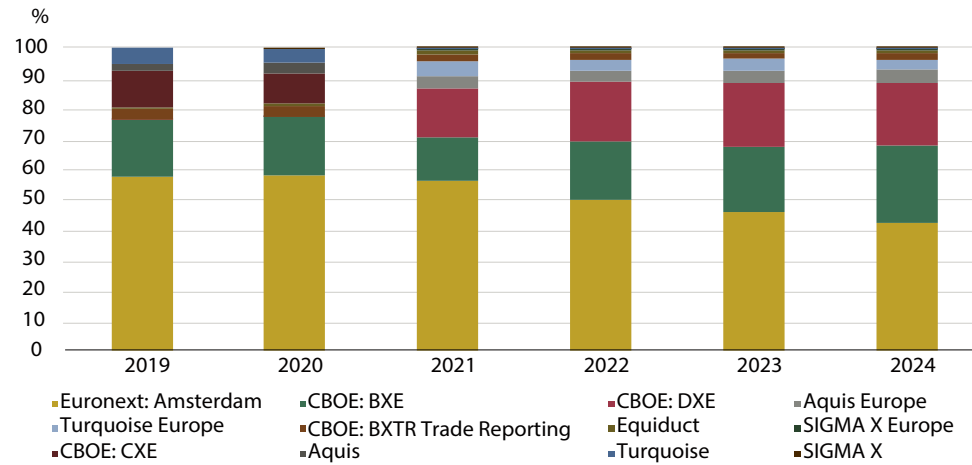
United Kingdom



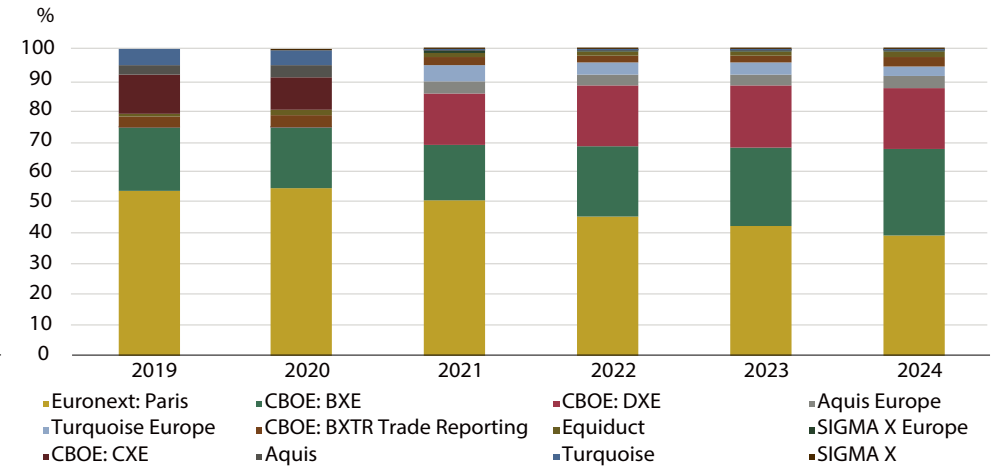
Analysis by trading venue: on-exchange trading (continuation)

FIGURE A.1.2

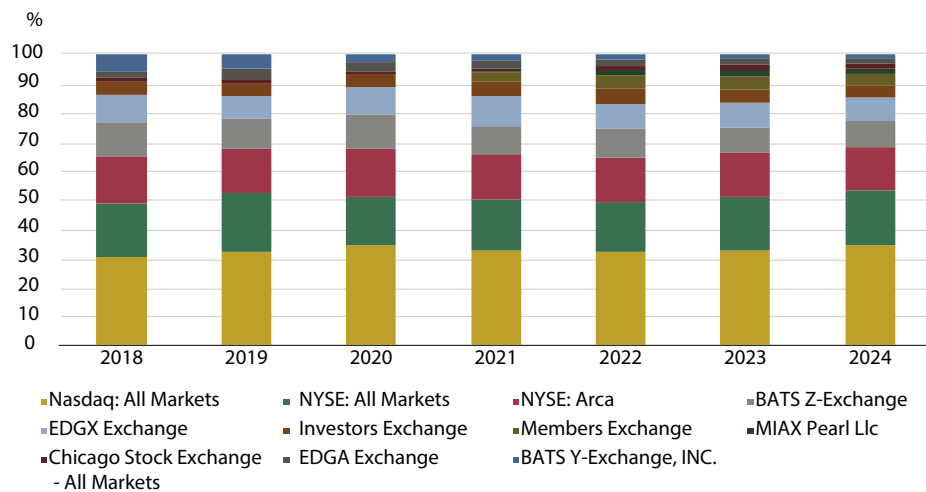
The Netherlands



France

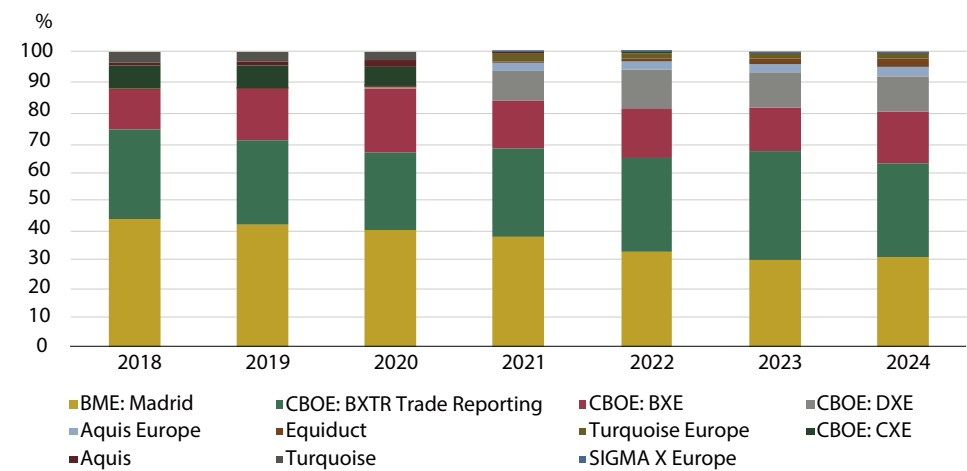


United States

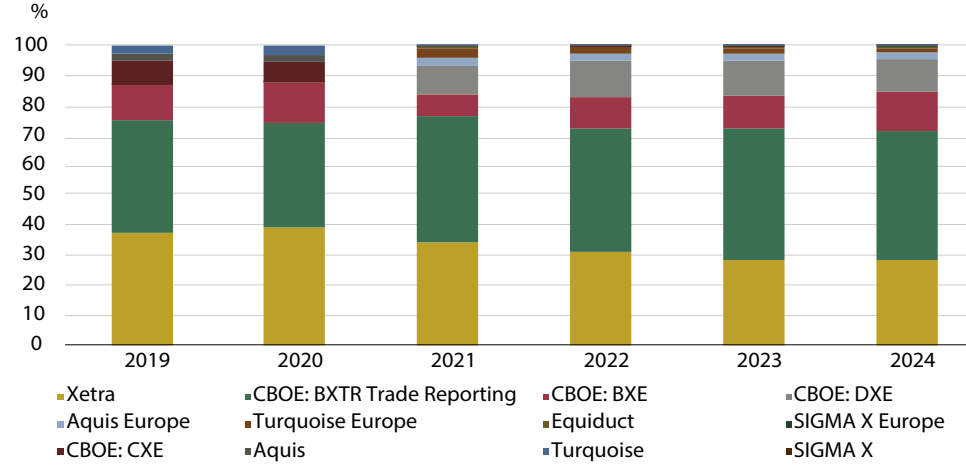


Source: BMLL and CNMV.

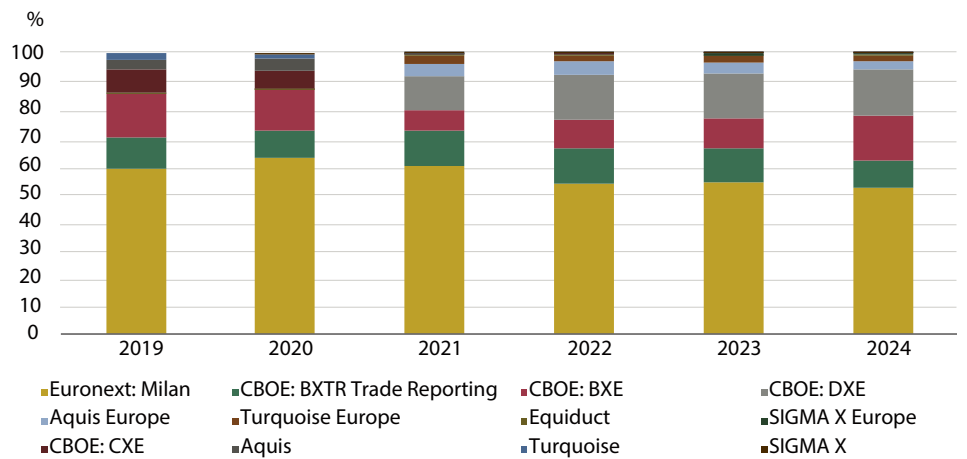
Spain



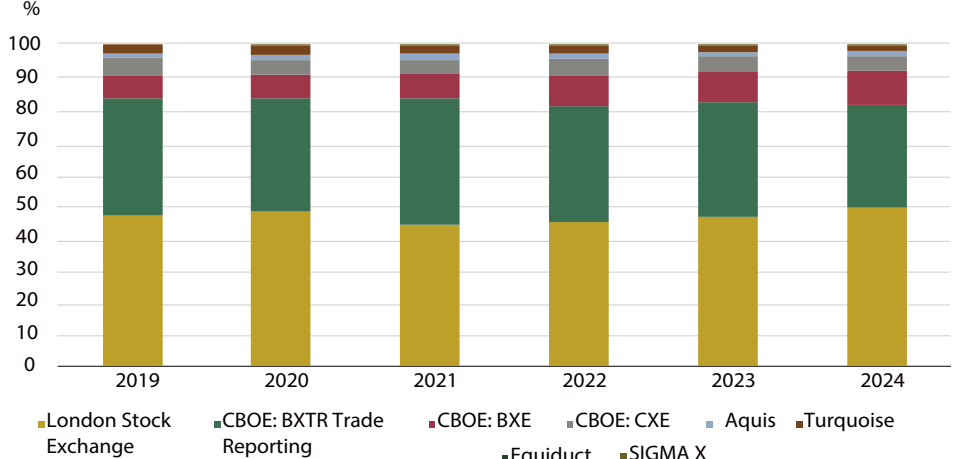
Germany



Italy



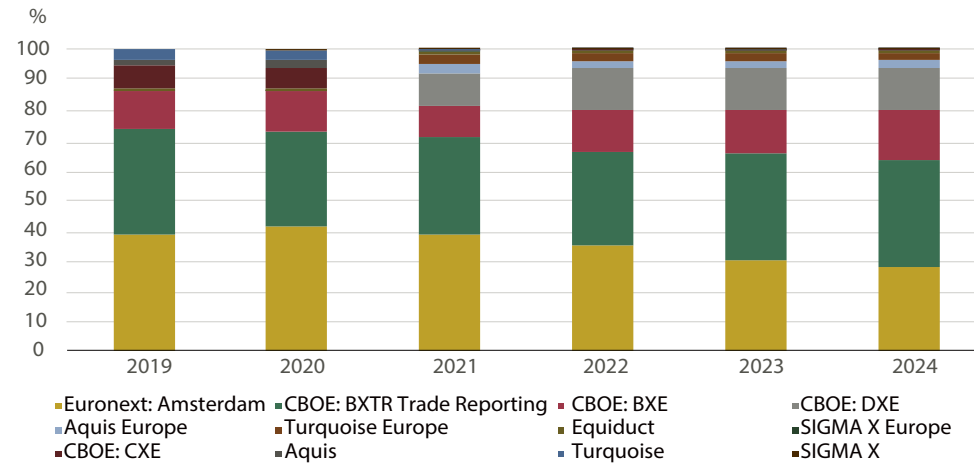
United Kingdom



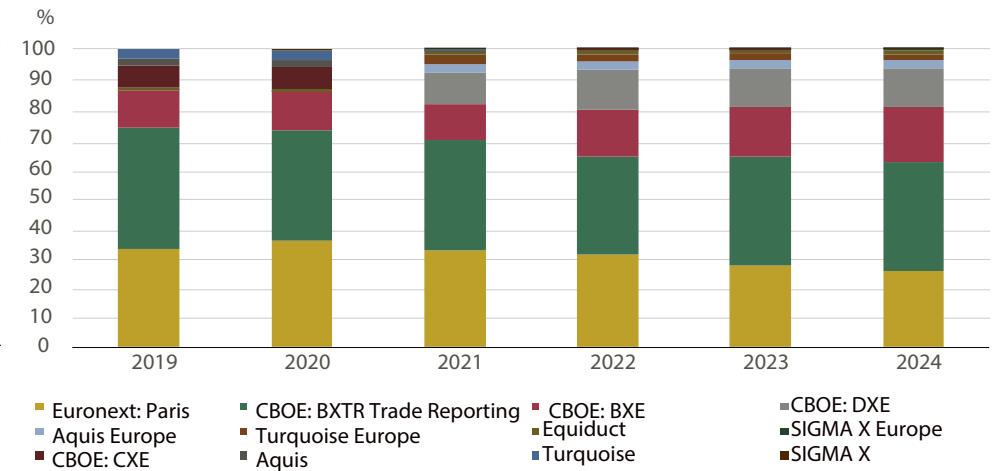
Analysis by trading venue: total trading: on-exchange, OTC and SI (continuation)

FIGURE A.1.3

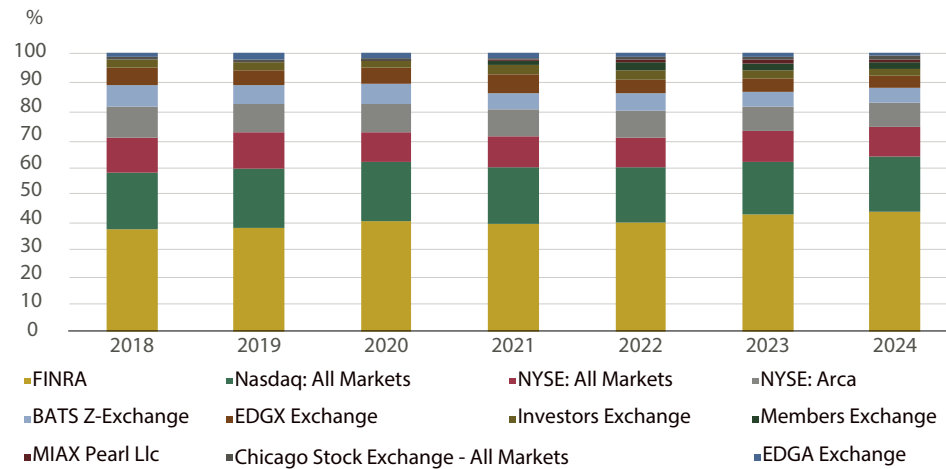
The Netherlands



France



United States

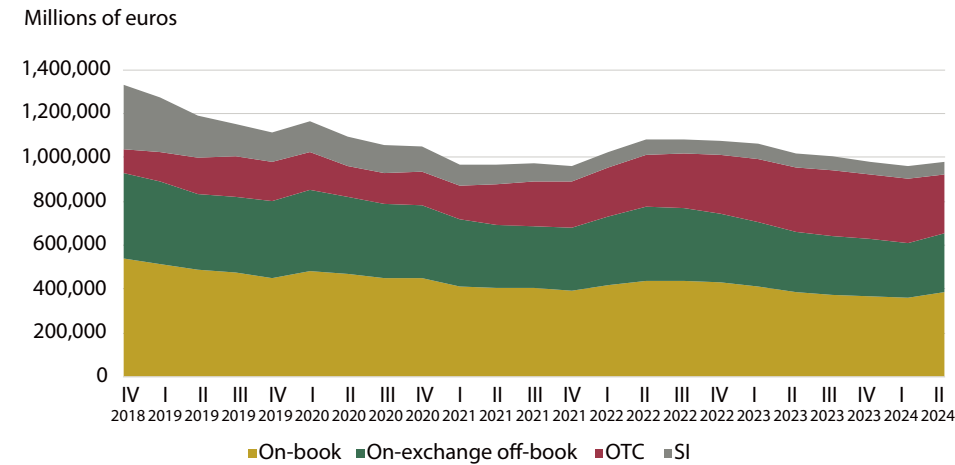


Source: BMLL and CNMV. FINRA records OTC trading.

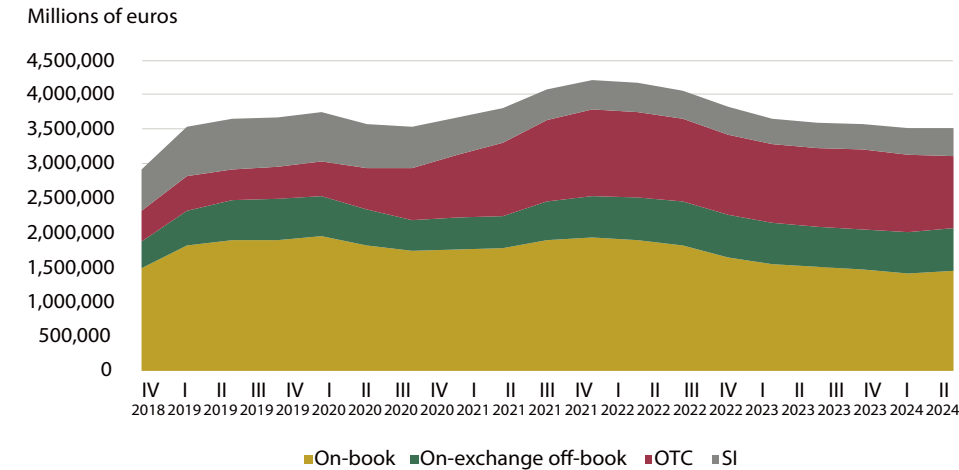
Analysis by trading mode: volume

FIGURE A.1.4

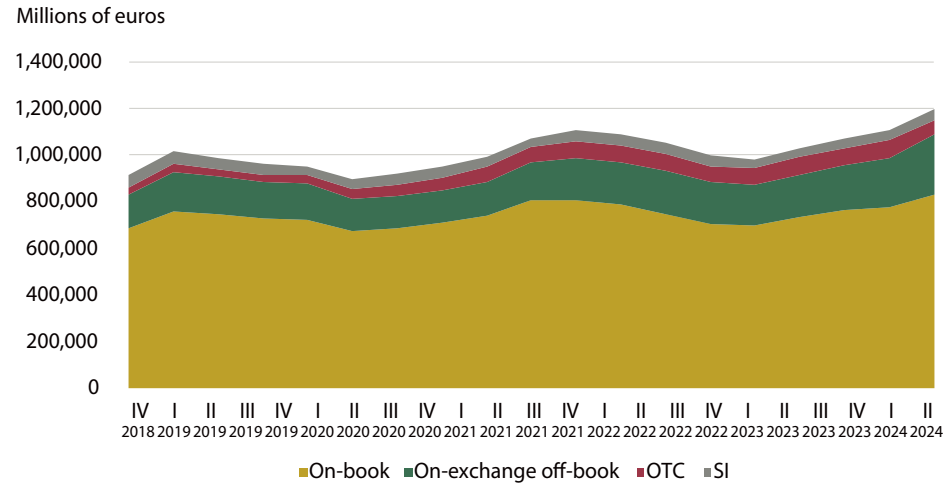
Spain



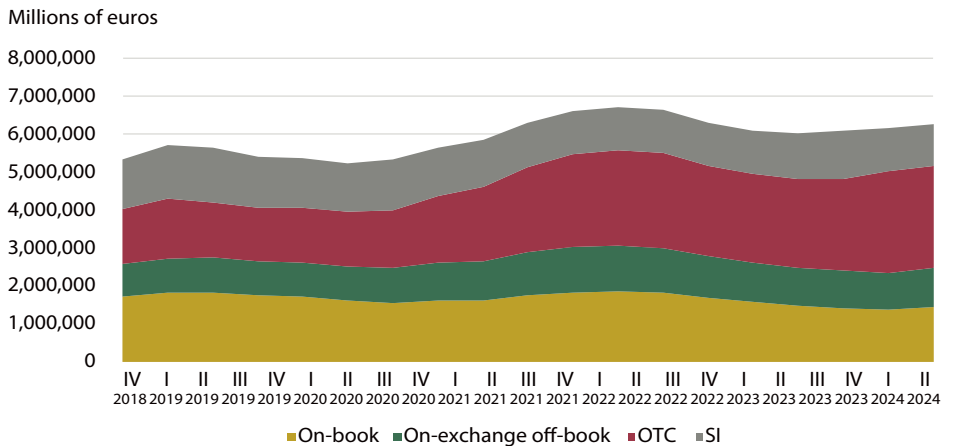
Germany



Italy



United Kingdom

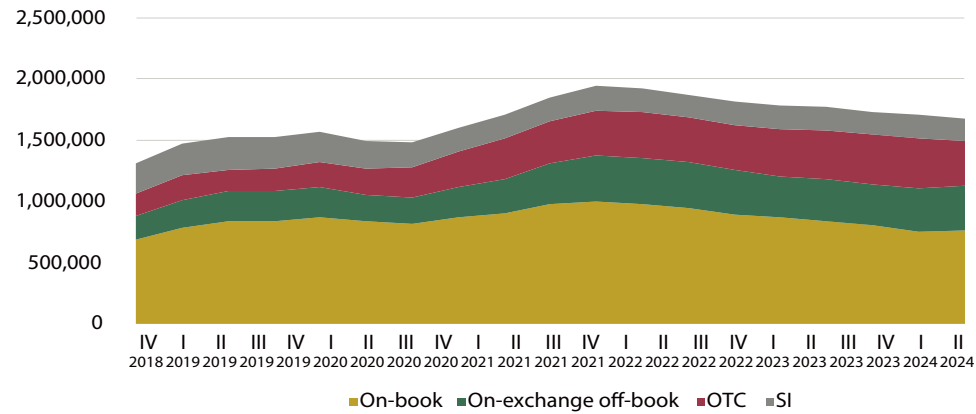


Analysis by trading mode: volume (continuation)

FIGURE A.1.4

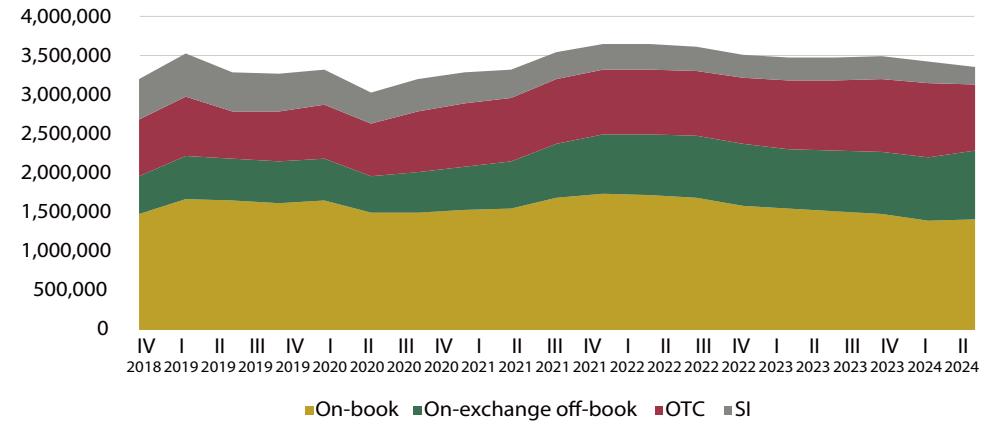
The Netherlands

Millions of euros



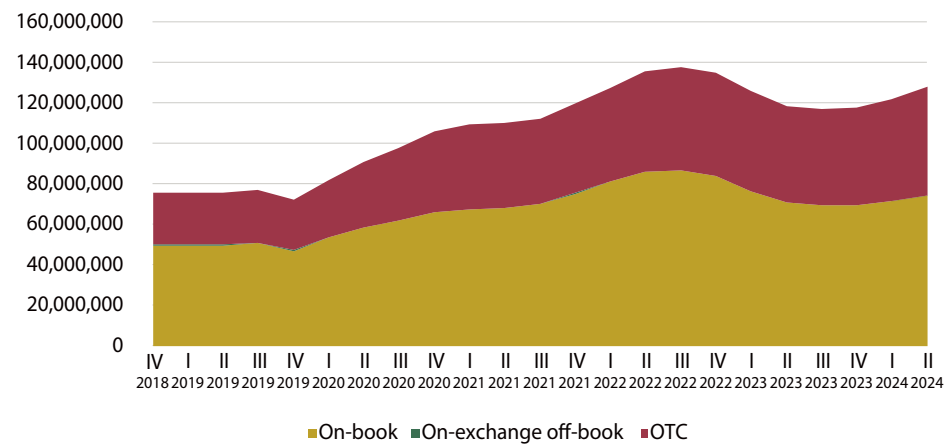
France

Millions of euros



United States

Millions of euros

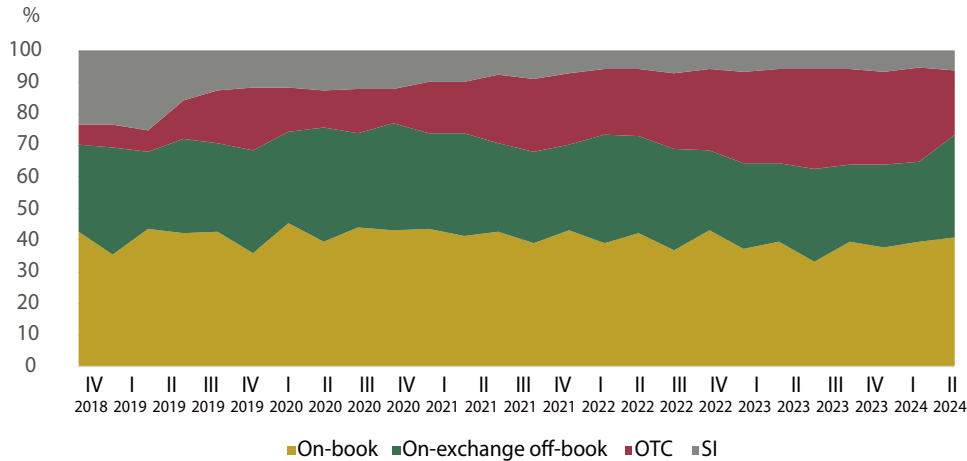


Source: BMLL and CNMV. Cumulative data for four quarters.

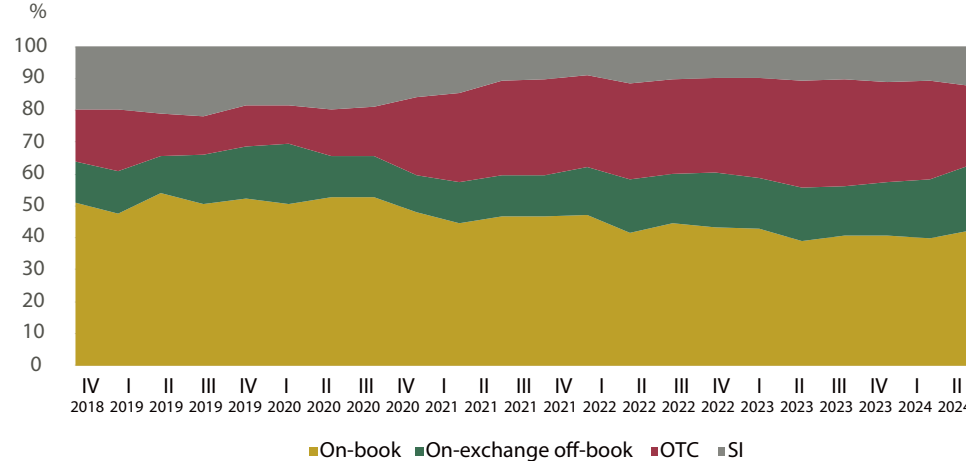
Analysis by trading mode

FIGURE A.1.5

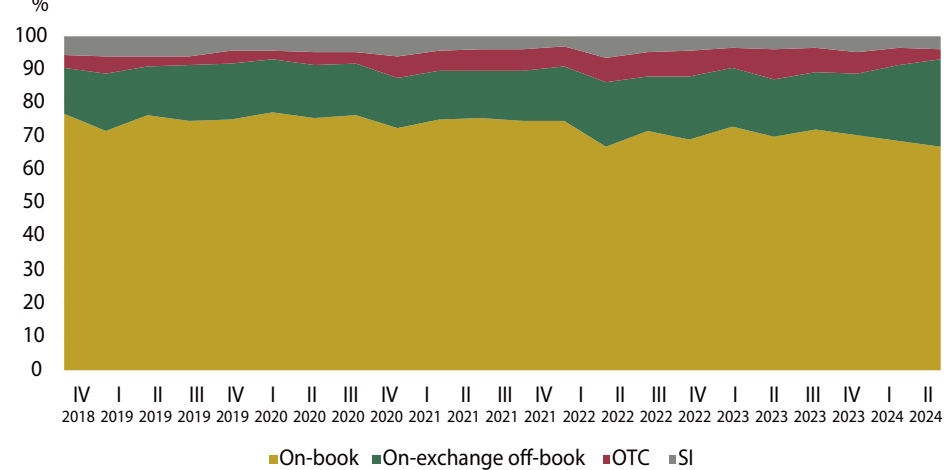
Spain



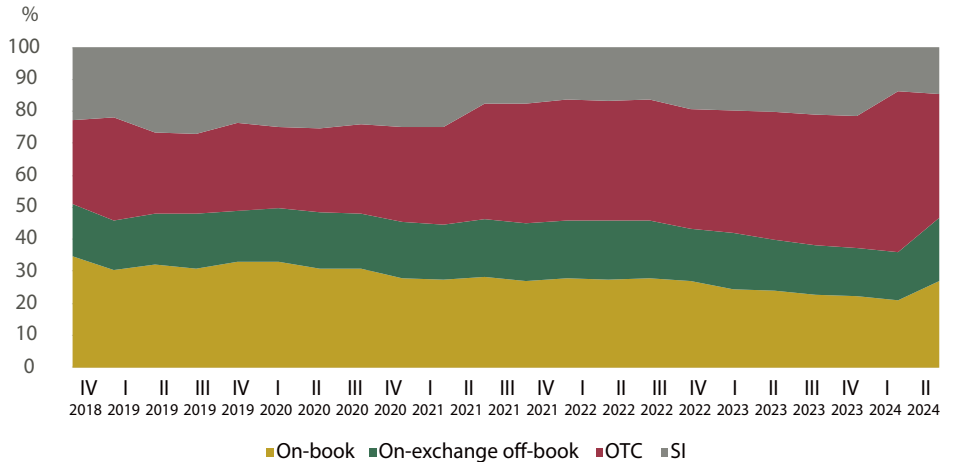
Germany



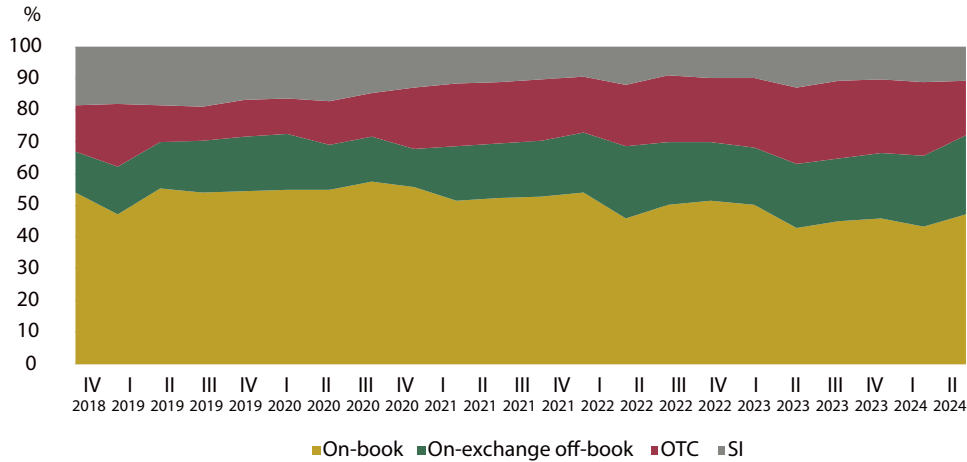
Italy



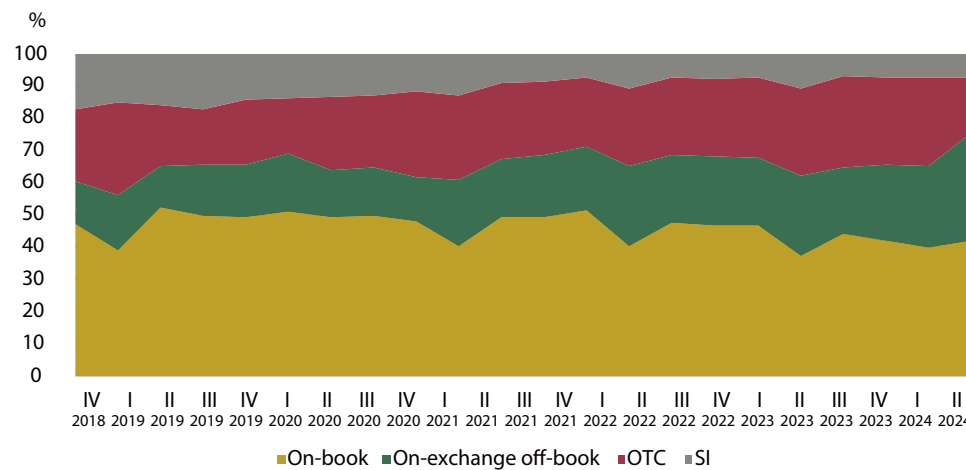
United Kingdom



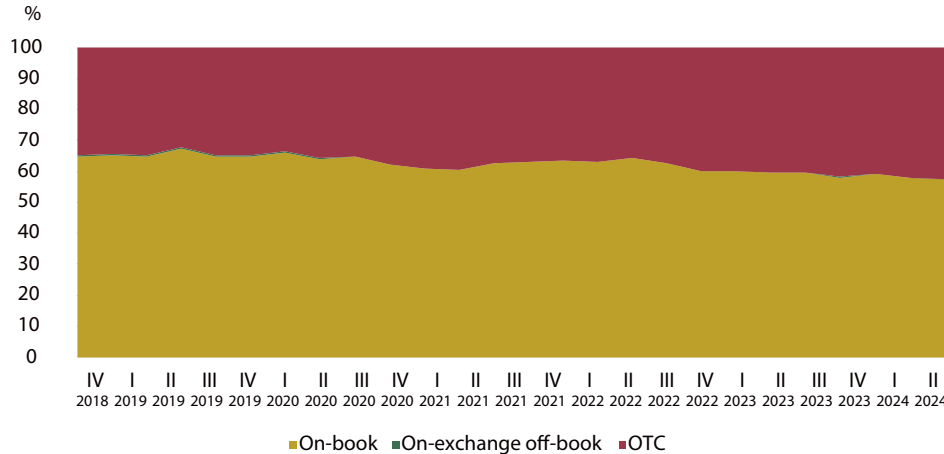
The Netherlands



France



United States



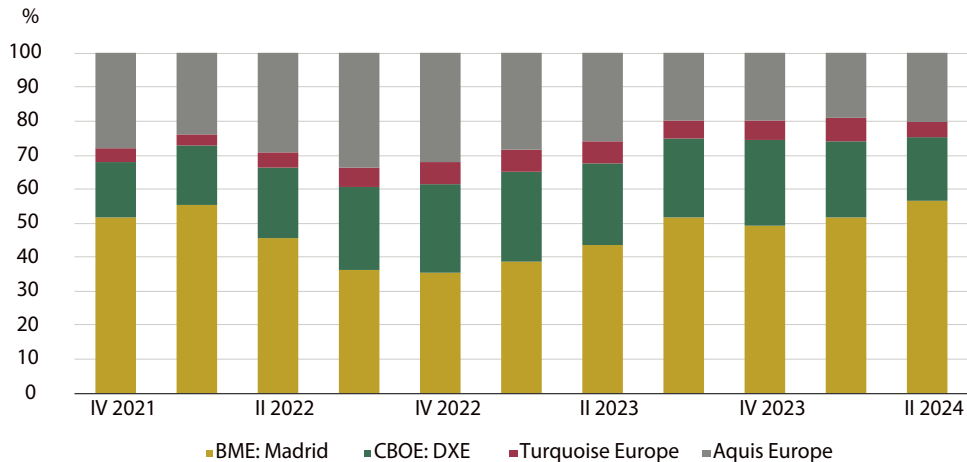
Source: BMLL and CNMV.

ANNEX A.2 Analysis of price formation and liquidity²³

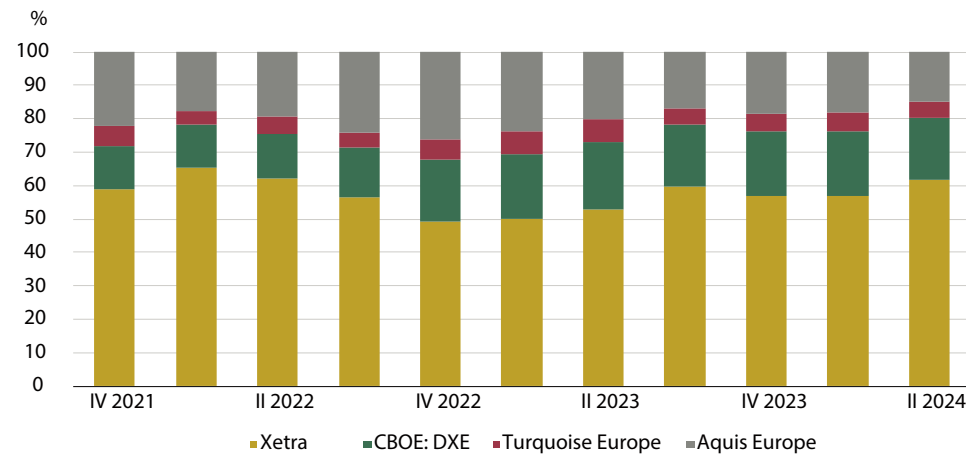
Percentage of times setting the best price (CBBO setter)

FIGURE A.2.1

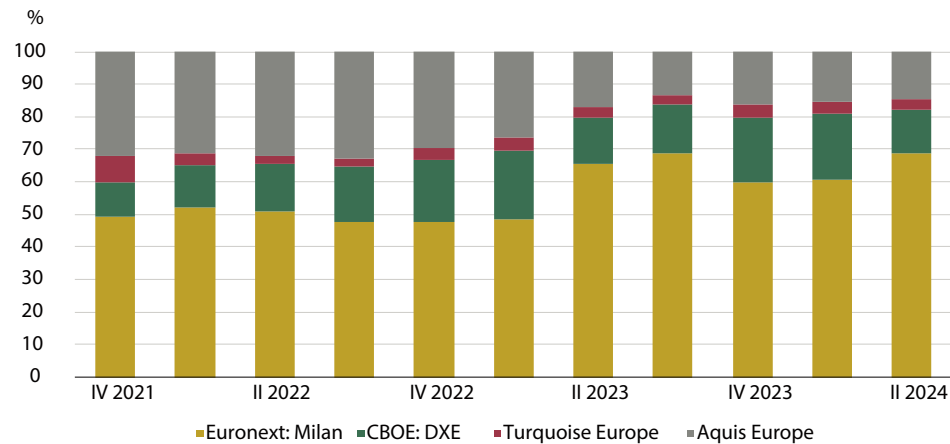
Spain



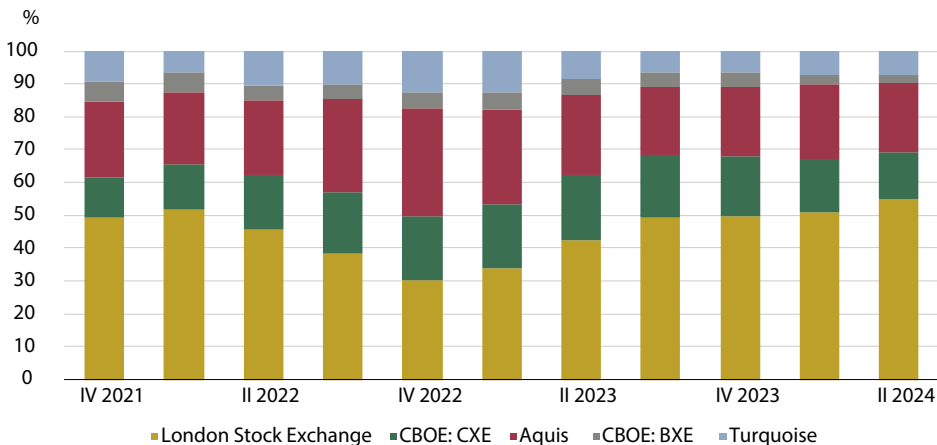
Germany



Italy



United Kingdom

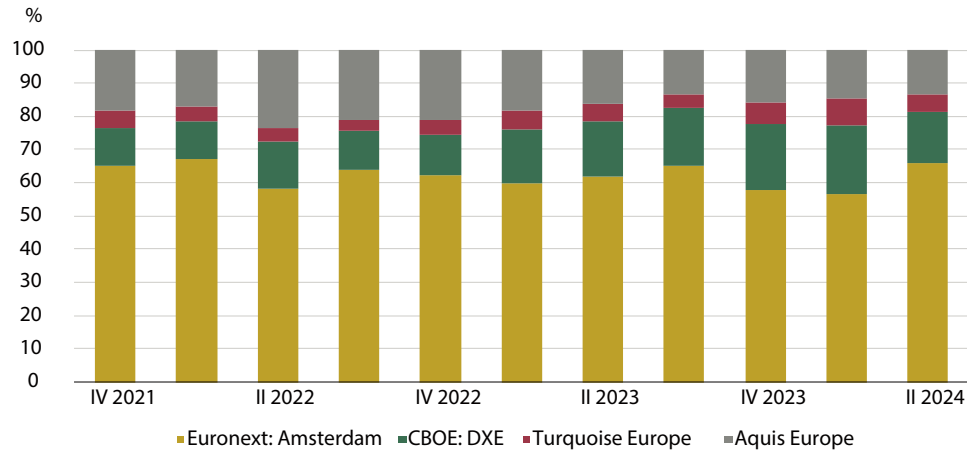


23 The price formation data in the US only consider trading in stocks that are part of the S&P500 index as of 13/09/2024.

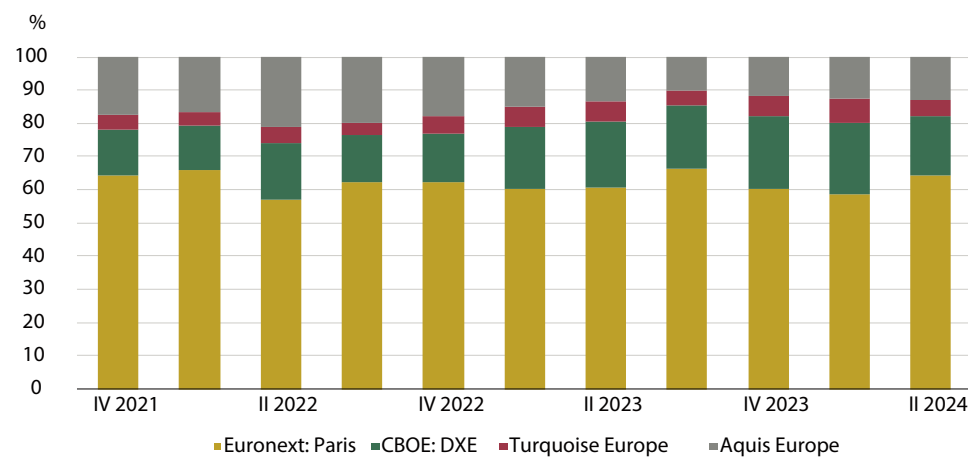
Percentage of times setting the best price (CBBO setter) (continuation)

FIGURE A.2.1

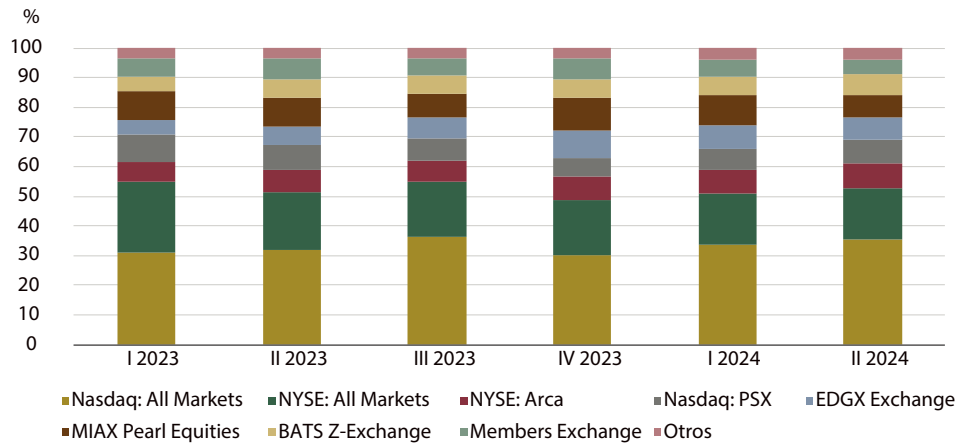
The Netherlands



France



United States

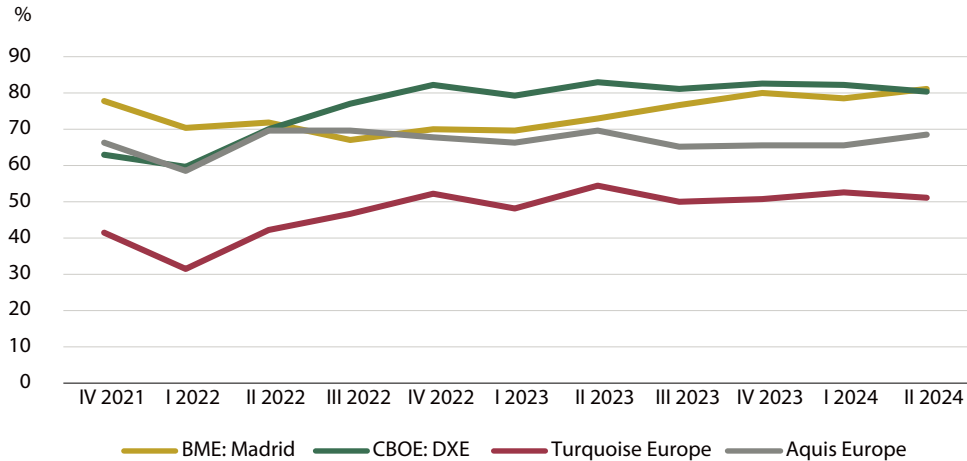


Source: BMLL and CNMV. In the US, "other" encompasses all trading venues with a metric of less than 1%.

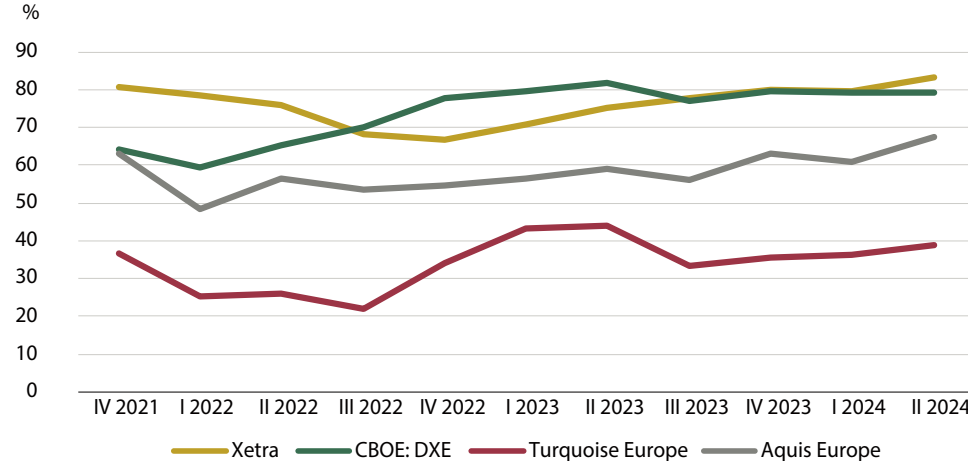
Percentage of time at best bid (CBBO)

FIGURE A.2.2

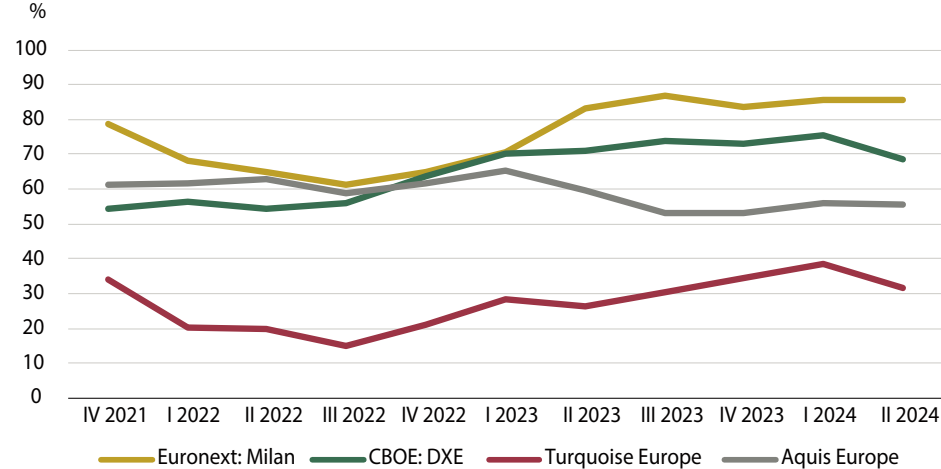
Spain



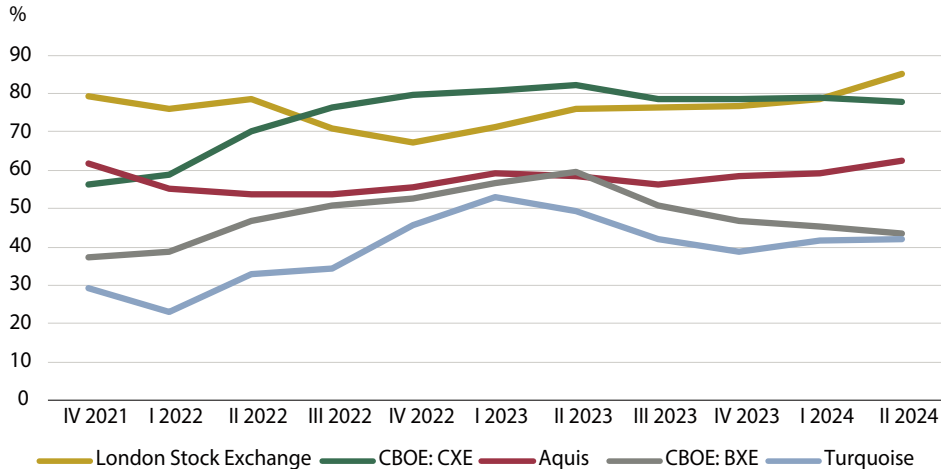
Germany



Italy



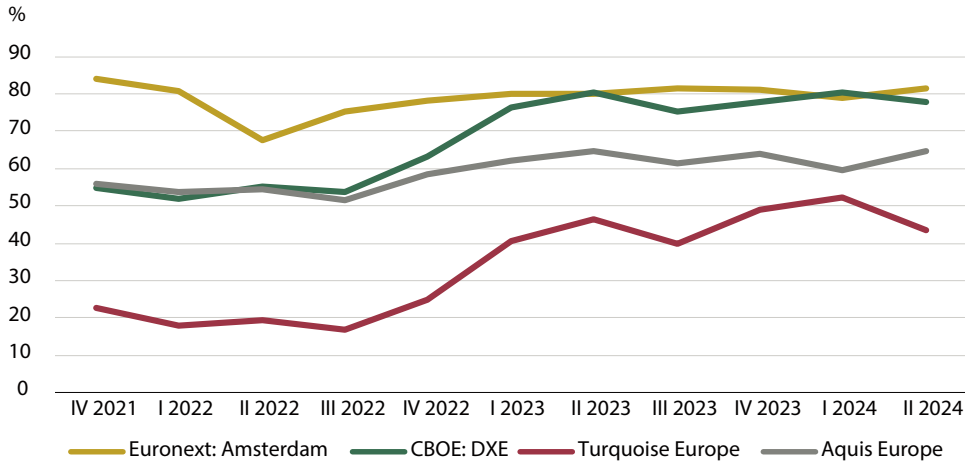
United Kingdom



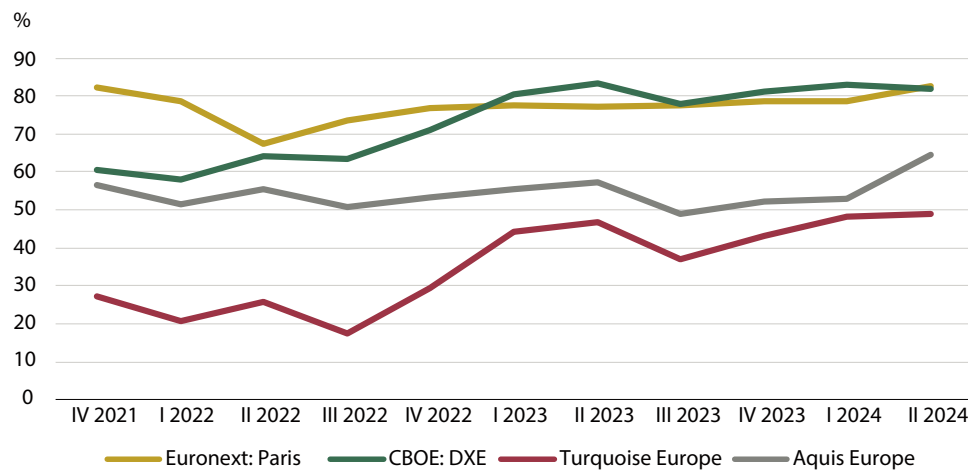
Percentage of time at best bid (CBBO) (continuation)

FIGURE A.2.2

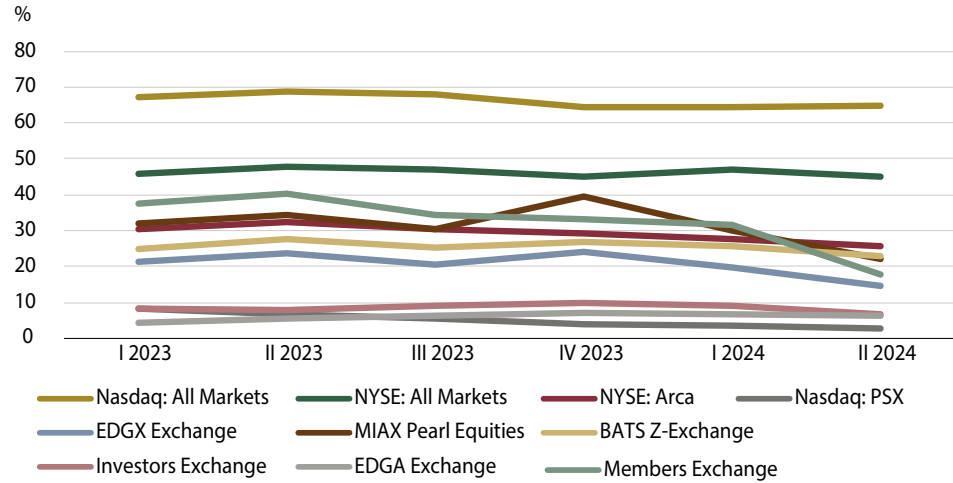
The Netherlands



France



United States

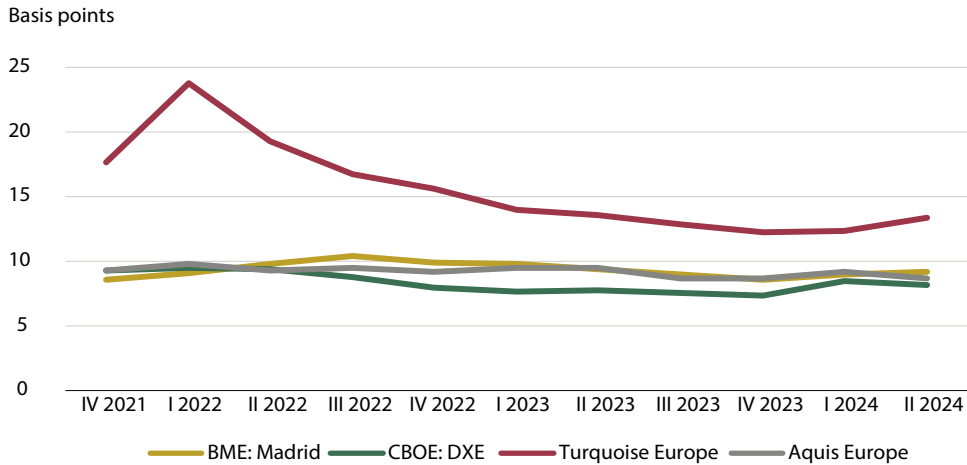


Source: BMLL and CNMV.

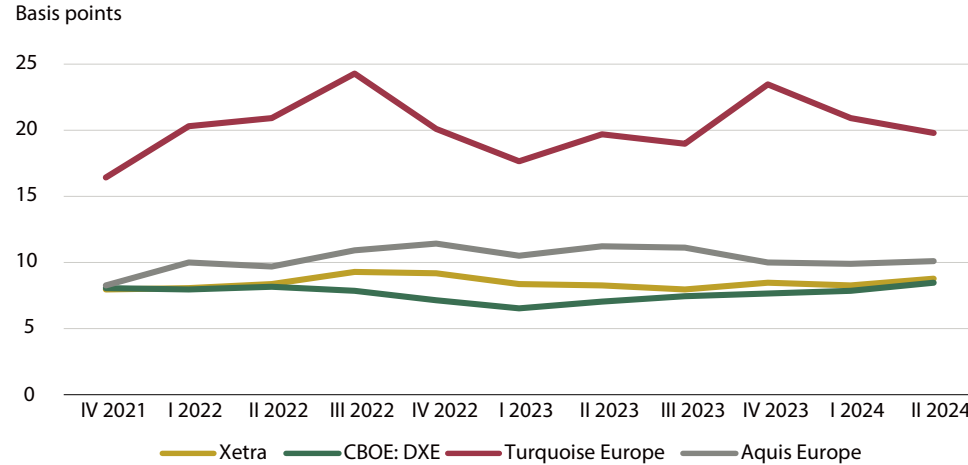
Volume-weighted bid-ask spread

FIGURE A.2.3

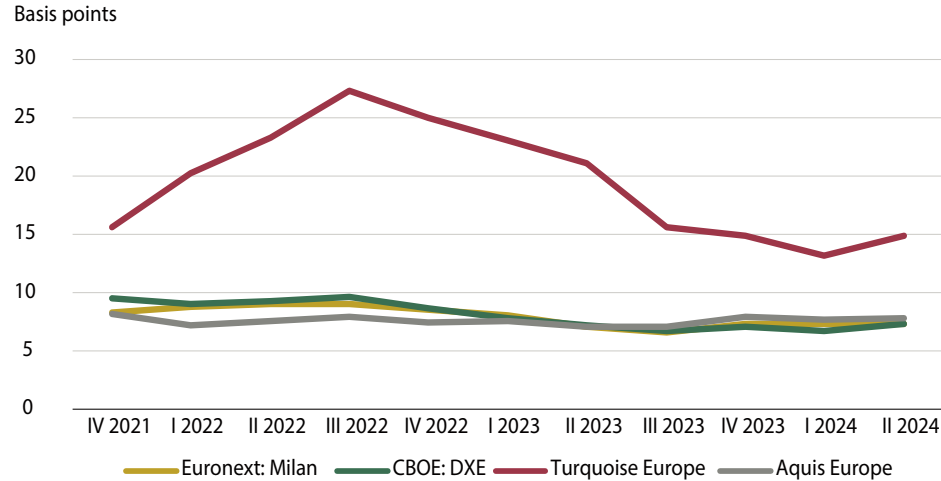
Spain



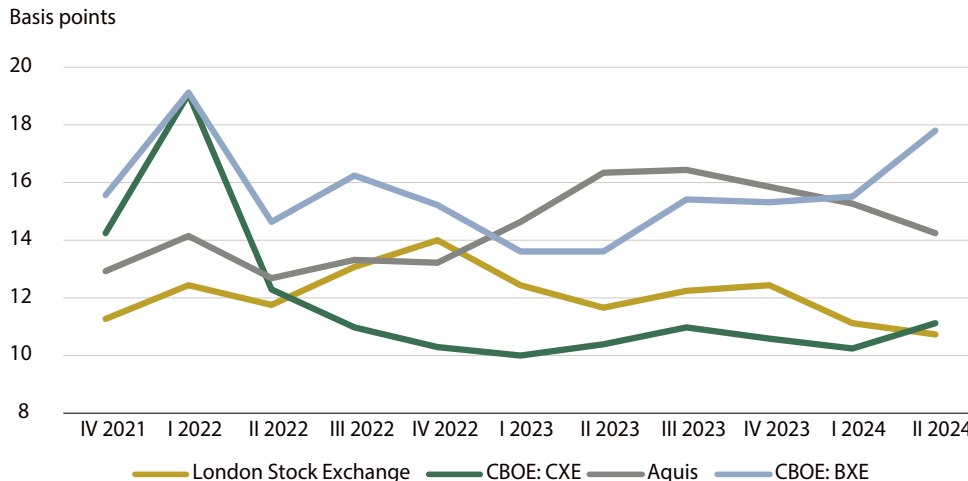
Germany



Italy



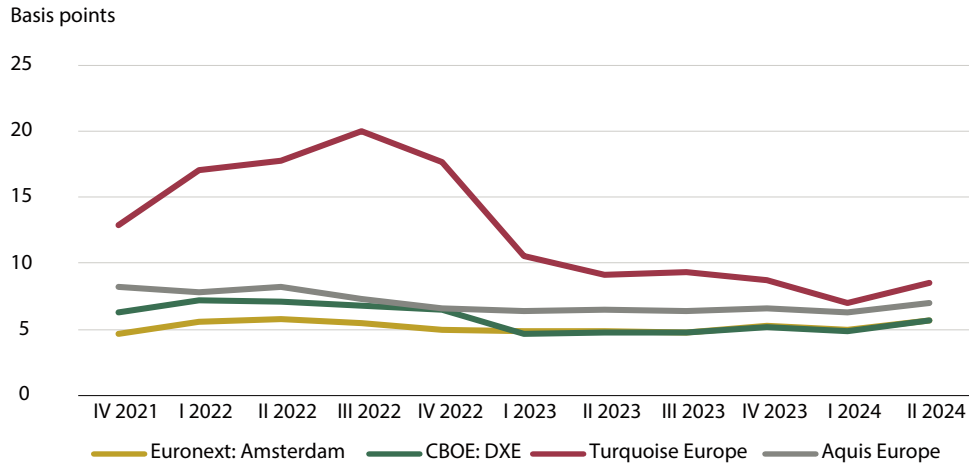
United Kingdom



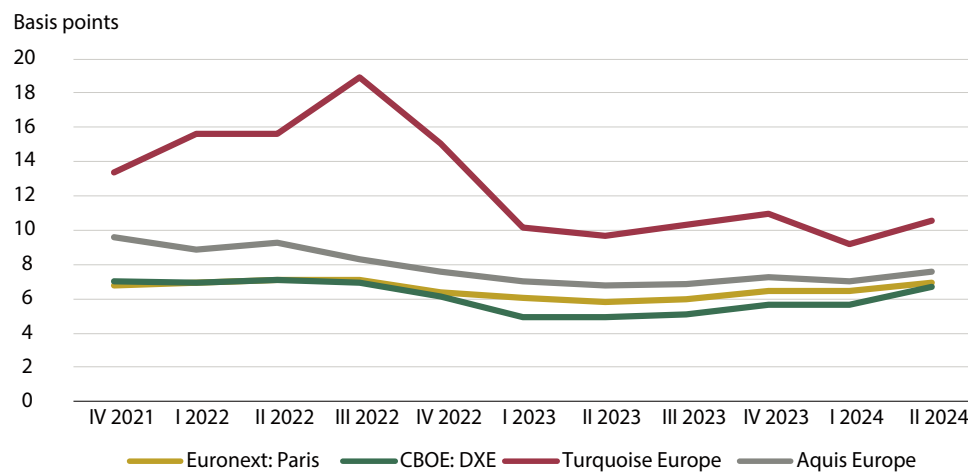
Volume-weighted bid-ask spread (continuation)

FIGURE A.2.3

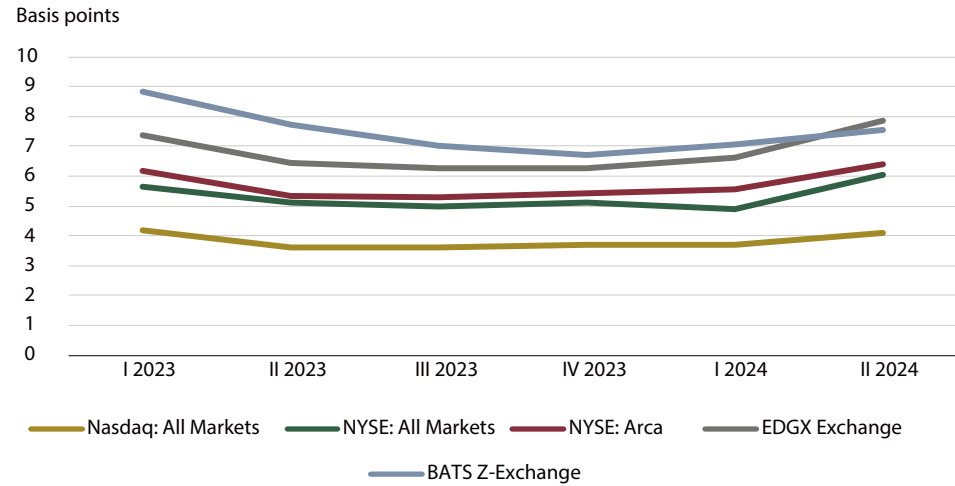
The Netherlands



France



United States

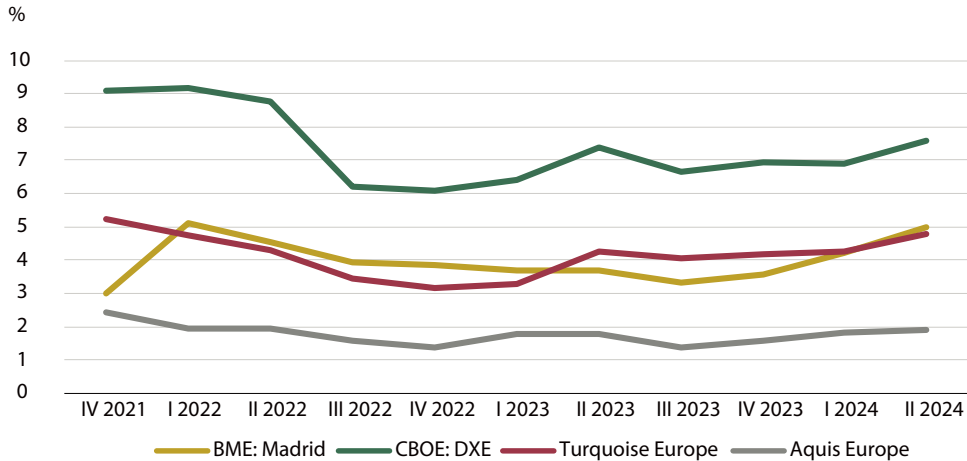


Source: BMLL and CNMV.

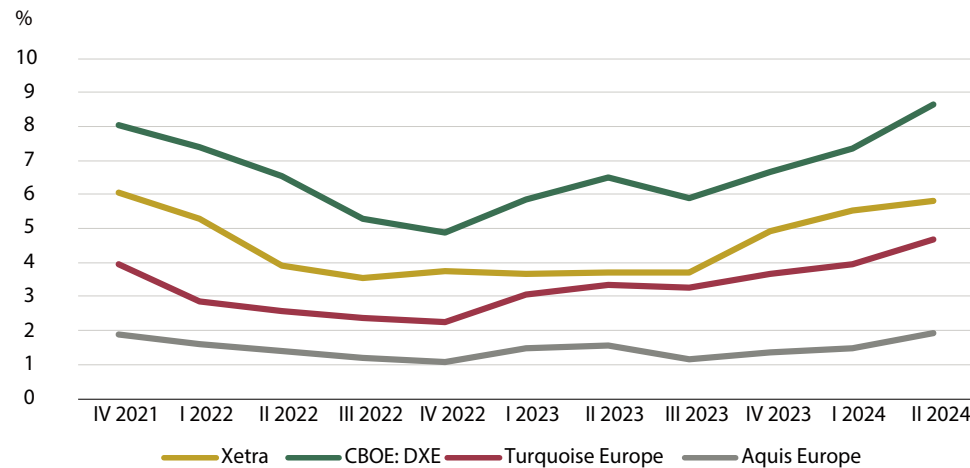
Probability of execution of an order

FIGURE A.2.4

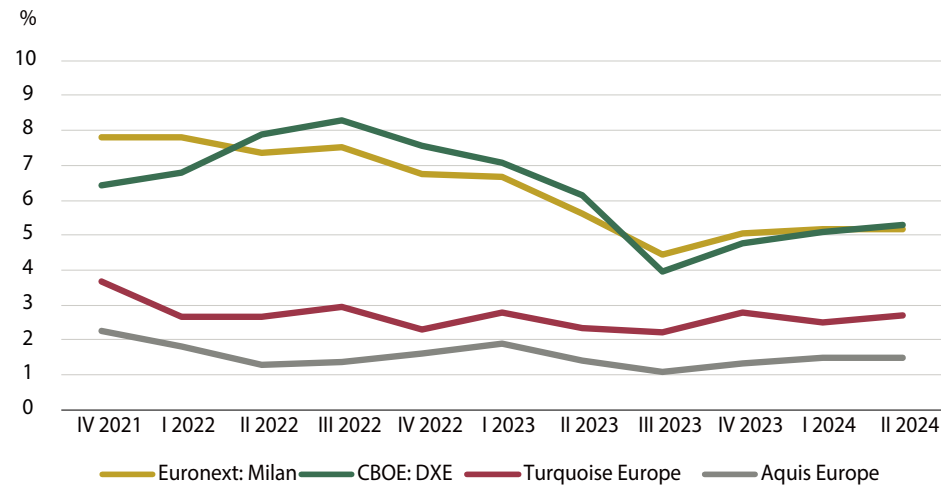
Spain



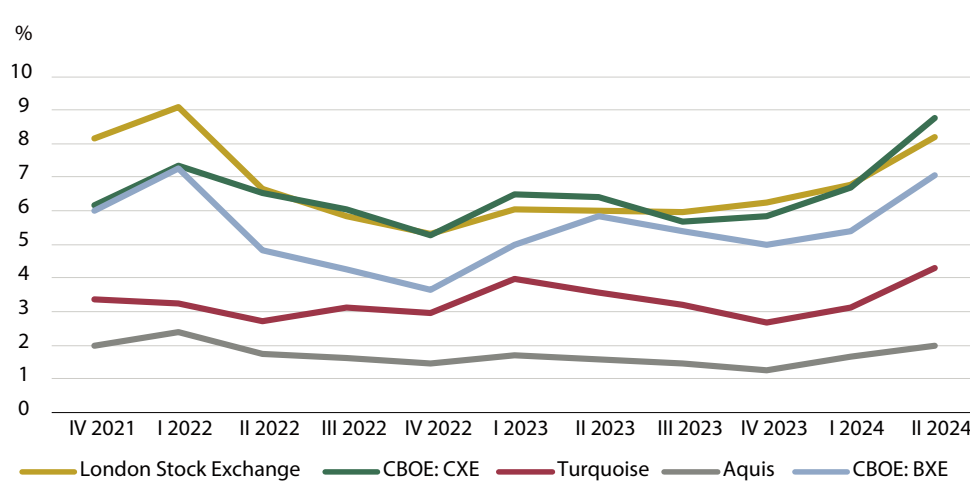
Germany



Italy



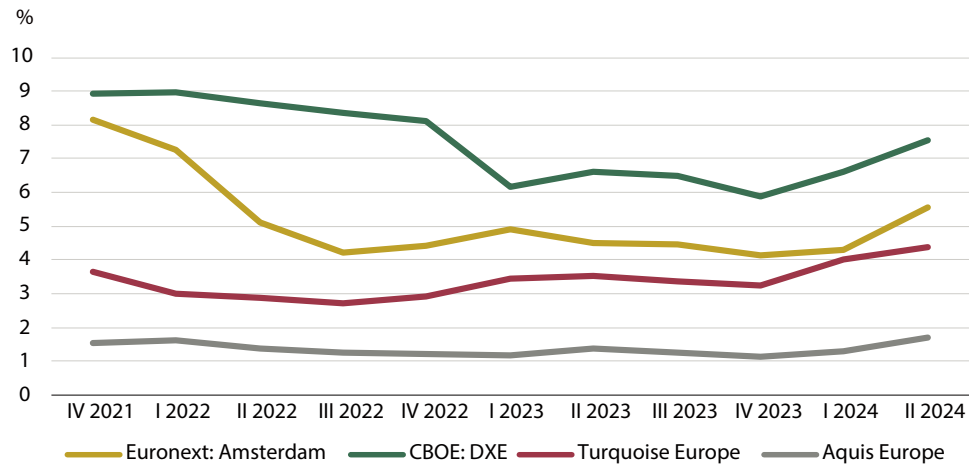
United Kingdom



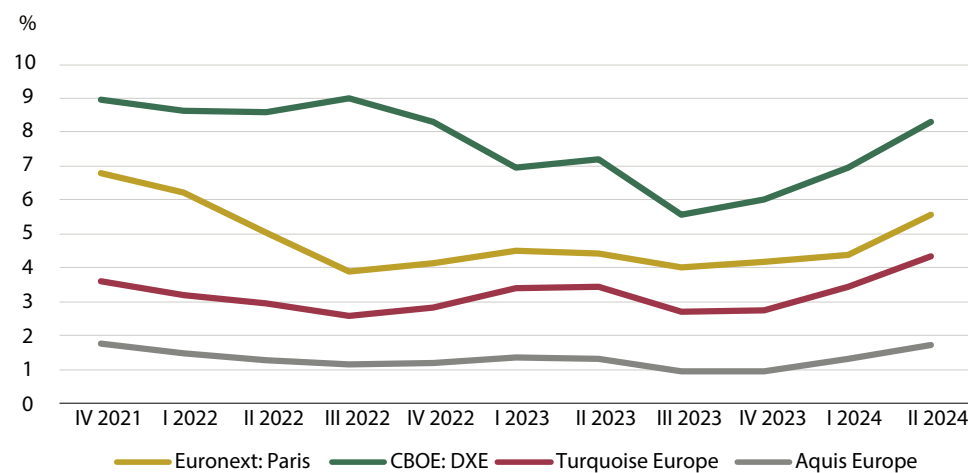
Probability of execution of an order (continuation)

FIGURE A.2.4

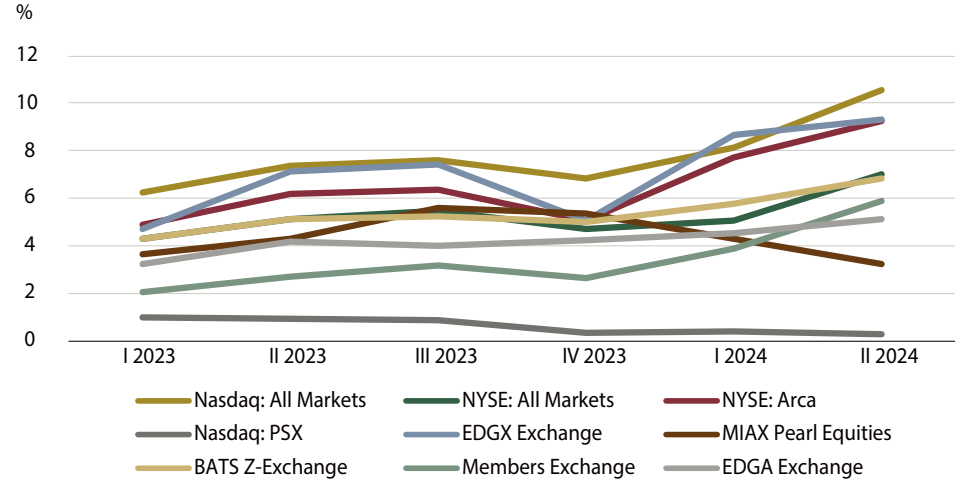
The Netherlands



France



United States



Source: BMLL and CNMV.

