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Liquidity in the UK corporate bond market

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Summary

In this paper, we assess the state of liquidity in the UK corporate bond market. To do this we closely follow the methodology in our '*Occasional Paper 14 - Liquidity in the UK corporate bond market: evidence from trade data (OP-14)'* using updated data from MiFID II transaction reports. Our aim is to understand the current level of, and trends in, liquidity and market activity in the UK corporate bond market.

In its Strategy 2025 to 2030 the FCA set out its regulatory priorities for the next five years, including a commitment to support growth, by ensuring the continued competitiveness of our world leading financial services. The corporate bond market is vital for economic growth, providing businesses with efficient access to funding for investment, expansion, and innovation. A well-functioning market supports financial stability, enables long-term capital allocation, and enhances investor confidence. This paper contributes to this work by informing us about developments in the corporate bond market.

Over our sample period of 2018 to 2024, the UK market faced several significant market events, including the UK's exit from the EU and European Common Market (Brexit), economic impacts of the coronavirus pandemic, and the first return of substantial inflation and interest rates since the global financial crisis. To examine how they fared during this turbulent period and identify any emerging trends that may affect the functioning of the market, we test four hypotheses on the UK corporate bond market. To see whether the UK corporate bond market was shrinking over the observed sample, we test whether volumes traded, and the number of actively traded UK corporate bonds were falling during this period. To investigate whether the price setting and capital allocation function of the UK corporate bond market was deteriorating, we test three hypotheses: whether dealer banks were less willing to take on inventory during this period; whether the UK corporate bond market had persistently decreased levels of liquidity during this period; and whether yield spreads in UK corporate bonds were higher, causing an increase in the cost of raising capital with corporate bonds over the period.

We conclude that despite significant disruption and challenges over the sample period, the UK corporate bond market showed resilience and made a strong recovery from the aforementioned challenges. We do not find evidence suggesting that there was a sustained deterioration in the price setting and capital allocation function of active and listed UK corporate bonds, or that market volumes were on a downward trend. We show that the market in 2024 was liquid and yield spread estimates were low. Both overall volume and the number of issuances trading on the UK market were growing in 2023 and 2024.

1 Overview

Purpose

By updating OP-14, we aim to improve the understanding of recent developments and market trends in the UK corporate bond market. The corporate bond market is a vital market for the UK economy, connecting financial markets to the real economy as they play a crucial role in companies' access to finance. The period of 2018 to 2024 has seen several significant market events and, by leveraging the FCA's access to MiFID-II transaction reports, we can contribute to furthering understanding of how market liquidity has been affected by these events.

The FCA has made several interventions in the UK bond market in recent years. For example, we have recently established a simpler and timelier post-trade transparency regime for bonds, applicable from December 2025. Following the introduction of the bond transparency regime, we will be establishing a consolidated tape (CT) for bonds to collate market data and expect to consult on establishing one for equities. This paper is part of an ongoing research workstream designed to inform policy discussions and assess changes in market conditions, activity, and liquidity. This work is an important contribution to our strategic objective of supporting the functioning of UK financial markets and economic growth.

Key findings

In summary, the results of our analysis show:

The UK corporate bond market experienced challenging market conditions from 2020 to 2022

We find evidence of two distinct periods of illiquidity. Firstly, a sharp rise in illiquidity alongside high levels of market activity immediately following the onset of coronavirus restrictions in the UK in spring 2020. Secondly, a period between mid-2021 and mid-2023 with less pronounced but sustained levels of illiquidity and reduced market activity, coinciding with a period of increased inflation and the first return of significantly increased interest rates since the global financial crisis. We find evidence of increased inventory risks for dealer banks and liquidity risk premiums for corporate bonds between 2020 and 2022.

Our sample shows a sharp drop in EUR denominated corporate bonds listed and traded on the UK market in 2021, immediately following the UK's exit from the EU and European common market.

The UK corporate bond market was strong and growing in 2023 and 2024

Following the period ending 2022, we find steadily growing transaction volumes, and a rise in the number of corporate bonds listed and traded on the UK market across the major denominations of GBP, USD, and EUR. With c. £5 trillion of volume traded in 2024 and 60% of all European corporate bond trading taking place in the UK (ICMA, 2024), the UK continued to be a global hub for corporate bond trading.

Our estimates show strong liquidity, low yield spreads and liquidity risk premiums, and low estimated inventory risk for dealers from 2023 onwards, indicating that the illiquidity impacts of the disruptive events were not sustained in the market. By the end of our sample period market conditions were healthy.

We acknowledge that our analysis is limited by the data we observe. As we only access data on the UK corporate bond market and not global markets, we are not able to compare the performance of the UK market with overseas markets and so we only look at the UK market in isolation.

Equality and diversity considerations

We have considered the equality and diversity issues that may arise from the proposals in this Occasional Paper.

Overall, we do not consider that the proposals in this Occasional Paper adversely impact any of the groups with protected characteristics i.e. age, disability, sex, marriage or civil partnership, pregnancy and maternity, race, religion and belief, sexual orientation and gender reassignment.

2 Research context

The importance of corporate bond markets

Transferable debt securities issued by companies, more commonly known as corporate bonds, are an important source of funds for businesses financing both ongoing operations and expansion. For investors, corporate bonds can be an important part of an investment portfolio, as there are a wide range of securities available to invest in and they generally offer less volatile returns than stocks, and higher returns than government bonds.

Non-financial institutions are a crucial engine to sustainable growth in the real economy and corporate bonds are an important source of finance for them by which they fund their business development. Bond financing for financial institutions also plays a crucial role in stimulating the real economy. It enables banks to access capital for a range of financial products, including trade finance, project finance, consumer credit, syndicated lending, mortgages through covered bonds, and other instruments, all of which provide indirect support to the real economy by enhancing liquidity and credit availability (ICMA, 2013).

While capital markets are global and firms can theoretically issue bonds in any jurisdiction, there are still important links between UK economic growth and the UK corporate bond market specifically. For the UK, maintaining a deep and liquid corporate bond market is essential—not just to attract international capital, but also to ensure that domestic savings are channelled efficiently into domestic investment. The cost and speed by which bonds can be traded is an important consideration for investors in placing their capital, alongside other market features such as legal and regulatory frameworks. Enhancing these features strengthens the UK's financial ecosystem and helps to determine the location a corporate issuer decides to issue their bonds in. This, in turn, supports sustainable economic growth by ensuring UK firms have ready access to capital. Further, the listing and trading activity contributes to the overall performance and growth of UK financial markets in terms of listing and trading volumes, as well as forming an important part of the package of products and services provided by the UK global financial hub.

Corporate bonds differ significantly from other UK securities in terms of their liquidity and the composition of market participants. They are generally less liquid and do not offer the narrow bid-ask spreads of government bonds or stocks. Only a small share of the largest and most liquid bonds trade regularly, and a significant share of bonds are not traded at all on the secondary market. However, although corporate bonds only trade infrequently, their average turnover ratios are only slightly lower than stocks since the average trade size is significantly higher than that of stocks. Corporate bond markets also have significantly less retail participation than equity markets and a much larger share of trades occur off-venue 'over-the-counter'.

The corporate bond market between 2018 and 2024

Over the period from 2018 to 2024, the UK corporate bond market experienced substantial volatility and many changes, influenced by events such as Brexit, the coronavirus pandemic, substantial inflation, and economic policy decisions and Bank of England interventions.

Pre-coronavirus conditions

Despite concerns around the transition period between the UK's vote to exit the EU in June 2016 and its formal exit in January 2020, the UK corporate bond market was relatively stable during 2018 and 2019. Issuance levels in investment grade bonds were well above pre-referendum levels, despite a small drop in 2018 (IOSCO, 2022). The International Capital Market Association (ICMA) reported that issuer and underwriter communities did not express concerns about significant market disruption in the primary bond market, and there has not been significant evidence of a shift away from London as a listing venue for Eurobonds ahead of Brexit (ICMA, 2021). In fact, analysis by the ECB shows that Euro area investors initially increased their exposure to UK listed and GBP denominated bonds following the Brexit vote (Carvalho et al, 2024). However, there is evidence that uncertainty around the Brexit deal and the post-Brexit transition led to a rise in high yield bond risk premia in GBP and EUR denominated bonds, relative to USD bonds in 2018 (Kadiric, 2019).

The coronavirus shock and Bank of England interventions

The coronavirus pandemic significantly disrupted the corporate bond market. The primary market was initially curtailed between February and March 2020 and liquidity levels in the secondary market dropped substantially, although the extent of illiquidity and how it manifested varied across types of bonds. A 'dash-for-cash' from investors manifested in the period immediately following global lockdowns, whilst corporate borrowing and debt issuances surged, leading to pressures from both the supply and demand for corporate bonds (IMF, 2021). In most jurisdictions, for some time only short-term, high-quality instruments could be traded and market participants reported particular challenges executing large blocks of trades and an eventual inversion of the yield-curve as the crisis deepened (IOSCO, 2022).

In response to the coronavirus crisis, the Bank of England alongside other central banks globally intervened in bond markets to stabilise financial conditions and support the economy. Through its quantitative easing program, the Bank expanded its asset purchases significantly, buying government bonds (gilts) and corporate bonds through the Corporate Bond Purchasing Scheme to inject liquidity into the financial system. Around the same time, the US Federal Reserve Bank[1] and the European Central Bank[2] introduced several programmes to further support global corporate bond markets. These interventions aimed to reduce borrowing costs, smooth market functioning, and provide support for businesses and households facing economic uncertainty.

[1] E.g., the Primary and Secondary Market Corporate Credit Facilities and the Money Market Mutual Fund Liquidity Facility
[2] The Pandemic Emergency Purchase Programme.

Post-coronavirus conditions

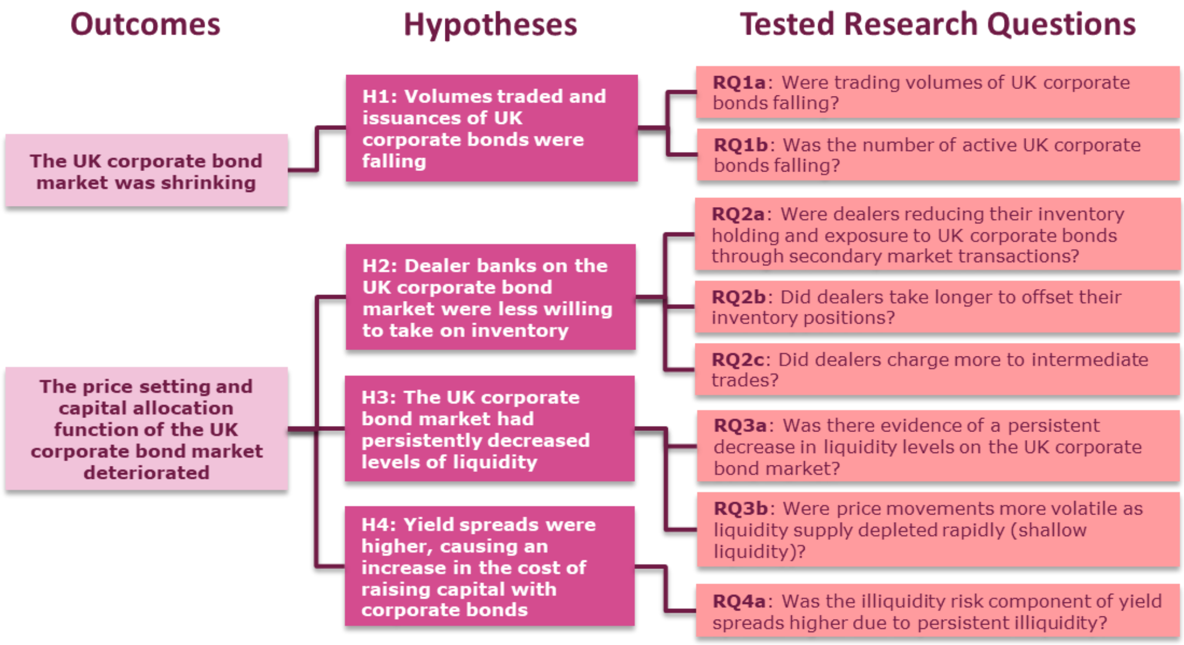
Following the peak years of the coronavirus pandemic of 2020 and 2021, challenges in the corporate bond market persisted, particularly in sectors heavily impacted by the pandemic, where credit risk remained elevated. There was a significant rise in the inflation rate as the economy started to recover. This increase was exacerbated by the Russian invasion of Ukraine and subsequent spike in energy prices, leading to the Bank of England significantly raising the Bank Rate from 0.1% in 2021 to 5.25% in June 2023. This caused more uncertainty in the bond market affecting the pricing and liquidity of bonds. The market was further tested during the 2022 'mini-budget crisis', which led to a sharp sell-off in gilts and spillover effects on corporate bonds, as rising yields and increased volatility strained market stability.

The UK corporate bond market nevertheless showed strong recovery from 2023 onwards, with total issuance increasing compared to 2022 levels (PWC, 2024). Investment-grade bonds continued to dominate, while high-yield bonds saw significant growth, reflecting improved market sentiment despite higher borrowing costs. Green and ESG bonds also had a record year in 2023 (ibid), driven by decarbonisation efforts and investor demand for sustainable finance. However, rising yields across UK corporate bonds highlighted the challenges posed by central bank actions to curb inflation and ongoing quantitative tightening programmes.

3 Research design

With this paper, we aim to provide evidence towards a series of research hypotheses about the functioning of the UK corporate bond market over the period in question detailed in Figure 1 below:

Figure 1: Research hypotheses tree



Source: FCA analysis

As the figure shows, we will test and provide evidence on four hypotheses on corporate bond markets between 2018 and 2024: (i) whether the UK corporate bond market was decreasing in size, (ii) whether there is evidence that dealers were less willing to accept inventory risk, (iii) whether market liquidity persistently deteriorated, and (iv) whether there is evidence that yield spreads persistently increased due to increased illiquidity. For each of our four hypotheses there are a series of supporting research questions that we test throughout this paper, to form evidence towards the hypotheses.

Defining and measuring liquidity

Liquidity in the bond market generally refers to the ease with which bonds can be bought or sold at a stable price close to their consensus value, in a short time, without causing significant price fluctuations. While no single measure exactly defines market liquidity, a liquid market has several important features, including (i) *breadth*, the presence of a wide range of buy and sell orders ensuring minimal bid-ask spreads, (ii) *depth*, the presence of sufficient order volume at various price levels, allowing large trades to be executed without significant price impact, and (iii) *resilience*, the market's ability to recover from temporary price shocks and maintain stable conditions over time. Most common liquidity measures aim to estimate one or more of these dimensions.

Measuring liquidity in corporate bond markets is notably more complex than in equity markets due to several structural and trading differences. Unlike stocks, which are typically traded on centralised exchanges, corporate bonds are largely traded over-the-counter. This decentralised structure limits information available on liquidity (with pre-trade information limited to quotes rather than orders). Additionally, bonds are issued in various forms – different maturities, coupons, and credit qualities – resulting in fragmented markets with low trading volumes for many issuances. Even within the same issuer, bonds may have significantly different liquidity profiles based on maturity, coupon structure, or other characteristics of the bond. While equities are traded frequently and at tighter bid-ask spreads, bond trades are often infrequent, and spreads can vary widely, making it harder to establish and estimate reliable liquidity metrics.

Liquidity measures

Following OP-14 and the literature cited within, we define and estimate three main measures of market illiquidity:

The Amihud measure (Amihud, 2002) is one of the most commonly used liquidity measures for corporate bond markets. It quantifies the price impact of trades relative to their size as the ratio of the average absolute price change per unit of trading volume, reflecting how much prices shift for each £ traded. A higher Amihud measure indicates that prices are prone to significant variation, signalling lower liquidity. For example, in a shallow market, a large trade may deplete available liquidity and significantly affect the market price, resulting in a high Amihud measure.

Using the Amihud measure to measure liquidity in infrequently traded instruments, like corporate bonds, comes with several caveats due to the trading dynamics in these markets. Crucially, even the most liquid corporate bonds do not trade daily – leading to many days with zero volume. This can result in a biased or unstable Amihud measure since the metric relies on the availability of consistent daily price and volume data. Observed price changes may reflect delayed responses to news or shifts in market conditions, rather than the immediate impact of trading. To mitigate these concerns, we use a monthly average Amihud across all our instruments and interpret the measure alongside other measures of illiquidity.

The BPW measure (Bao, Pan & Wang, 2011) is a proxy for the price impact of transaction costs. It is calculated as the negative of the autocovariance of subsequent bond returns, effectively measuring the 'transitory movement' of returns around the mid-price induced by buy and sell orders. A higher value of the BPW measure indicates an increase in transaction costs, leading to an increased 'up and down' movement in subsequent bond returns induced by price reversals, indicating an increase in illiquidity. The BPW is specifically designed for corporate bond markets where trades are often infrequent and with significant variation in size, as it only relies on subsequent returns data without daily aggregation.

The imputed roundtrip cost (IRC) measure (Feldhutter, 2012) directly measures roundtrip transaction costs, giving a tangible sense of liquidity costs investors might face in practice. The IRC is designed to estimate transaction costs when bid and ask prices are not observed and only transaction prices are available. In practice, matched roundtrips in corporate bond markets usually consist of a dealer-client and dealer-dealer transaction, and the difference in price provides insight into the margin that market-makers earn for providing liquidity. However, calculating the IRC relies on matching trade pairs in a bond within a certain timeframe and unmatched trades are disregarded for the calculation, leading to liquidity estimates being based on only a small subset of observed trades.

For all three measures, the Amihud, the BPW, and the IRC, to account for data outliers, we use a statistical technique, winsorisation, to restrict liquidity measures to 98% of the observed population (a parameter value widely used in academic studies). That is, we set the largest and smallest 1% estimated liquidity values in each month to the value of the 99^{th} and 1^{st} percentile, respectively.

Detailed formulae for these measures are provided in Appendix 2. We also present evidence on the following measures of liquidity for the instruments in our sample:

- The proportion of non-trading days;
- Market volume measured by the number of trades and GBP volume traded; and
- Average monthly turnover (proportion of issuance traded).

Assessing inventory risk

Transaction costs, and thus illiquidity, are driven by three key determinants: (i) adverse selection, as providers of liquidity must price in risks that counterparties have superior information about asset values, (ii) processing costs (including intermediary profits), and (iii) inventory risk. Inventory risk arises where dealers that take on positions when providing liquidity to markets are exposed to the risk that prices will move against them before they can unwind their positions. The risk is greater for larger trades and where the bonds are traded less often, as it is more difficult to unwind such positions without affecting prices.

Unlike in OP-14, we do not have access to data on dealers' overall inventory positions and rather focus exclusively on dealer inventory accumulation as they buy and sell corporate bonds on the secondary market because aggregate inventory positions are not recorded in MiFID transaction reports. Further, since the data used in our analysis does not include information on repo or credit derivative transactions, no conclusions can be drawn on the aggregate change in dealers' total risk exposures or capital committed over the period.

We do, however, give a view of inventory risk by assessing the 'time to offset' a trade for dealers. This is measured time required for a dealer to zero-out their position in a bond after buying or selling it – estimated separately for different trade sizes. More detail on the methodology is provided in Annex 2.

Data

The FCA receives MiFID II transaction reports on instruments that are admitted to trading on UK venues and either executed on a UK trading venue or involving at least one UK counterparty (even when the trades are 'off-venue'). This makes the dataset suitable to analyse activity in corporate bond markets where a significant amount of trading takes place 'off-venue'.

We distinguish between two universes of corporate bonds: (i) a universe of 'active bonds' that includes corporate bonds 'admitted to trading' on UK venues and actively traded, and (ii) a universe of 'active and listed bonds', which additionally requires that bonds are listed on UK venues. Admission to trading is subject to the venue's admission and disclosure standards, while listing is additionally subject to the FCA's UK Listings Rules.

To define our active and listed universe, we extract a sample of 13,948 corporate bond securities labelled as listed on UK venues with a maturity date after January 2018 and with credit rating at issuance data available from Bloomberg. After cleaning to remove duplicate reports, outliers, and pre-issuance trades to focus on secondary market activity, we observe 4,129,755 trades reported to the FCA through the MiFID II regulation between January 2018 and December 2024 on 6,208 of these securities. For the remaining 7,740 securities, no post-issuance trades were reported over the sample period. The untraded, 'inactive' bonds include bonds that are held to maturity from issuance, and bonds that were issued before January 2018 and had no trades reported from January 2018.

To define our wider universe of 'active' bonds, we extract from MiFID II reports all bonds traded between 2018 and 2024 with a CFI (Classification of Financial Instruments) beginning with DB (debt instruments – bonds) or DT (debt instruments – medium term notes), excluding any CFI codes with second attribute T or C (government or supranational guarantee). We merge information from Eikon to exclude any remaining non-corporate bonds and, after cleaning as above of duplicate reports and pre-issuance trades, extract 34.4m transaction reports on 110,863 unique instruments.

In the remaining analysis, we will refer to the narrower universe of listed bonds as 'active and listed' bonds and the wider universe of bonds admitted to trading as 'active' bonds.

Table 1 below presents summary statistics of our data. For active and listed corporate bonds, in terms of both number of transactions and £ volume, EUR denominated bonds make up the largest fraction of transaction volume in our data, followed by GBP denominated bonds. USD denominated bonds are approximately one third of the number of EUR denominated transactions but a slightly larger proportion of volume due to their larger average transaction size. For active bonds, transaction volumes in EUR and USD denominated bonds dominate the sample, reflecting the UK's position as a global hub for trading in fixed income markets. Unsurprisingly, GBP denominated bonds are much more likely to also be listed on UK venues on top of being admitted to trading and make up a larger share of overall listed volume. Bonds denominated in other currencies only account for a small proportion of overall volume in active bonds and active and listed bonds.

Table 1: Descriptive statistics – UK corporate bond market 2018 to 2024

	Total	Daily mean	Std. dev.	Daily median	Daily P25	Daily P75
UK active and listed corporate bonds[3]						
Transactions	**4.1m**	**2,342**	**625**	**2,318**	**1,928**	**2,720**
GBP bonds	1.5m	850	258	820	692	971
EUR bonds	1.8m	1,023	341	1,003	790	1,221
USD bonds	0.6m	355	126	335	275	417
Other bonds	0.2m	114	87	72	53	165
Volume[4]	**£5,430b**	**£3.1b**	**£1.0b**	**£3.1b**	**£2.4b**	**£3.7b**
GBP bonds	£1,981b	£1,124m	£412m	£1,082m	£862m	£1,358m
EUR bonds	£2,321b	£1,317m	£598m	£1,167m	£858m	£1,784m
USD bonds	£1,044b	£592m	£249m	£564m	£432m	£741m
Other bonds	£82b	£47m	£38m	£37m	£22m	£61m
UK active corporate bonds						
Transactions	**34.4m**	**19,540**	**4,480**	**19,585**	**16,747**	**22,450**
GBP bonds	2.7m	1,508	425	1,453	1,254	1,716
EUR bonds	16.m	9,317	2,547	9,361	7,684	10,830
USD bonds	14.3m	8,115	1,925	8,106	7,090	9,330
Other bonds	1.1m	600	215	574	423	764
Volume	**£32,668b**	**£18.5b**	**£4.9b**	**£18.7b**	**£15.7b**	**£21.6b**
GBP bonds	£2,939b	£1,667m	£540m	£1,634m	£1,331m	£1,949m
EUR bonds	£15,018b	£8,518m	£2,579m	£8,497m	£6,894m	£10,305m
USD bonds	£13,194b	£7,484m	£2,099m	£7,525m	£6,393m	£8,740m
Other bonds	£1,517b	£861m	£473m	£778m	£513m	£1,096m

Source: FCA analysis based on MiFID II transaction reports

For much of this paper, we will restrict attention to active and listed corporate bonds, as we have access to additional information for such bonds that we can use for disaggregation by bond characteristics in our regression analysis. Additionally, this sample is more comparable to the sample used in OP-14 (which used bonds where the UK was the national competent authority at the time). We supplement the MiFID II data with data on Overnight Interest Swap (OIS) rates from the Bank of England, foreign exchange rates from the ECB, and Bloomberg data on coupon rates, issue amounts, and credit ratings at issuance (from S&P, Fitch, and Moodys) for the active and listed bonds in our sample as well as bond issuers' long-term debt levels, interest rate payments, leverage, operating profit, EBIT, and equity market volatility. These data are used for our yield spread analysis and as control variables in our regression analysis.

[3] Based on Bloomberg information on listing venue.

[4] GBP, EUR, and USD trades only.

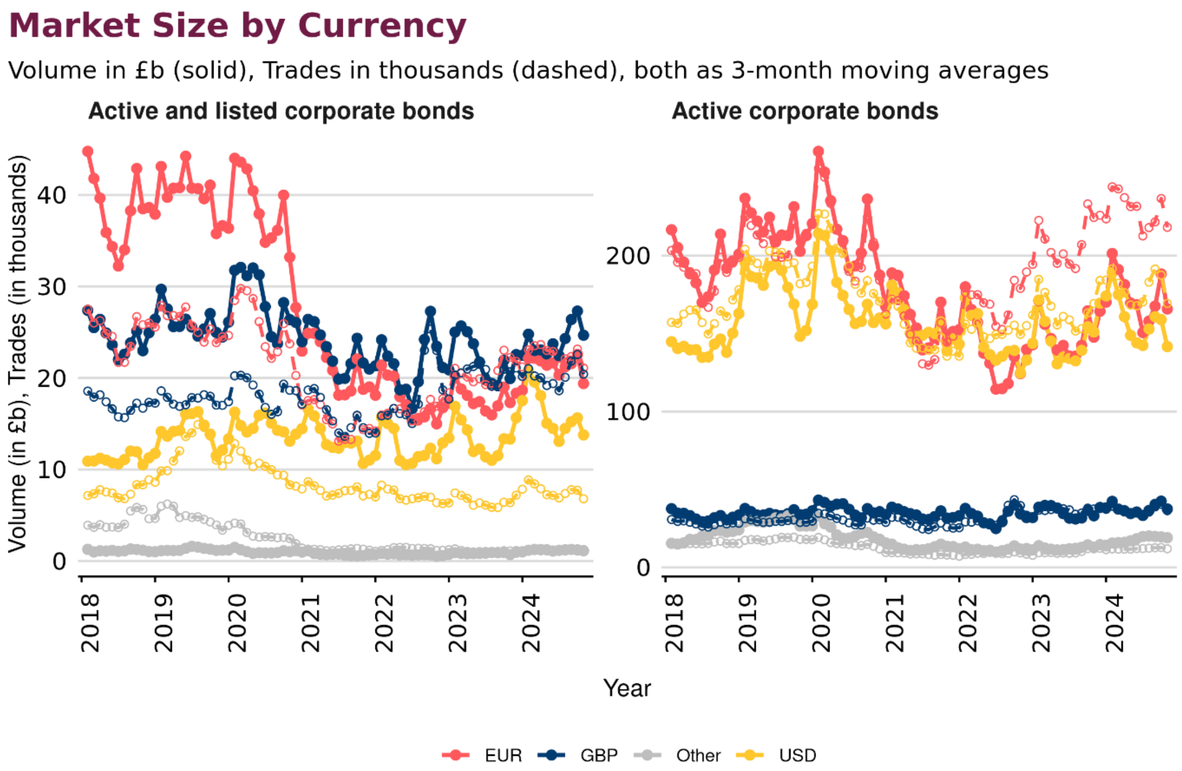
4 Results

Trends in the UK corporate bond market

The size of secondary corporate bond markets is commonly estimated using several potential measures. In this paper we use three primary measures to indicate market size: **trading volume** (the total £ volume of bonds traded over a given period – the most direct measure of market activity), **number of transactions** (the number of transactions executed in a given period – gives an overview of the granularity of trading), and the **number of active bonds** (the number of bonds that have been traded in a given period – gives a view of market breadth).

Figure 2 shows the three-month rolling average of £ volume (in billions) and the number of transactions (in thousands) of corporate bonds for both our sample of active and listed bonds and our sample of active bonds.

Figure 2: Corporate bond market size over time



Source: FCA analysis

GBP and EUR denominated bonds made up the largest share of overall volumes in our active and listed sample, with EUR bonds dominating ahead of 2021 and GBP bonds making up the largest share from 2021 onwards. EUR and USD denominated bonds made up the largest share of both transactions and volume in the sample of active bonds, accounting for approximately 3-4 times the average monthly volume of GBP denominated bonds. This reflects the UK's position as a global hub for trading in corporate bond securities with over £33 trillion total volume traded between 2018 and 2024.

The most noticeable trend in transaction volumes is the sharp fall in EUR denominated volume between 2020 and 2021. This fall is most evident in active and listed bonds, and trading in active bonds decreased only by a smaller fraction. Before 2021, the ratio of volume in active and listed bonds to volume in active bonds was significantly larger for EUR bonds than USD bonds and by 2022, the two ratios are almost equal. As we will show in Figure 3 and Figure 4 below, the fall in EUR denominated trading volumes was accompanied by a decrease in the number of listed EUR denominated bonds active on the UK market; following Brexit, from 2020 to 2021[5] the inflow of new issuances did not keep up with the outflow of bonds (e.g. those reaching maturity). Meanwhile, the number of EUR denominated bonds admitted to trading (active bonds) on UK venues was rising throughout our sample.[6] All in all, these findings suggest that following Brexit an increasing number of EU issuers were not choosing to list on UK venues but continued to seek admission to trading on UK MTFs and OTFs.

In addition to the EUR specific trends, we can also see that across currencies, the volume traded initially rose during the onset of the coronavirus pandemic in Q1 and Q2 2020 and then went through a slump in activity until around mid-2022. From this point onwards, both active bonds and active and listed bonds across all three major currencies were trending upwards in number of transactions and £ volume traded, giving cause for cautious optimism about the overall health of the UK corporate bond market. Interestingly, over the sample period, USD denominated bonds saw an increase in average trade size while GBP and EUR denominated bonds saw a decrease in the same metric.

RQ1a: Were trading volumes of UK corporate bonds falling?

Despite a sharp fall in EUR denominated volume traded in 2021 for active and listed bonds (-43.7%), from 2022 to 2024 trading volumes on UK venues were rising on a year by year basis in both corporate bonds listed (9.7% per year) and corporate bonds admitted to trading (9.0% per year). Outside of EUR denominated trading, trading volumes largely recovered to pre-coronavirus levels.

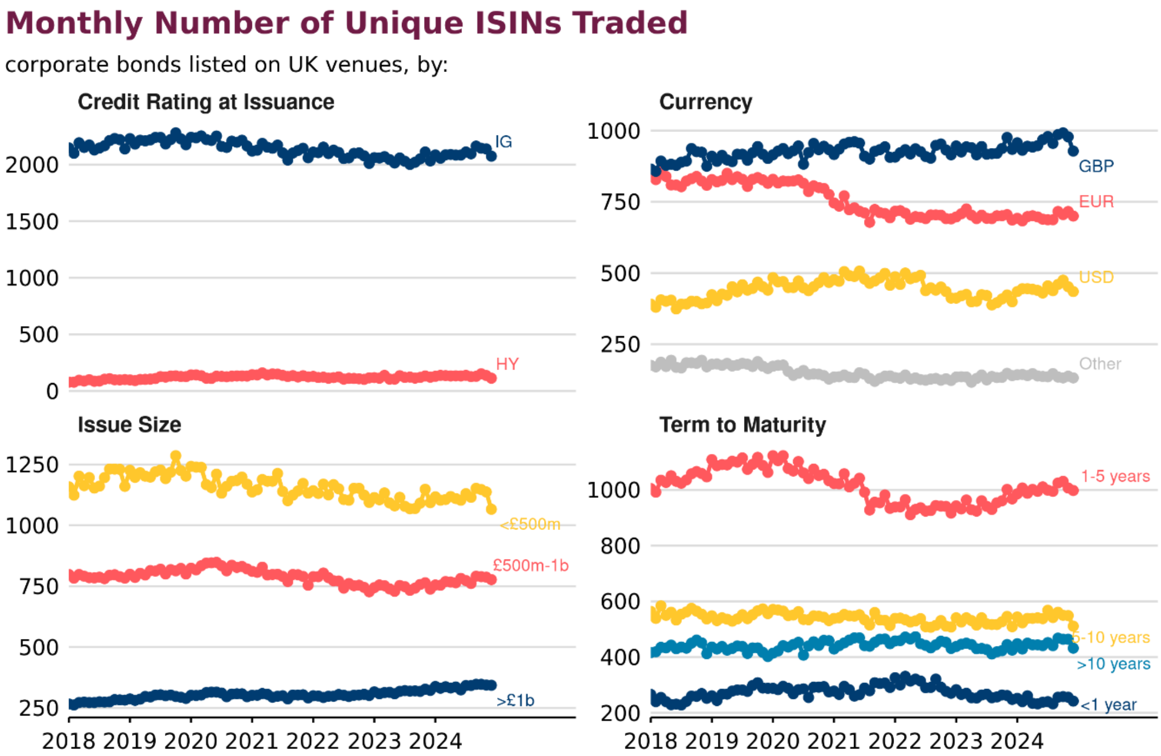
The majority of trading volume in corporate bonds occurred in investment grade (IG) bonds, with a maturity of 1-5 years, and in large trades of £1m+. These proportions were relatively stable across our sample despite the fluctuating overall volume. However, we note a significant trend away from medium issue sizes (£500m - £1b) to larger and smaller issue sizes as the former made up c. 60% of overall volume in 2018 and only one-third in 2024.

[5] The UK formally withdrew from the EU on 31 January 2020 and the transition period of Brexit negotiations ended on 31 December 2021.

[6] With some seasonal fluctuations such as a fall in the last month of most years (including 2024) due to a reduced number of trading days in December.

Figure 3 shows the number of unique listed corporate bonds actively traded per month broken down by their credit rating at issuance, denomination currency, issue size, and term to maturity. This measure is more suited to demonstrating the composition of corporate bond instruments listed and traded on the UK market, rather than just the number of concurrent listings, as not all listed securities are actively traded on a regular basis.

Figure 3: Number of unique instruments traded by factors – active and listed bonds

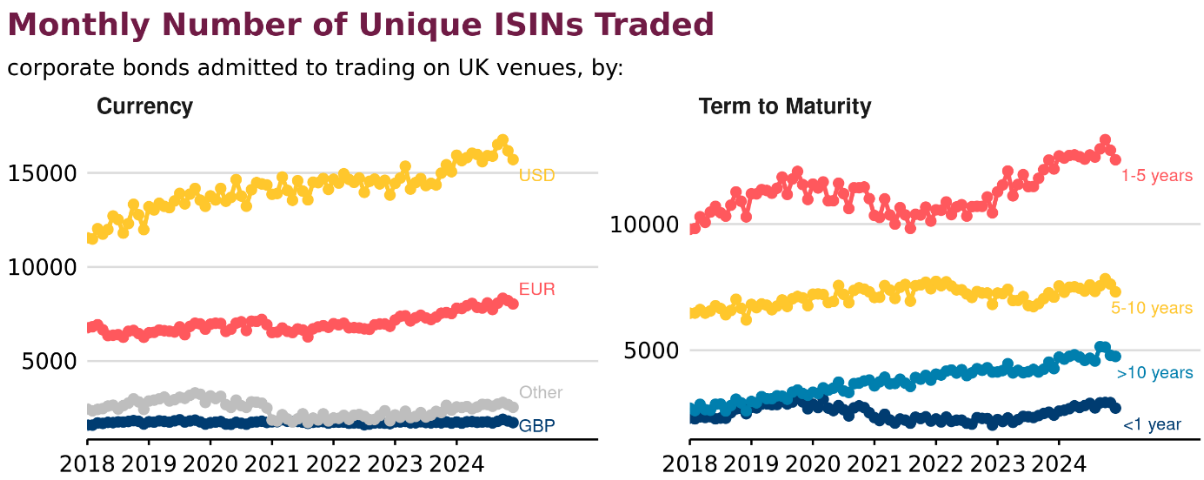


Source: FCA analysis

These graphs show a slight overall increase in the number of unique GBP and USD denominated instruments traded per month and the aforementioned fall in EUR denominated bonds in 2021. We also note that larger issue sizes of £1b and above were making up an increasing proportion of the number of corporate bonds traded, whereas the most commonly used smaller issue size of less than £500m was seeing a downward trend. Further, the graph suggests that medium term maturities (1-5 years) saw a significant fall in market share between 2020 and 2022 but were gaining in market share both before and after this period. One possible explanation of this development could be the specific circumstances and incentives for refinancing, created during the coronavirus pandemic, that made certain maturities more available and attractive for issuers.

Figure 4 shows, for each month, the number of unique corporate bonds admitted to trading on a UK venue and traded at least once. This shows that across major currencies, the number of bonds admitted to trading on a UK venue and finding liquidity was continuously increasing across our sample. We do note, however, that despite growth from 2021 onwards, fewer bonds in currencies other than GBP, EUR and USD were trading on UK venues in 2024 than in 2018, largely driven by a fall in European currencies other than EUR alongside the fall in EUR listings in 2020 and 2021. The graph on maturity also highlights that in 2020 to 2021 during the peak of the coronavirus pandemic shorter term maturity bonds were decreasing in popularity but outside of this period were the fastest growing type of bond in our sample.

Figure 4: Number of unique instruments traded by factors – active bonds



Source: FCA analysis

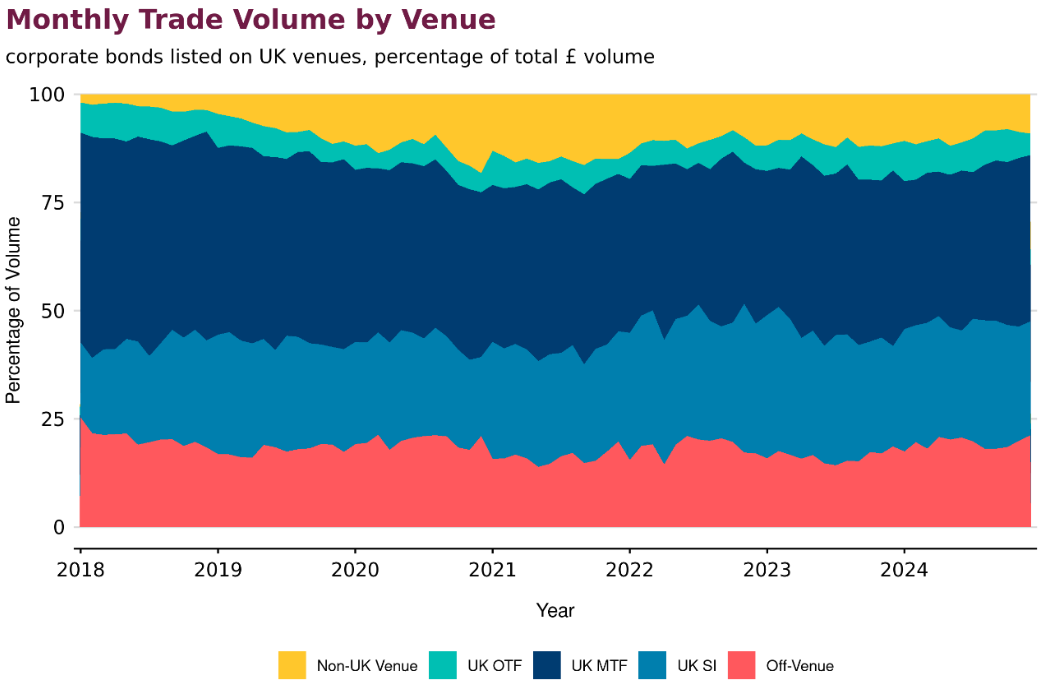
In Figure 5 below, we split the £ volume traded by the type of venue the trade occurs on. Here we find significant differences to OP-14, where the majority of trades happened over the counter (off-venue). In our sample, the largest share of trading happened on Multilateral Trading Facilities (MTFs), followed by Systematic Internalisers (SIs)[7]. Off-venue trades accounted for the third largest share of trading. While a causal analysis of the shift in venue composition is beyond the scope of this paper, it is at least partially attributable to regulatory changes introduced by the MiFID II regime.[8]

Although it is still the largest share of trading, the overall use of MTFs has fallen relative to SIs and off-venue trades in our sample, from c. 50% of total £ volume traded in 2018 to c. 35% of £ volume in 2024. The proportion of trades in corporate bonds reported to the FCA as occurring on a non-UK venue increased significantly between 2018 and 2021 and has remained relatively constant since. These trades are predominantly in EUR denominated bonds (64%) with an IG rating (95%) and on Dutch, French, and German venues (42%, 20%, 20%, respectively). The fall in UK MTF venue share and increase in non-UK venue share may be attributable to a shift in European MTF demand from UK to Dutch venues following Brexit that was not similarly evident for UK SIs (ESMA, 2024). Organised Trading Facilities (OTFs) made up the smallest share of UK venue type that corporate bonds were traded on.

[7] Multilateral Trading Facilities, Organised Trading Facilities, and Systematic Internalisers are venue designations introduced by the European MiFID reforms. MTFs are market operators that bring together multiple third-party buying and selling interests in financial instruments in the system and in accordance with non-discretionary rules (the investment firm operating an MTF has no discretion as to how interests may interact). In contrast with how an MTF operates, order execution must be carried out on an OTF on a discretionary basis. Systematic Internalisers are investment firms which on an an organised, frequent, systemic and substantial basis, deal on own account when executing client orders outside a regulated market, UK MTF or UK OTF without operating a multilateral system and fulfils criteria set out by the FCA for SI designation (usually based on transaction volumes).

[8] Under MiFID II, off-venue trades are disincentivised due to reporting and transparency obligations for the counterparties. Moreover, large dealer banks, that account for a significant share of overall trading activity, are classified as SIs under the regime, effectively changing the designation of trades that may be very similar to off-venue trades to occurring on the dealers' SI venue.

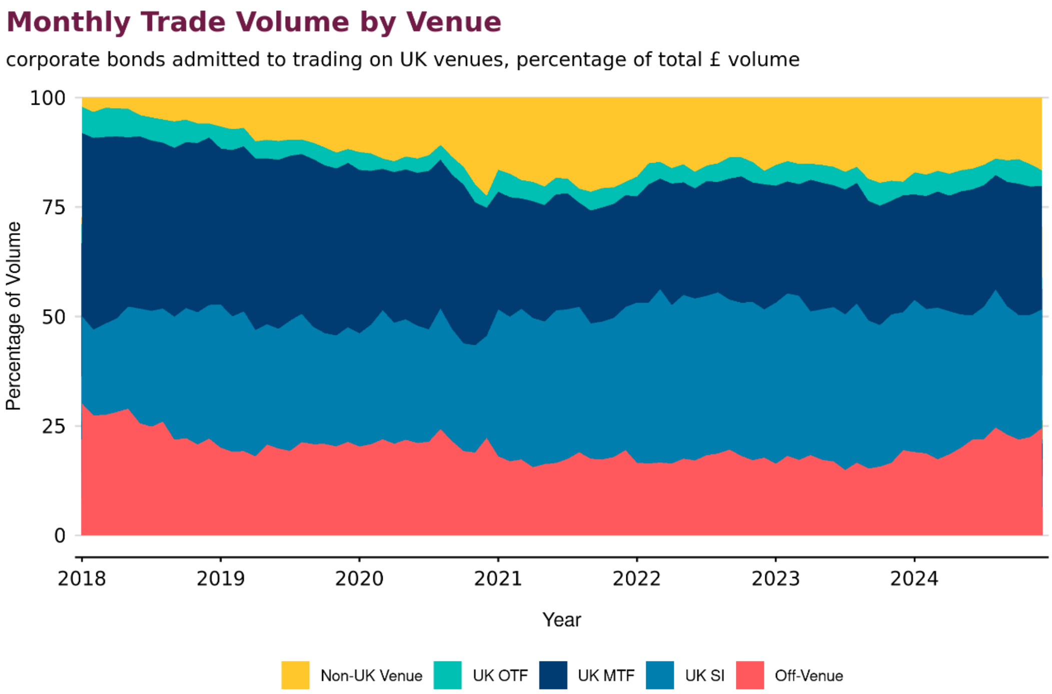
Figure 5: Trading venue composition of active and listed bonds over time



Source: FCA analysis

For bonds admitted to trading on UK venues the relative venue share was almost identical to listed bonds as shown in Figure 6.

Figure 6: Venue composition of active bonds over time



Source: FCA analysis

RQ1b: Was the number of active UK corporate bonds falling?

From 2018 to 2024, in our sample of active bonds, the average number of unique corporate bonds admitted to trading and trading on UK venues increased across GBP (2.3% annually), EUR (2.6% annually), and USD (4.7% annually) denominations. In our sample of active and listed bonds, we find a sharp fall in EUR denominated bonds (-11.0%) traded on the UK corporate bond market in 2021, immediately following Brexit. However, outside of this period and across USD and GBP active and listed bonds, the number of actively traded bonds remained roughly constant.

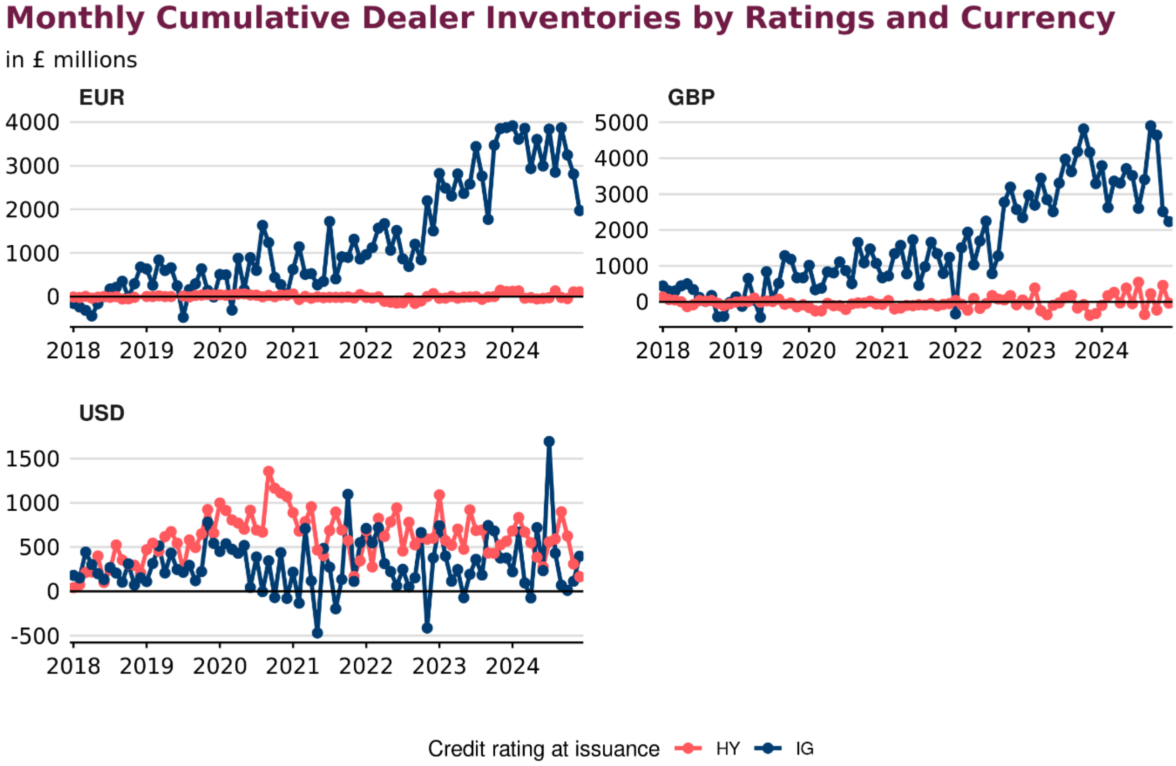
Dealer inventories

We identify dealers in the UK corporate bond market by adding firms that account for a large portion of market activity and are classified as investment banks to the list of Gilt Edged Market Makers (GEMMs).[9] In total we identify 22 large dealers in corporate bonds and these dealers are involved in 74% of total volume traded. This analysis and the remainder of the paper restricts attention to the universe of active and listed corporate bonds.

Figure 7 below shows our estimates for dealer inventory accumulation between 2018 and 2024. These charts show the monthly cumulative dealer inventories, that is, the aggregate trading of all identified dealers (adding buy trades and subtracting sell trades) from 2018 onwards. A trend line above zero indicates that dealers have on aggregate bought more corporate bonds on the secondary market than they have sold over our sample (in face value terms).

[9] A Gilt-edged Market Maker is a primary dealer in gilts and actively trades in either conventional gilts, index-linked gilts or both.

Figure 7: Monthly dealer inventory accumulation (January 2018 = zero)



Source: FCA analysis

We note again that there are significant data limitations to this analysis:

- We do not observe primary market activity in our sample;
- We do not observe dealers' initial inventory levels;
- Given the above, we also do not observe how much inventory is shed from dealers' books when bonds reach maturity; and
- We do not observe repo and credit derivative transactions.

We therefore cannot draw conclusions on the aggregate change in dealers' risk exposures or capital committed to corporate bonds over the period.

Bearing these caveats in mind, if across dealers there was a systematic and strategic decision to decrease corporate bond inventory levels, we should arguably also see this through their accumulated trading in the secondary market over that period. We note, however, that our results do not indicate significant decumulation in dealer inventories in corporate bonds over the period through secondary market activity alone.[10] On the contrary, our results indicate that from mid-2022 onwards, in aggregate, dealers have been building inventory in EUR and GBP denominated IG corporate bonds through their secondary market transactions. This accumulation is small, however, compared to the overall volume traded in these bonds over the period (c. 1%) and the level of inventories and inventory accumulation observed in OP-14. We do not interpret it as sufficient evidence to claim that dealers have increased their aggregate exposures to corporate bonds over the period.[11]

[10] However, there may still be significant decumulation as inventory leaves dealer trading books at maturity.

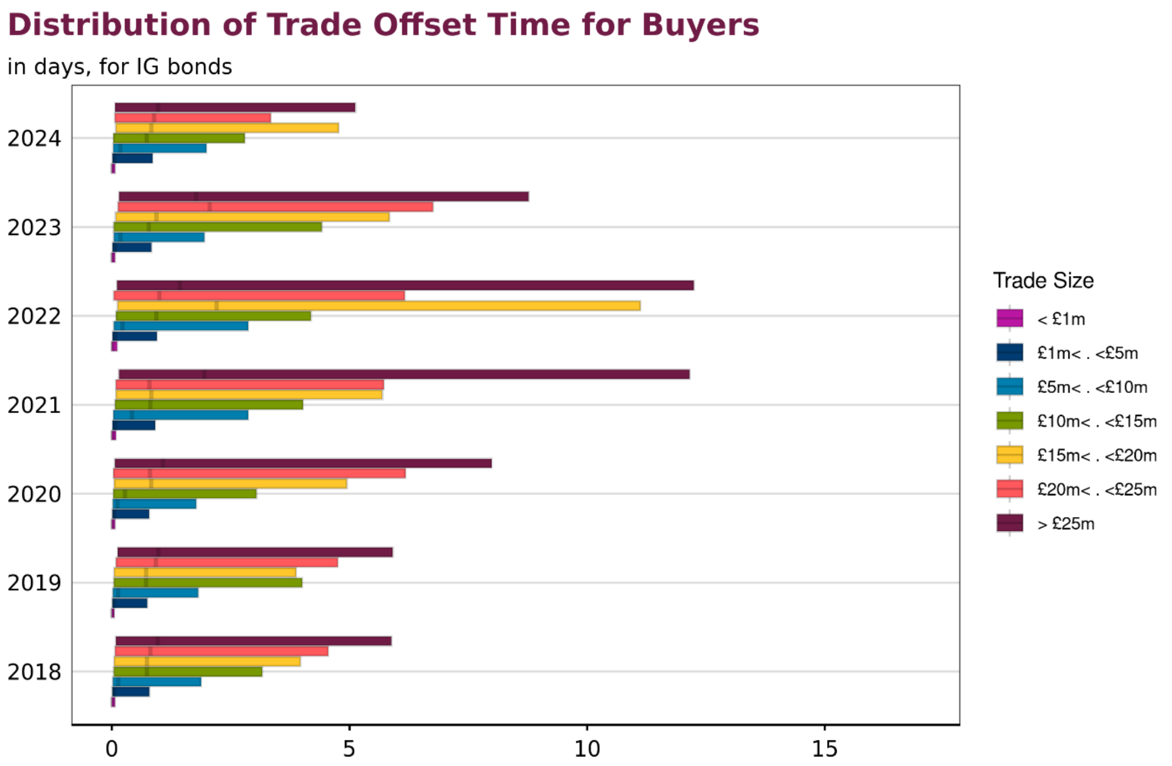
[11] In OP-14, we reported overall dealer inventories of upwards of £300b and quarterly changes in inventories of up to £150b.

RQ2a: Were dealers reducing their inventory holding and exposure to UK listed corporate bonds through secondary market transactions?

Our data suggests that through their secondary market activity alone, in aggregate dealers have not reduced their UK corporate bond inventories since 2018. However, due to data limitations, we cannot find conclusive evidence on whether dealers have changed their overall risk exposure to UK listed corporate bonds.

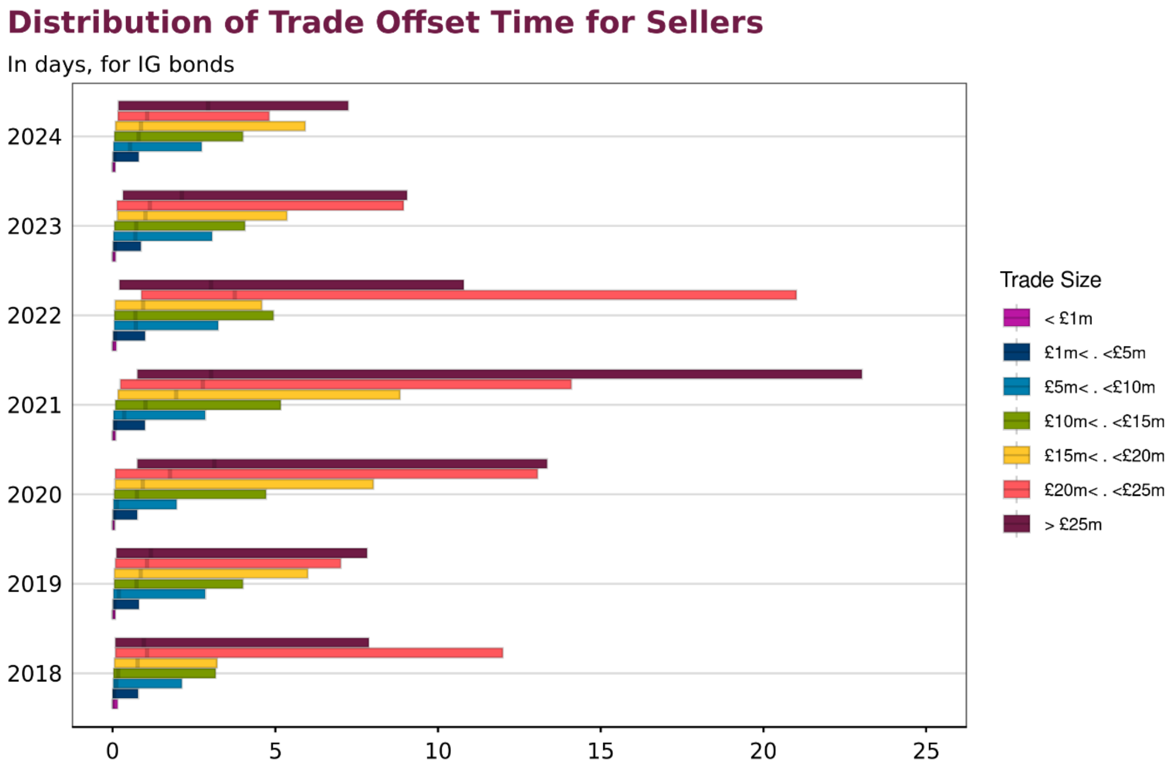
Figure 8 and 9 below show our estimated median and interquartile range of trade offset times for dealer trades by trade size categories.

Figure 8: Time required to offset buy-trades by trade size for dealers



Source: FCA analysis

Figure 9: Time required to offset sell-trades by trade size for dealers



Source: FCA analysis

These results show that in GBP denominated bonds, during the 2020 to 2022 period, a considerable proportion of large trades of £15m and above took dealers longer to offset than in 2019. This difference is more noticeable for sell orders than buy orders but present in both. Longer offset times for both sell orders and buy orders are indicative of increased inventory risks. Increased offset times for sell orders suggest that when selling an inventory position, between 2020 and 2022 dealers were often reluctant to add the bond back on their inventory books, likely because of dealers' perception or expectation about the risks of holding the inventory. Increased offset times for buy orders suggest that dealers experienced increased inventory holding times and were therefore more exposed to potential downside risk from price changes. From this perspective, observing larger increases in offset-times for sell-trades could potentially indicate that perceived inventory risk was more significant than actual inventory risk.

By 2023, the distributions appeared more similar to the 2019 distribution and 2024 saw one of our lowest estimated interquartile ranges of trade-offset times in the sample for trades of £15m+ in both buy and sell orders. These findings are indicative of increased inventory risk between 2020 and 2022.

We also compare the mean difference in trade offset times for post-coronavirus years (2020 onwards) to 2019 levels for large trade sizes to see if any of the observed differences above are statistically significant. The results are in Table 2 below:

Table 2: Mean differences in trade offset times by year and trade size

Year	Trade size	Difference to 2019 (buy)	Difference to 2019 (sell)	N (buy)	N(sell)
2019	£15m-£20m	*Base year*	*Base year*	283	216
	£20m-£25m			155	129
	£25m+			452	359
2020	£15m-£20m	8.14%	108.16%***	264	271
	£20m-£25m	22.35%	33.78%	145	146
	£25m+	15.15%	59.7%**	375	354
2021	£15m-£20m	21.26%	50.23%	183	203
	£20m-£25m	18.88%	42.59%	74	83
	£25m+	61.65%**	59.46%**	239	249
2022	£15m-£20m	19.64%**	12.97%	163	162
	£20m-£25m	-28.04%	76.33%	72	71
	£25m+	25.03%	55.82%*	234	213
2023	£15m-£20m	51.71%	53.37%	256	240
	£20m-£25m	17.95%	-37.22%	108	84
	£25m+	36.63%	2.72%	298	309
2024	£15m-£20m	36.21%	36.73%	224	211
	£20m-£25m	-35.42%	-42.96%	92	100
	£25m+	-5.23%	20.87%	392	334

Source: FCA analysis, significance levels are from t-tests of mean-differences. Significance at 10% level is marked *, at 5% level ** and at 1% level ***

These findings are in line with what is shown in the graphs above, showing that the average time to offset was higher between 2020 and 2022 compared to 2019 across our large trade size buckets (although the difference is not consistently statistically significant, due to substantial variation in the estimated trade-offset times).[12] Comparing 2023 and 2024 to pre-COVID levels in 2019, there were no statistically significant differences in the average time to offset for both buy and sell trades, suggesting that the earlier increase in trade-offset times was not sustained.

[12] With the exception of sell trades between £20m to £25m in 2022.

RQ2b: Did dealers take longer to offset their inventory positions?

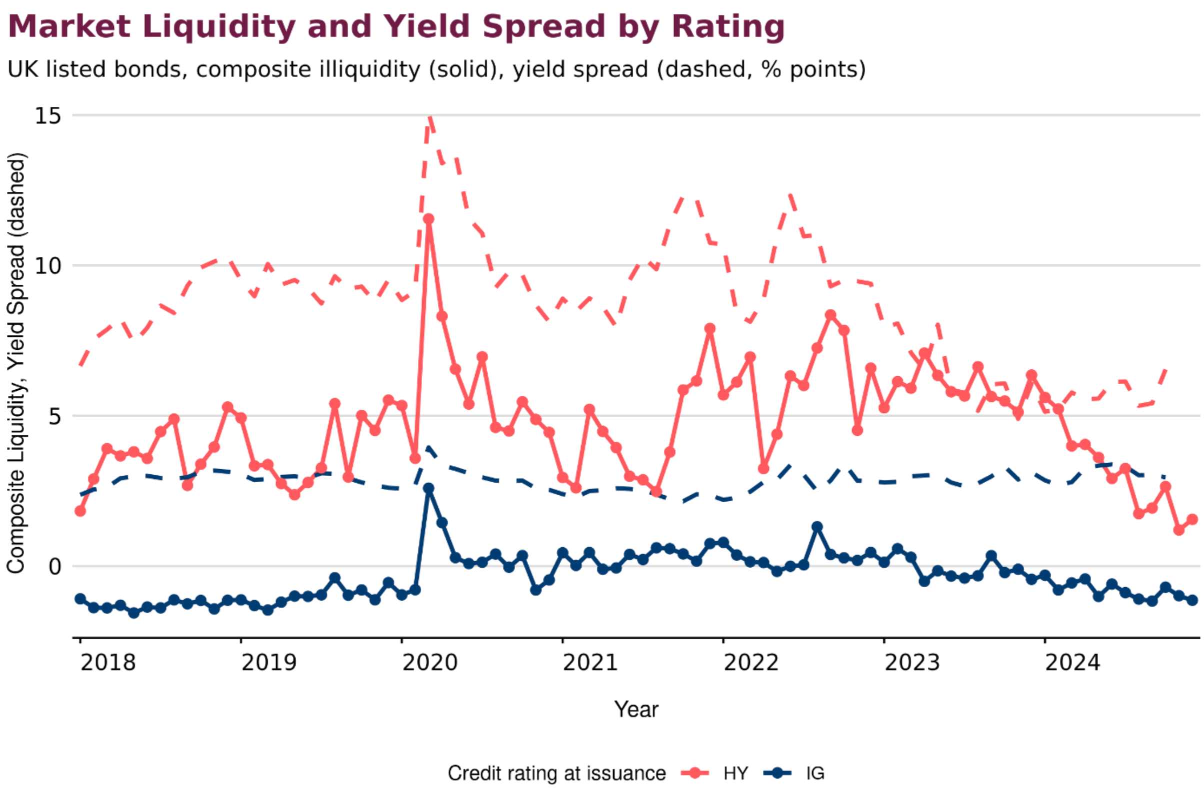
We find indicative evidence that dealers took longer to offset large buy and sell orders of £15m and above during the 2020 to 2022 period. Average trade offset times across buy and sell orders in the ranges of £15m-£20m, £20m-£25m, and £25m+ were larger in 2020 to 2022 than 2019 with a number of statistically significant differences. However, in 2023 and 2024, trade offset times were largely at or below pre-2020 levels and we find no evidence of a sustained increase in trade offset times or statistically significant differences to pre-coronavirus levels.

Evolution of liquidity in the UK 2018 to 2024

In the following section we explore the evolution of market liquidity in the UK corporate bond market from 2018 to 2024. As discussed above, in this period, the UK experienced several significant events that had a marked impact on liquidity in corporate bonds, including Brexit, the coronavirus pandemic, and the first return of substantial inflation since the global financial crisis in 2008 and the associated increase in interest rates.

Figure 10 below provides an overview of bond spreads and a 'composite illiquidity' measure (defined in more detail further below) for both investment grade (IG) and high –yield (HY) corporate bonds in our sample.

Figure 10: Overview of liquidity and yield spreads



Source: FCA analysis

Figure 10 shows two distinct illiquidity events in the sample period: (i) a sharp rise in illiquidity and spreads in both HY and IG bonds in early 2020 with the onset of restrictions due to the coronavirus pandemic; and (ii) a less pronounced, but longer lasting period, of increased spreads and illiquidity from the end of 2021 to the beginning of 2023.

Comparing Figure 10 to Figure 2 on corporate bond market size over time, we can further note that these two periods of illiquidity were associated with very different market conditions in terms of trading volume environment. In early 2020, traded volume spiked both in terms of £ volume and the number of transactions (February to April 2020 average volume across USD, EUR, and GBP was 17.8% and average monthly transactions 14% above the previous three months in listed bonds) while the period of 2021-22 saw a relative decrease in both £ volumes and the number of transactions (2021 – 2022 volume was 17.0% below 2020 levels in listed USD and GBP bonds and 48.6% in listed EUR bonds).

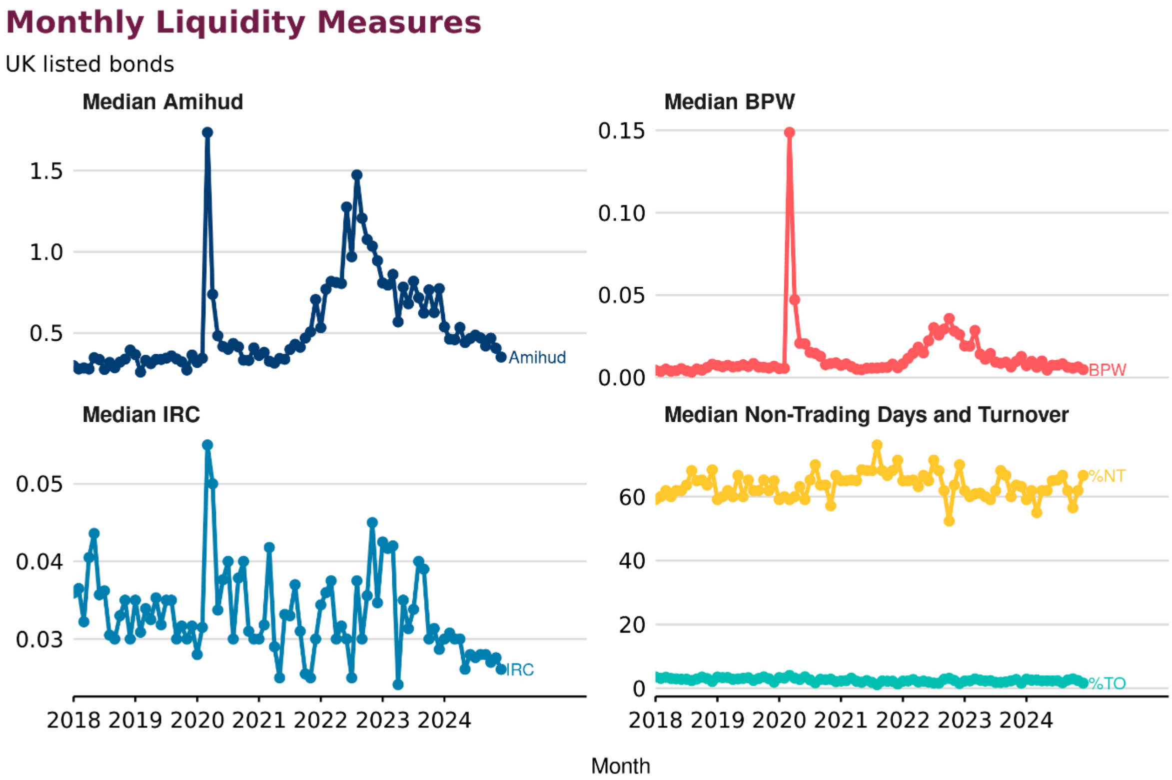
Together, these results show that market conditions in 2024 were characterised by high liquidity, low spreads, and increased transaction volume in both HY and IG corporate bonds. Spreads, illiquidity estimates, and volume measures of market activity were at among the most liquid levels in 2024 over our whole sample.

RQ3a: Was there evidence of a persistent decrease in liquidity levels on the UK corporate bond market?

We do not find evidence for an ongoing persistent decrease in liquidity levels in UK corporate bonds. Our illiquidity estimates for 2024 were at or below their lowest levels across our sample for both high-yield and investment grade corporate bonds listed in the UK. There is however significant evidence for two periods of raised illiquidity, a sharp spike in illiquidity across bonds with the onset of coronavirus restrictions in Q1 and Q2 2020 and a more shallow but prolonged period of raised illiquidity estimates from mid-2021 to mid-2023.

Figure 11 and Figure 12 below show the results of calculating the different individual liquidity measures discussed in Section 3, with the former showing the median of individual bonds' liquidity measures and the latter the mean. The Amihud, IRC, and BPW measures all show a similar pattern to the composite measure above: illiquidity sharply spiked in 2020 and showed a less pronounced but longer spike between 2021 and 2023. This is shown most clearly in the median Amihud and BPW measures. Once again, these findings indicate that by 2024, the market largely returned to 2018 levels of liquidity. We show both the median and mean estimates of these measures as it provides meaningful context about the distribution of the measures across corporate bonds in our sample.

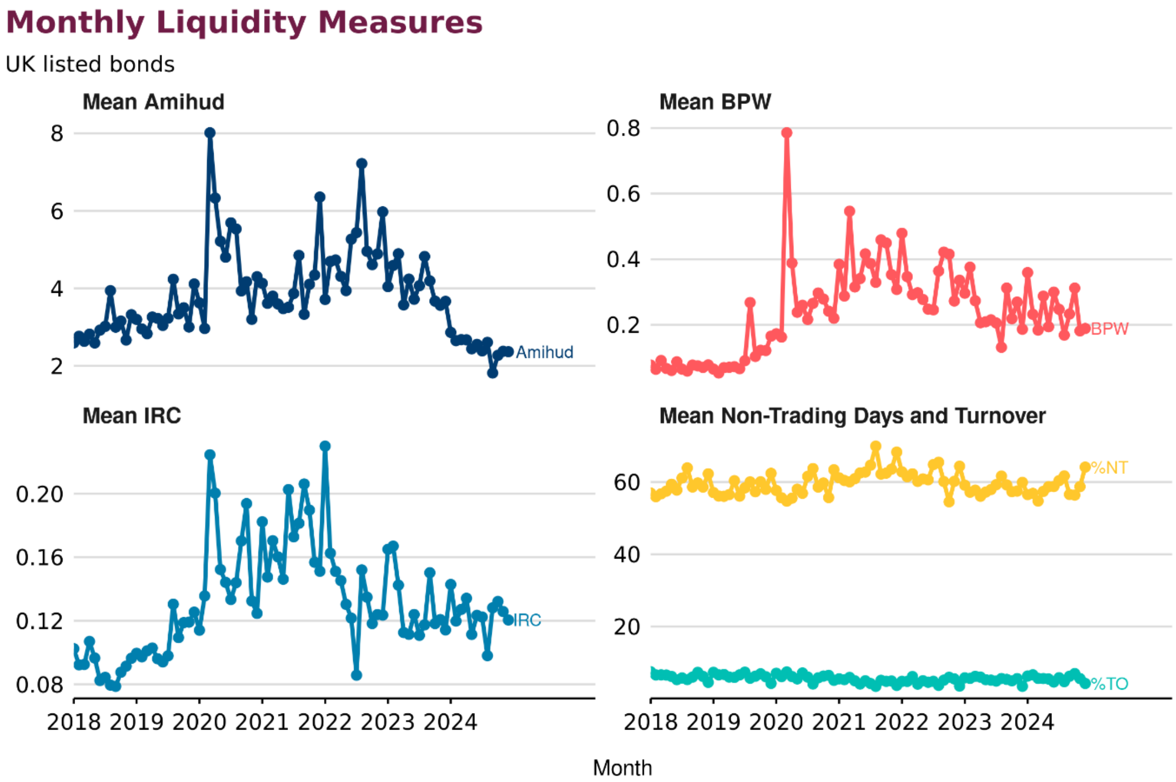
Figure 11: Overview of different liquidity measures (medians)



Source: FCA analysis

The three liquidity measures primarily used in this paper all capture slightly different aspects of liquidity. The Amihud is a measure of how responsive the price of a security is to trades, weighed by the size of the trade. The BPW, on the other hand, aims to measure aggregate liquidity by estimating the transitory component of price movements, which effectively capture the transaction costs associated with buying and selling corporate bonds. This difference may help explain the observed difference in the median Amihud and BPW measures in the second peak of illiquidity in our sample. The Amihud estimates would have been affected more by permanent changes in bond prices caused by central bank interest rate increases than the BPW, which estimates transitory price movements caused by 'price reversals'.

Figure 12: Overview of different liquidity measures (medians)



Source: FCA analysis

Comparing the mean and the median of our estimates provides meaningful context about the distribution of the measures across corporate bonds in our sample. Since the distribution of measures was highly skewed,[13] the mean estimates were significantly higher than the median across the sample (for a more detailed graphical summary of the distribution of our estimated liquidity measures please refer to Figure 15, Figure 16, and Figure 17 in the annex). This implies that the mean of the measures is a better reflection of what occurs in the tails of the liquidity distribution, while the median is more informative about the liquidity of most corporate bonds. From this perspective, Figure 11 and Figure 12 show that although liquidity conditions returned to normal for most corporate bonds in 2024, there is some evidence of remaining illiquidity in the tail end of the distribution (the least liquid bonds) as indicated by the elevated levels of the mean IRC and BPW estimates in 2024.

We can also interpret the Amihud ratio as capturing the *depth* of the liquidity pool in a market. In a shallower market, trades 'eat up' available liquidity quickly, leading to increased price impacts of trades and therefore increased Amihud estimates. In light of this interpretation of the Amihud, our results suggest that during the coronavirus period liquidity pools became shallower. The spike in the mean Amihud with the initial coronavirus restrictions is likely caused by 'liquidity flight' in the most illiquid bonds, but the persistent increase in the median Amihud up until 2023 suggests that liquidity pools for the average bond may have remained shallow for a significant time. By 2024 both measures returned to pre-coronavirus levels or below and we therefore do not find any evidence of a sustained decrease in liquidity.

[13] Even after winsorising the distribution as we did here.

RQ3b: Were price movements more volatile as liquidity supply depleted rapidly (shallow liquidity)?

As measured by the Amihud ratio, estimated illiquidity levels in 2024 were at or below pre-coronavirus levels and we do not, therefore, find evidence supporting a sustained decrease in the depth of liquidity pools and increase in the volatility of price movements, despite significant evidence for both during and following the coronavirus period. However, estimates of slightly raised mean BPW and IRC in 2024 compared to pre-2020 suggest that the least liquid corporate bonds still traded with elevated illiquidity even in 2024.

The Imputed Roundtrip Cost (IRC) measures the price difference between separate trades of a roundtrip. A roundtrip is a set of subsequent trades where an intermediary (usually a dealer bank) buys a quantity of a bond from an ultimate seller and sells it (subsequently or ahead of the other trade) to a separate ultimate buyer. The mean market IRC is thus an approximation of the transaction costs charged by dealers for providing liquidity in this way. Our results in Figure 11 and Figure 12 therefore show that between 2020 and mid-2022 dealers significantly increased their charges for intermediating roundtrip trades. Moreover, in 2024 median roundtrip costs were at their lowest in the sample but mean roundtrip costs remained slightly elevated compared to pre-2020 conditions. This indicates that although roundtrip costs for average bonds were at low levels, roundtrip costs at bonds and trades with higher risks remained elevated compared to pre-2020.

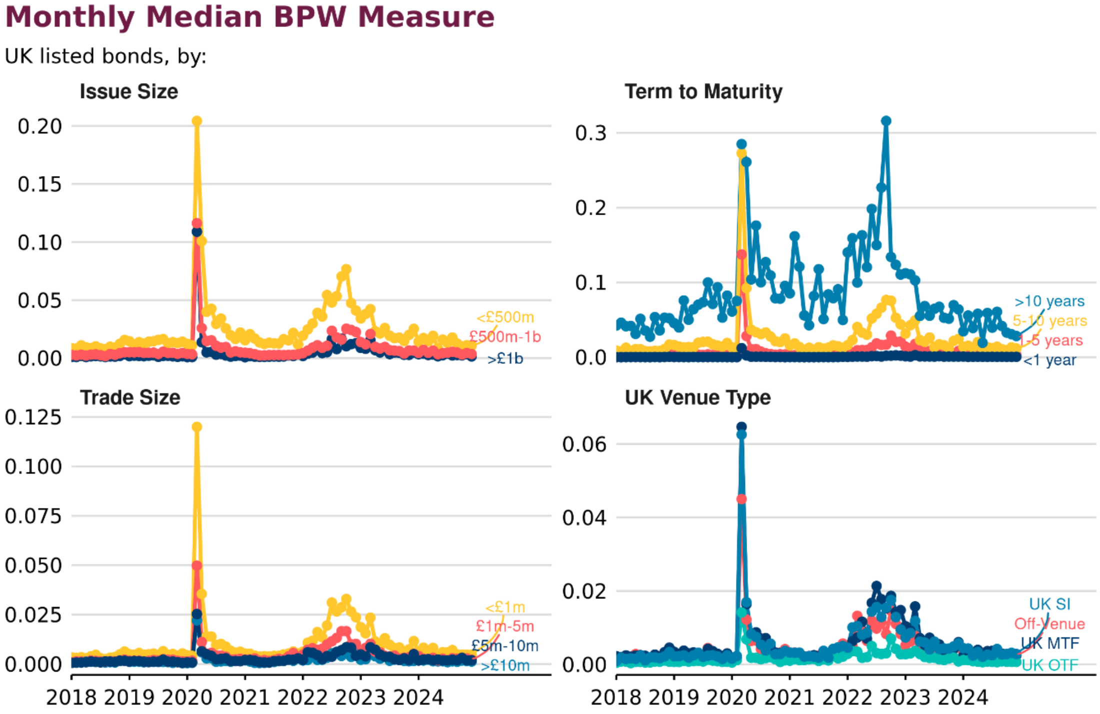
RQ2c: Did dealers charge more to intermediate trades?

Our estimates from imputing average roundtrip costs charged by dealers suggest that between 2020 and 2022 dealers significantly increased their fees for intermediating roundtrip trades. Although these estimated transaction costs fell and were at the lowest level in our sample by 2024 for the median bond, they remained above pre-coronavirus levels in our sample for the least liquid bonds, suggesting that rountrip costs for bonds with higher risks remained elevated in 2024.

In Figure 11 and Figure 12, we also plot non-trading days and mean monthly turnover (both as percentages). Similar to the findings of OP-14, these measures showed less variability than our other presented liquidity measures and we do not include them in our further analysis. Only the number of non-trading days was slightly raised during the slowdown in market activity around 2022 described above. Other than that, both measures, with some monthly variation, were broadly constant over the sample period.

We are also interested in how the liquidity profile of corporate bond changes with the bond's issue size, term to maturity, trade size, and the venue type it is traded on. The median BPW measure disaggregated by these factors are shown in Figure 13 below. For this part of the analysis, we show the results for the median BPW measure for clarity, but they are qualitatively similar for our other liquidity measures.

Figure 13: Liquidity estimates by factors



Source: FCA analysis

In summary, bonds with a larger issue size, shorter term to maturity, and larger trade size appeared more liquid, while the liquidity profile of bonds was similar across the different venue types. However, we recognise that these factors are correlated. For example, a smaller issue size is more likely to be by a smaller company, with on average worse credit rating.

It is important to bear in mind the construction of the BPW measure when interpreting these graphs, particularly regarding to the term-to-maturity of the bond. The BPW estimates the credit spread in subsequent bond transactions as the negative autocorrelation of prices in consecutive transactions. Corporate bonds tend to trade closer to face value the closer the bond is to maturity and therefore have less associated credit spreads with shorter maturities. It is thus less a reflection of the liquidity of the bond, but rather a consequence of the maturity risk component of credit spreads, that the BPW measure was lower for shorter term maturities than longer term maturities.

The composite illiquidity measure

Following OP-14 and the Dick-Nielsen et al. (2012) analysis on which it is based, we calculated the composite measure of liquidity presented in Figure 10 as the weighted average of our three main liquidity measures and the Amihud-Risk measure. More details on how the composite measure is calculated are provided in Annex 2.

Table 3 reports the composite measure broken down by different characteristics across the sample . The results show that bonds were more liquid (lower composite illiquidity score) when they (i) were closer to maturity; (ii) had an investment grade credit rating; (iii) had a larger issue size; (iv) were more recently issued; and (v) were denominated in

EUR. In this table, a negative number implies better than average liquidity and a positive number worse than average liquidity. These results are in line with what we have described in the section above. But it is important to highlight that like the BPW measure described before, our composite measure is largely a measure of transaction costs and not other aspects of liquidity such as volume and frequency of trading. It estimates higher liquidity for bonds that trade within a narrower range of prices even when these are traded infrequently (such as shorter maturity bonds).

Table 3: The composite liquidity measure

Group	Factor	Composite illiquidity measure
Term to maturity	Less than 1 year	**-0.69**
	1 to 5 years	**-0.07**
	5 to 10 years	**0.39**
	Greater than 10 years (including perpetual)	**0.36**
Credit rating at issuance	Investment grade	**-0.33**
	High Yield	**4.71**
Issue size	Less than £500m	**0.83**
	£500m to £1b	**-0.37**
	Greater than £1b	**-0.46**
Bond age	Less than 3 months	**-0.09**
	3 months to 1 year	**-0.10**
	1 year to 2 years	**-0.06**
	Greater than 2 years	**0.25**
Denomination currency	GBP	**0.05**
	EUR	**-0.47**
	USD	**-0.67**
	Other	**1.08**

Source: FCA analysis, lower values imply better liquidity

The liquidity component of bond spreads

A bond's spread is the difference in its yield compared with a risk-free rate. How liquidity relates to bond spreads is important for us to understand as it has implications for issuers' cost of capital. An increase in the yield spread premium for illiquid bonds implies increased difficulty for smaller issuers and issuers with weaker credit profiles (i.e. companies issuing less liquid corporate bonds) to raise capital through corporate bonds.

In this section we estimate the impact of illiquidity on bond spreads and calculate the proportion of spreads attributable to illiquidity. Annex 2 gives more detail on our methodological approach and how yields and spreads are calculated. We follow the approach of Dick-Nielsen et al (2012) and OP-14 and implement a two-step procedure to estimate the liquidity component of bond spreads.

In the first step of our analysis, we regress the bond spread on our liquidity measure and a series of control variables, separately for each liquidity measure.[14] The results of the regression are shown in Table 4 below (spreads are measured in basis points). Unlike OP-14, we do not separately estimate these regressions for IG and HY bonds due to the small sample size of HY bonds and associated limited explanatory power.[15] Instead, we estimate the regressions over our whole sample and include a dummy variable in the regression that controls for the credit rating at issuance of the bond (HY = 1, IG = 0) as well as an interaction variable between the HY dummy and the illiquidity measure.

All of our liquidity measures are statistically significant and positively correlated with estimated spreads. For HY bonds, the positive coefficient on the interaction term indicates that this positive correlation was larger for HY bonds across most of our measures. However, the interaction term is only statistically significant for our BPW and IRC measures. Note that an insignificant coefficient on the interaction term does not imply that HY bonds do not have higher associated spreads but just that the difference in spreads was not higher than what we would expect given their increased illiquidity and credit risk.

Table 4: The impact of liquidity on bond spreads

	Coefficient	(std error)	HY interaction	(std error)	#Obs	Adj R^2
Composite measure	93.7^{***}	(40.1)	247.6	(358)	8,142	0.63
Amihud	3.21^{***}	(0.53)	0.57	(3.78)	11,916	0.65
BPW	9.29^{***}	(2.27)	43.0^{*}	(27.7)	11,448	0.62
IRC	46.3^{***}	(14.1)	$1{,}059^{*}$	(579.8)	8,196	0.62
Amihud Risk	1.39^{***}	(0.47)	-1.69	(2.39)	11,287	0.65

Source: FCA analysis. The dependent variable in all regressions is the yield spread between the bond and a riskfree rate. Standard errors are heroscedasticity robust and clustered at issuing firm and quarter level. Significance at 10% level is marked *, at 5% level ** and at 1% level ***

In the second step of our analysis, we use the estimated regression coefficients from first step to estimate the liquidity component of bond spreads. That is, the spreads our regression results attribute to differences in liquidity estimates across corporate bonds (expressed in basis points). It is estimated as the difference in yield spreads between a very liquid bond and a bond with average liquidity, capturing how much of the latter's yield spread can be attributed to its higher illiquidity relative to the very liquid bond.[16]

To give a sense of scale to the liquidity component of bond spreads, we also calculate the percentage of the spread of bonds explained by the estimated illiquidity component. This

[14] The ratio of operating income to sales, long term borrowing, the financial leverage ratio (all for the issuing firm), equity volatility measured by the FTSE UK implied volatility index, The 10 year OIS swap rate, the ratio of the 10 to 1 year OIS swap rate, the bond age, issue size, term to maturity, and coupon rate. We also tested including the firm's EBIT and interest expenses but it did not substantially affect our results and reduced sample sizes significantly due to limited data availability (both variables were statistically insignificant).

[15] To obtain the regression results, we require complete data across all controls and the dependent and independent variable. As we do not get these data directly we rely on data obtained from Bloomberg, limiting our sample sizes.

[16] We calculate these results separately for IG and HY bonds

is calculated as the implied spread given our regression coefficients and liquidity estimates of a bond, divided by the actual spread of the bond. The results for both the estimated liquidity component and percentage of spread attributable to it are shown in Table 5 below.

Table 5: The liquidity component of bond spreads in basis points

	Comp. measure	Amihud	BPW	IRC	Amihud Risk
Liquidity component					
Investment Grade (95% CI)	2.95 (1.70;4.19)	1.72 (1.17;2.28)	0.43 (0.22;0.64)	1.36 (0.55;2.17)	1.82 (1.18;2.46)
High Yield (95% CI)	36.7 (0;105)	26.7 (0;79.1)	8.54 (0.44;16.6)	179.3 (14.4;344)	0 (0;22.5)
% Spread due to Liquidity					
Investment Grade (95% CI)	1.54 (0.89;2.19)	0.87 (0.59;1.16)	0.24 (0.12;0.36)	0.56 (0.23;0.89)	0.93 (0.60;1.26)
High Yield (95% CI)	2.33 (0;6.67)	0.51 (0;1.51)	1.02 (0.05;1.99)	13.7 (1.1;26.3)	0 (0;1.04)

Source: FCA analysis

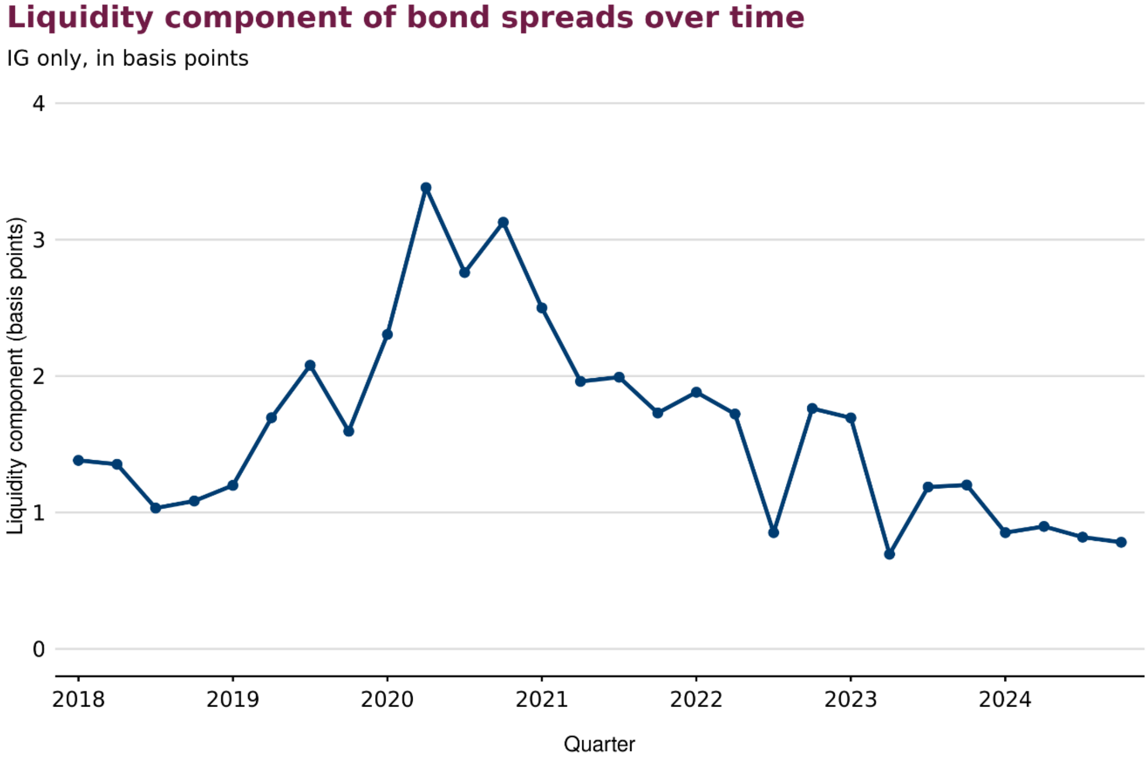
Our results are qualitatively similar to OP-14. We find that for IG bonds the liquidity component of spreads as well as the percentage of the spread explained by the liquidity component were smaller than for HY bonds for most liquidity measures. However, there are a few differences in our estimates that are worth highlighting.

Firstly, due to the small number of HY bonds in our regression analysis, the confidence intervals for HY liquidity components and the percentage of the spread they explain are very large. For this reason, we should also treat the point estimates with caution, and we do not interpret any differences in absolute value as evidence that the liquidity component for HY bonds has changed since 2014.

Secondly, our estimates for the liquidity component of IG bonds are larger than in OP-14 and statistically significantly greater than zero across all our liquidity measures. Our results suggest that the liquidity component of IG bonds was responsible for 3.16 basis points of spread, explaining 1.6% of spreads in these bonds. Notably, although OP-14 found that the liquidity component of IG bonds was not associated with any of their spread, our results suggest that for these bonds, the liquidity component was responsible for a small proportion of spreads.

Figure 14 below shows how the liquidity component of bond spreads has changed over time. To estimate the time series, we replicated the analysis described above to calculate the percentage of spreads due to illiquidity for each quarter of data. We do not report the findings for this analysis for HY bonds as the small sample sizes did not allow us to obtain consistent estimates of the liquidity component on a quarterly basis.

Figure 14: Time series of liquidity component of spreads



Source: FCA analysis

The findings show that the liquidity component of spreads peaked during the onset of the coronavirus pandemic in the UK in Q2 2020 at approximately 3.5 basis points of spreads. Following this period, the liquidity component declined to reach pre-pandemic levels in early 2023. Therefore, these results suggest that the liquidity component of spreads has not persistently increased in the UK relative to pre-coronavirus conditions. It is also interesting to note that despite the significant illiquidity observed during the coronavirus pandemic, at least for IG bonds, it did not result in similar spikes in the liquidity component of bond spreads as found during the global financial crisis. For example, Dick-Nielsen et al (2012) find liquidity premiums of over 100 basis points at the peak of the global financial crisis in investment grade bonds using a very similar methodology. Notably spreads, particularly in investment grade bonds, were also much more substantial during this time period. This indicates that relative to the global financial crisis, liquidity was more resilient in 2020.

RQ4a: Was the illiquidity risk component of yield spreads higher due to persistent illiquidity?

We do not find any evidence supporting a persistent increase in the illiquidity risk component of yield spreads and our estimated liquidity components were at their lowest over our sample period in 2024. Moreover, despite an increase in the liquidity component of spreads during coronavirus restrictions between 2020 and 2021, liquidity components of spreads did not reach the same highs as estimated in similar analyses for the global financial crisis.

5 Conclusion

In this work we followed the approach of OP-14 to monitor the state of UK corporate bond market, with specific focus on the level of liquidity. In doing this, we provided evidence towards four research hypotheses (from Figure 1: Research hypotheses tree):

1. **Whether volumes traded and issuances of corporate bonds on the UK market were falling**

Despite a sharp fall in EUR denominated volume traded in 2021 for active and listed bonds (-43.7%), from 2022 to 2024 trading volumes on UK venues were rising on a year by year basis in both corporate bonds listed (9.7% per year) and corporate bonds admitted to trading (9.0% per year). Outside of EUR denominated trading, trading volumes largely recovered to pre-coronavirus levels (RQ1a).

From 2018 to 2024, in our sample of active bonds, the average number of unique corporate bonds admitted to trading and trading on UK venues increased across GBP (2.3% annually), EUR (2.6% annually), and USD (4.7% annually) denominations. In our sample of active and listed bonds, we find a sharp fall in EUR denominated bonds (-11.0%) traded on the UK corporate bond market in 2021, immediately following Brexit. However, outside of this period and across USD and GBP active and listed bonds, the number of actively traded bonds remained roughly constant (RQ1b).

2. **Whether dealer banks on the UK corporate bond market were less willing to take on inventory**

Our data suggests that through their secondary market activity alone, in aggregate dealers have not reduced their UK corporate bond inventories since 2018. However, due to data limitations, we cannot find conclusive evidence on whether dealers have changed their overall risk exposure to UK listed corporate bonds (RQ2a).

We find indicative evidence that dealers took longer to offset large buy and sell orders of £15m and above during the 2020 to 2022 period. Average trade offset times across buy and sell orders in the ranges of £15m-£20m, £20m-£25m, and £25m+ were larger in 2020 to 2022 than in 2019, with a number of statistically significant differences. However, in 2023 and 2024, trade offset times were largely at or below pre-2020 levels and we find no evidence of a sustained increase in trade offset times or statistically significant differences to pre-coronavirus levels (RQ2b).

Our estimates from imputing average roundtrip costs charged by dealers suggest that between 2020 and 2022 dealers significantly increased their fees for intermediating roundtrip trades. Although these estimated transaction costs fell and were at the lowest level in our sample by 2024 for the median bond, they remained above pre-coronavirus levels in our sample for the least liquid bonds, suggesting that rountrip costs for bonds with higher risks remained elevated in 2024 (RQ2c).

3. **Whether the UK corporate bond market had persistently decreased levels of liquidity**

We do not find evidence for an ongoing persistent decrease in liquidity levels in UK corporate bonds. Our illiquidity estimates for 2024 were at their lowest levels across our sample for both high-yield and investment grade corporate bonds listed in the UK. There is however significant evidence for two periods of raised illiquidity, a sharp spike in illiquidity across bonds with the onset of coronavirus restrictions in Q1 and Q2 2020 and a more shallow but prolonged period of raised illiquidity estimates from mid-2021 to mid-2023 (RQ3a).

As measured by the Amihud ratio, estimated illiquidity levels in 2024 were at or below pre-coronavirus levels and we do not, therefore, find evidence supporting a sustained decrease in the depth of liquidity pools and increase in the volatility of price movements, despite significant evidence for both during and following the coronavirus period. However, estimates of slightly raised mean BPW and IRC in 2024 compared to pre-2020 suggest that the least liquid corporate bonds still traded with elevated illiquidity even in 2024 (RQ3b).

4. **Whether yield spreads were higher, causing an increase in the cost of raising capital with corporate bonds**

We do not find any evidence supporting a persistent increase in the illiquidity risk component of yield spreads and our estimated liquidity components were at their lowest over our sample period in 2024. Moreover, despite an increase in the liquidity component of spreads during coronavirus restrictions between 2020 and 2021, liquidity components of spreads did not reach the same highs as estimated in similar analyses for the global financial crisis (RQ4a).

In summary, the results of our analysis show that despite significant challenges from the coronavirus crisis, Brexit, a period of sustained uncertainty, inflation, and increased interest rates, the UK corporate bond market made a strong recovery in 2023 and 2024. The market was liquid, yield spread estimates were low, and both overall volume and the number of issuances trading on the UK market were growing.

Annex 1: Data

MiFID Data Cleaning

To support our analysis, we access MiFID transactions reported to the FCA by investment firms as part of the onboarded MiFID II regime.

MiFID II (Markets in Financial Instruments Directive II) is a comprehensive legislative framework implemented by the European Union on January 3, 2018, to improve the functioning and transparency of financial markets and offer enhanced protection for investors. It expands upon MiFID I, which was introduced in 2007, by extending regulatory coverage to a broader range of asset classes and trading venues, importantly also including trading off-exchange. MiFID II mandates the reporting of transactions across various financial instruments, including equities, bonds, derivatives, and commodities.[17]

As MiFID information is reported by market participants, data cleaning is needed prior to any analysis. Our cleaning approach is broadly based on the approach suggested for MiFID II transaction reports by Jurkatis (2024), but we have adapted it to suit the data needs of our research.

We undertook the following main cleaning steps:

- We removed duplicate transaction reports stemming from multiple counterparties involved in a trade each reporting the trade;
- We cleaned price data for prices misreported as either yield or quantity traded (instead of % of par value) and price data misreported as a fraction or in basis points (instead of % points);
- We winsorised the price and quantity distribution at 99% of the distribution;
- We removed internal trades and pre-issuance trades; and
- We converted all quantities to GBP using end-of-day foreign exchange rates accessed through the ECB.

[17] For more info and helpful resources see: https://www.fca.org.uk/markets/transaction-reporting

Annex 2: Methodology

Liquidity measures

In this annex, we describe in detail the implementation of the individual statistics and liquidity measures used in this paper.

Amihud measure

We estimate the Amihud measure by calculating for each bond i on each day d:

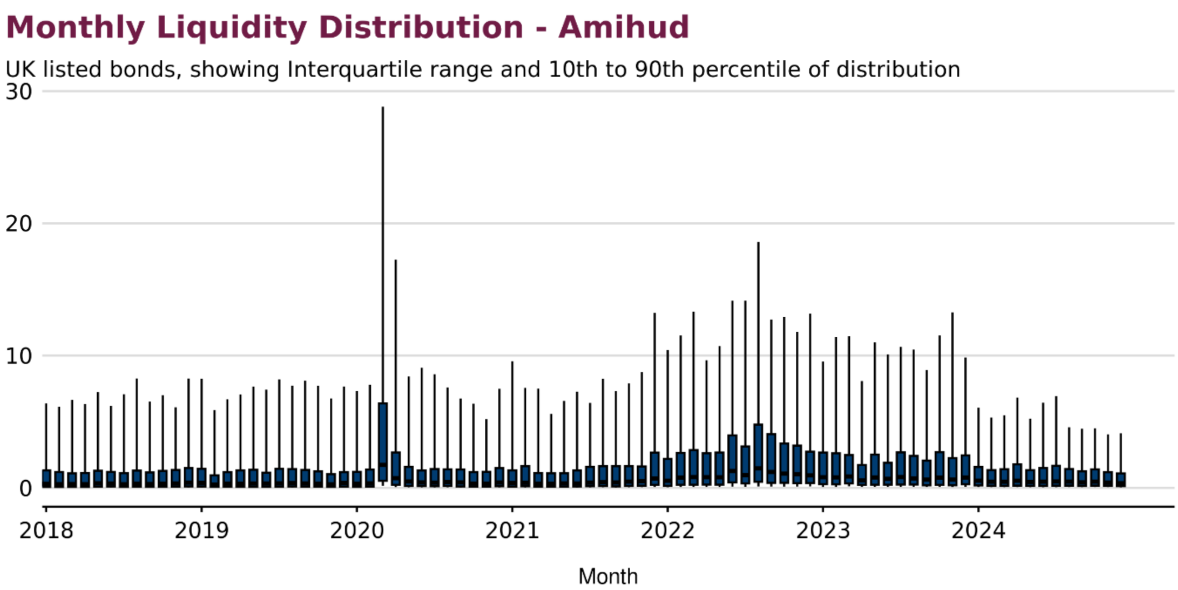
$$Amihud_{i,d} = \frac{1}{N_{i,d}} \sum_{t=1}^{N_{i,d}} \frac{|R_{i,t}|}{V_{i,d}}$$

Here:

- $R_{i,t} = 100 \cdot \ln{(P_t/P_{t-1})}$ is the return on the asset i for trade t, calculated using the logarithmic formula for the purposes of daily aggregation;
- $V_{i,t}$ is the trading volume (in £) in bond i on day d; and
- $N_{i,d}$ is the number of trades in bond i on day d.

We aggregate the daily Amihud measures on the bond-month level first by taking a weighted mean (weighted by the number of trades in a day) and subsequently aggregate these to the sample measure with another weighted mean (weighted by the number of trades in a bond-month).

Figure 15: Amihud distribution over sample



Source: FCA analysis

Bao, Pan, Wang (BPW) measure

The BPW measure is a variation of the Roll (1984) measure of bid-ask spreads. It is calculated as the negative of the covariance between subsequent bond returns:

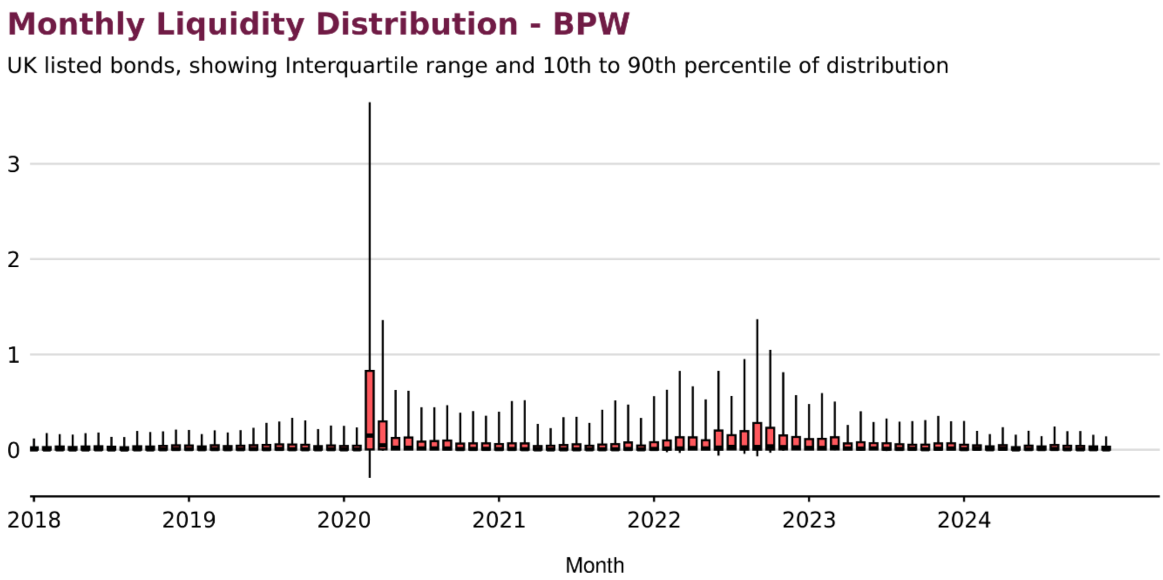
$$BPW_{i,t} = -cov(R_{i,t}, R_{i,t+1})$$

Here:

- $R_{i,t} = P_{i,t} - P_{i,t-1}$ is the difference in the flat price between a trade and the most recent previously observed trade.

We estimate the BPW measure on a bond-month level first and then take the mean of these as the sample BPW measure (weighted by number of trades in a bond-month).

Figure 16: BPW distribution over sample



Source: FCA analysis

Imputed Roundtrip Cost (IRC) measure

We estimate the IRC of a bond by following the approach of Feldhutter (2011) by matching observed trades into roundtrips (where the same quantity of a bond is bought and then subsequently sold) and then computing for each roundtrip r in bond i:

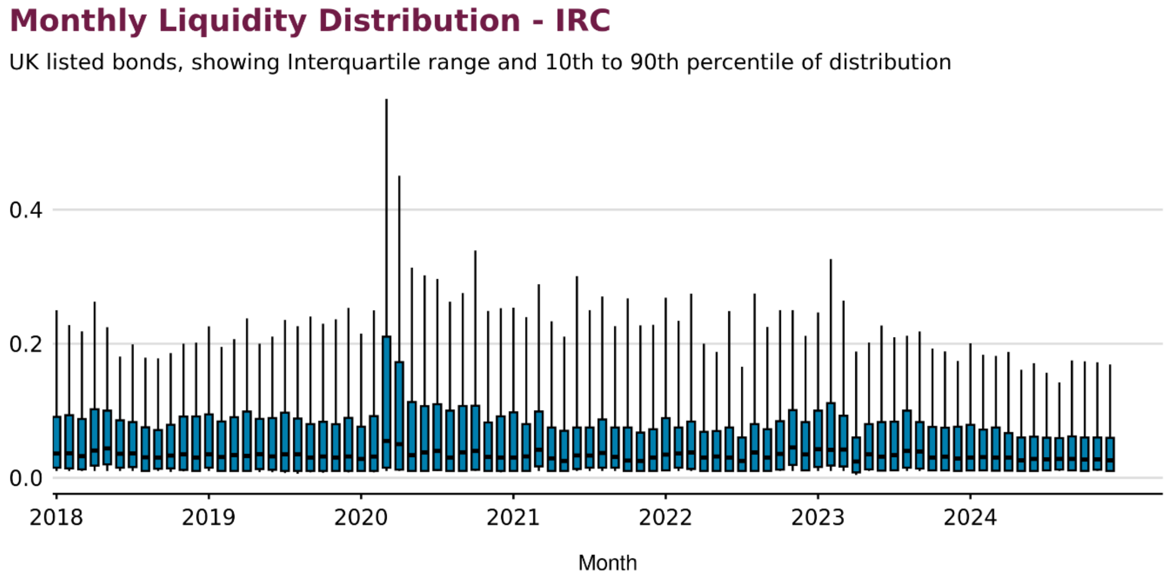
$$IRC_{r,i} = \frac{P_{max} - P_{min}}{P_{min}}$$

in the roundtrip. Here:

- P_{max} is the highest; and
- P_{min} is the lowest flat price observed in the roundtrip.

Roundtrips are defined in Feldhutter (2011) as instances where the same bond is traded 2 or 3 times at the same quantity within 15 minutes of each other. The IRC measure is aggregated to the day level first, as the average IRC across roundtrips in a bond-day. To obtain monthly and sample means, we take weighted means of daily IRC measures (weighted by the number of roundtrips in a day).

Figure 17: IRC distribution over sample



Source: FCA analysis

Turnover

The monthly turnover of a bond is calculated as the total face value of the bond traded in a month (in £), divided by the total issuance size of the bond (in £).

Proportion of non-trading days

We calculate the proportion of non-trading days for a bond in a month as:

$$\frac{PT_{i,t} - DT_{i,t}}{PT_{i,t}}$$

Here:

- $PT_{i,t}$ is the number of potential trading days for a bond i in month m, i.e., the number of non-weekend, non-holiday days between the beginning and end of the month and the issuance and maturity day of the bond; and
- $DT_{i,t}$ is the number of days the bond was traded in the month.

Corporate bond spreads

We calculate the month-end yield of each instrument by taking the average yield to maturity for all trades on the last day in a month the instrument is traded. We exclude all non-fixed rate bonds from the calculation for simplicity and calculate yield to maturity (YTM) for each observed trade in fixed-rate bonds in our sample. The quarterly bond yield is taken to be the last estimated yield-to-maturity in a bond within a quarter. We also follow Dick-Nielsen et al (2012) in excluding all bonds with a maturity of less than one month and a maturity of greater than 30 years from our analysis of yield spreads.

We estimate the spread of the bond for each month as the difference between the yield, as calculated above, and the closest, maturity-matched, end-of-month UK Overnight Indexed Swaps spot rate obtained from the Bank of England. We winsorise the 0.5% highest and lowest spreads by replacing all values below the 0.5th percentile and above the 99.5th percentile with the values at those respective cutoff points.

The composite liquidity measure

Following the approach of OP14 and Dick-Nielsen, et al (2012), we estimate the composite liquidity measure as the equal-weighted average of the scaled (demeaned and divided by their respective standard deviation) Amihud, BPW, IRC, and Amihud Risk measures. This is a close approximation of the first principal component of the principal component analysis (PCA) described below.

We carried out PCA on our estimated liquidity measures. PCA is a statistical technique used to reduce the dimensionality of data while preserving as much variance as possible. It transforms the original variables into a smaller set of new, uncorrelated variables called principal components, which are linear combinations of the original variables ordered by the amount of variance they explain. The first principal component explains the most variance, with each subsequent component capturing progressively less variance, making PCA useful for simplifying datasets and identifying underlying patterns.

Table 6 below shows the results of our PCA estimation. The first principal component explains 47% of the overall variation in the measure and the loadings are high and nearly equal for our first four measures. These results closely match those of Dick-Nielsen et al (2012) and OP-14.

Table 6: Principal Component Analysis of liquidity measures

	PC1	PC2	PC3	PC4	PC5	PC6
Mean Amihud	0.47	0.12	0.47	-0.34	-0.55	-0.36
Median BPW	0.47	0.26	-0.41	0.17	-0.39	0.61
Mean IRC	0.43	0.23	-0.57	-0.16	0.38	-0.52
Amihud Risk	0.43	0.27	0.54	0.26	0.58	0.22
Turnover	-0.32	0.61	0.02	-0.66	0.12	0.27
Non-trading days	0.30	-0.65	-0.03	-0.57	0.23	0.33
% Explained	77.5%	15.3%	6.1%	0.8%	0.1%	0.1%

Source: FCA analysis

Following Dick-Nielsen et al (2012), the composite liquidity measure is then calculated as the equally weighted average of the Amihud, BPW, IRC, and Amihud Risk measures, after subtracting each measure's mean and dividing by its standard deviation.

To disaggregate the composite liquidity measure by its factors as in Figure 10 and Table 3, we first demean and divide by the standard deviation for the overall sample and then calculate the composite measure for the separate factors.

The liquidity component of bond spreads

In this section we describe our methodology used in the liquidity component of bond spreads section from the main body of the paper.

To calculate estimated yields to maturity we restrict our sample to only fixed coupon bonds. These make up the majority of bonds in our dataset. We calculate yield to maturity for bond i at time t as the interest rate $ytm_{i,t}$ that solves:

$$0 = T_1 \cdot \frac{C_i}{\left(1 + ytm_{i,t}\right)^{T_1}} + \sum_{\theta=T_1+1}^{T_{i,t}} \frac{C_i}{\left(1 + ytm_{i,t}\right)^{\theta}} + \frac{100}{\left(1 + ytm_{i,t}\right)^{T_{i,t}}} - P_{i,t}$$

Here:

- $T_{i,t}$ is the time to maturity in years for bond i at time t;
- T_1 is the time to the next full year until the bond matures, e.g. for a bond with 2.5 years until maturity, it will be 0.5;
- C_i is the fixed coupon rate of bond i; and
- $P_{i,t}$ is the price of bond i at time t.

This formulation accounts for the uneven length of time periods until maturity and the fact that we are observing clean prices net of accrued interest (coupon payments).

As discussed in the main body of the paper, we follow Dick-Nielsen et al (2012) and OP-14 and adopt a two-step procedure to estimate the liquidity component of bond spreads. As a first step, we regress our estimated corporate bond yield spreads on our liquidity measures and the control variables described in Section 4. The regression is estimated on the panel of quarters t and bonds i in our sample:

$$Spread_{i,t} = \alpha + \beta_0^l LiquidityMeasure_{i,t}^l + \beta_1 HY_{i,t} + \beta_2 LiquidityMeasure_{i,t} \cdot HY_{i,t} + \Sigma_{k=3}^{K+2} \beta_k X_{i,t}^k + \epsilon_{i,t}.$$

- $Spread$ denotes yield difference between the bonds estimated yield to maturity and the maturity matched OIS swap rate;
- $LiquidityMeasure^l$ denotes the liquidity measure $l \in$ {Amihud, BPW, IRC, Amihud Risk, Composite} used in the regression. We separately estimate the above regression for our liquidity measures;
- HY is a dummy variable that takes the value 1 if bond i received a High Yield credit rating at issuance and 0 otherwise;
- X^k is one of K control variables used in the regression.

We do not use monthly data for the regression analysis as our firm level accounting details were only available to us on a quarterly basis. We calculate two-way cluster-robust standard errors, clustered on both the instrument i and the quarter t..

Using the regression estimates, we adapt the methodology of Dick-Nielsen et al (2012) to our changed regression specification to calculate the liquidity component of bond spreads as follows. We define the liquidity component of an average bond as the difference between the 50th percentile P_{50}^l and the 5th percentile P_5^l of the distribution of liquidity estimates for our measure l and calculate the liquidity component LC^l as:

$$LC^l = \widehat{\beta_0^l}\left(P_{50}^l - P_5^l\right)$$

For Investment Grade bonds and:

$$LC^l = \left(\widehat{\beta_0^l} + \widehat{\beta_2^l}\right)\left(P_{50}^l - P_5^l\right)$$

For High Yield bonds, accounting for the additional interactive term. To estimate the confidence intervals CI_{LC}^l of the liquidity component, we calculate:

$$CI_{LC}^{l} = \left(\widehat{\beta_0^l} \pm 1.96 \cdot \widehat{se_0^l}\right)\left(P_{50}^{l} - P_{5}^{l}\right)$$

For Investment Grade bonds and:

$$CI_{LC}^{l} = \left(\widehat{\beta_0^l} + \widehat{\beta_2^l} \pm 1.96\sqrt{\widehat{se_0^l}^{2} + \widehat{se_2^l}^{2} + 2\widehat{cov_{0,2}^l}}\right)\left(P_{50}^{l} - P_{5}^{l}\right)$$

For High Yield bonds, accounting for the interactive term β_2^l. Here:

- $\widehat{se_0^l}$ is the estimated standard error of coefficient β_0^l; and
- $\widehat{cov_{0,2}^l}$ is the estimated covariance between coefficient β_0^l and β_2^l.

We then compute the fraction of the yield spread explained by the liquidity component. We first estimate for each observation in the dataset their individual liquidity components LC_i^l (as above, but replacing P_{50}^l with its own estimated liquidity measure in quarter t) and divide it by the spread of the bond in quarter t. We then take the median value of these estimates multiplied by 100 as the percentage of spread due to illiquidity. The confidence intervals are calculated in the same way but using the formula for calculating confidence intervals introduced above. These calculations are done separately for IG and HY bonds.

Inventory analysis

In this section we briefly explain our approach for calculating dealers' inventory offset time. As mentioned before, unlike in OP-14, our data does not allow us to observe the inventory held by dealers. We can only observe changes in the inventory of dealers for individual instruments over time. By studying time to buy/sell for dealers we attempt to give a view of inventory risk. This is measured as the distribution of time required for a dealer to zero-out their position in a bond after buying or selling it – estimated separately for different trade sizes.

To calculate the offset time, we start by computing the time taken for each trade quantity to be traded cumulatively in the opposite direction. For example, when a dealer buys (sells) 100 bonds, we compute how many days it takes for them to net sell (buy) 100 of the same bond. In that period the dealer can continue buying/selling the same bond and what matters is when the net quantity traded of that bond is equal but in opposite direction.

Suppose for each $trade_i$ there exist a $trade_n$ where:

$$|VOlume_{trade_i}| = -|VOlume_{trade_{i+1}} + VOlume_{trade_i} + \cdots VOlume_{trade_n}|$$

Then the trade offset time is calculated as the difference between date-time of $trade_i$ and $trade_n$, whenever $trade_n$ exists.

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