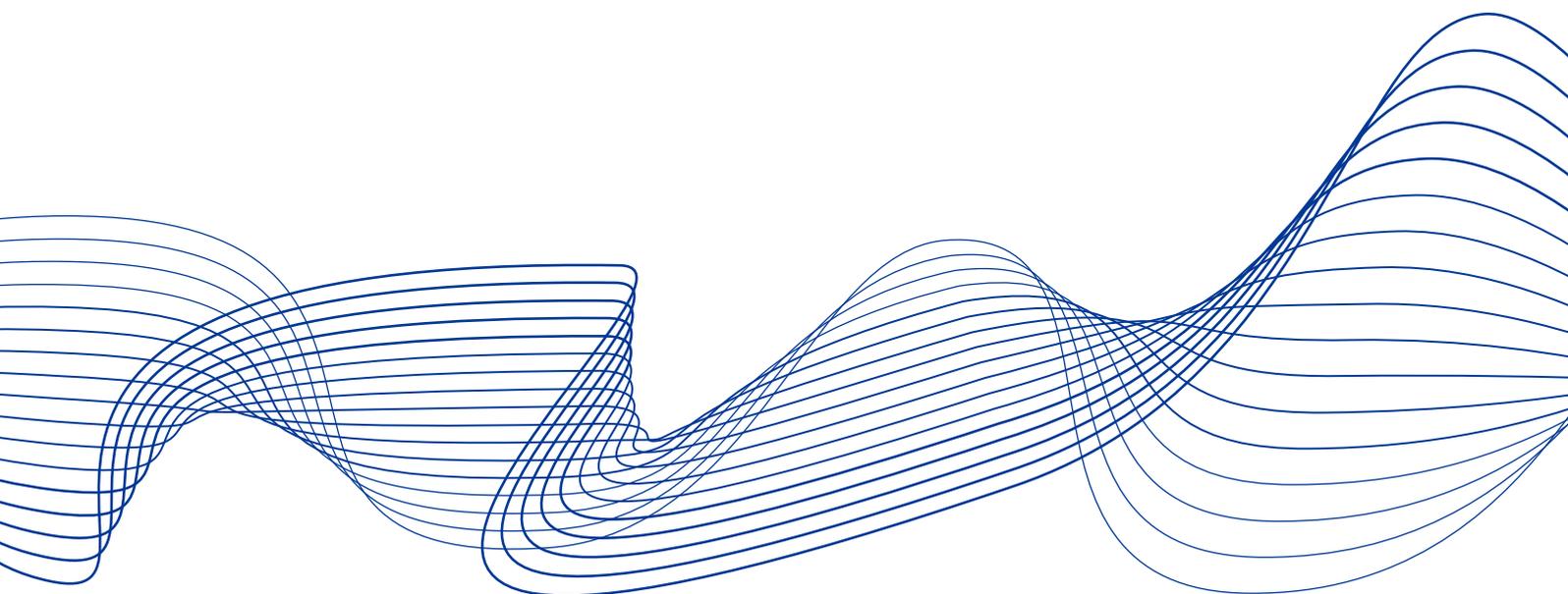


Market liquidity and market-making

October 2016



ESRB
European Systemic Risk Board
European System of Financial Supervision

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Executive summary

Recently, there has been widespread concern that a significant decline in market liquidity could result in some fixed income markets becoming impaired, which could pose a threat to financial stability. In its broadest sense market liquidity refers to the ease with which securities can be bought or sold without having an undue impact on prices. Liquid markets help facilitate the financing of investments in the real economy and so support economic growth.

Whether these concerns can be substantiated remains unclear, mainly because of data availability problems. This report investigates the issue and presents new evidence, particularly focusing on the supply of liquidity services by market-makers. To obtain this information the European Systemic Risk Board (ESRB) conducted a quantitative data collection exercise as well as a qualitative survey with the largest market-makers operating in Europe.

The data gathered show mixed evidence of developments in market liquidity. For asset classes other than corporate bonds, gross and net inventories have either increased or remained unchanged. However, for European corporate bond markets, gross and net inventories have declined since 2010, possibly indicating a reduced ability or willingness of market-makers to act as intermediaries in these markets. Moreover, compared with the growth in outstanding amounts of corporate bonds, market-makers' inventories have decreased even more. The findings from the ESRB's data collection are consistent with market-based measures of liquidity.

Market-makers responding to the qualitative survey perceive that reductions in overall market liquidity, post-crisis regulation, changes in the general market environment and developments in the investor base are causing a reduction in their market-making activities. Banks view the capital and liquidity regulation and increased transparency requirements under the new MiFID II/MiFIR rules in particular as impeding their market-making capacity.

Liquidity resilience, i.e. the existence of liquid markets during times of stress, is important for financial stability. The financial crisis has shown that, at normal times, liquidity conditions may be perceived to be ample, but a sudden lack of liquidity can occur during times of stress.

Any possible deterioration in the supply of market liquidity as indicated by the results presented in this report has occurred against a backdrop of increasing demand for liquidity. Demand has increased owing to the expansion in market-based finance and an increase in bond holdings by asset managers.

There is a significant information gap in terms of financial reporting in the EU that hampers a full assessment of the level of market liquidity and any related systemic risks. This report contributes to the debate on market liquidity conditions by providing new evidence, in particular on market-making activities. The data provide a mixed picture with the results varying by asset market and the market liquidity indicator used.



Section 1

Introduction¹

Market liquidity, in its broadest sense, refers to the ease with which financial assets can be bought or sold without having an undue impact on prices. Not all financial assets are equally liquid in this sense. From a financial stability perspective, what matters most is how market liquidity contributes to the efficiency of financial markets, as well as how well financial markets respond to stress. Market liquidity is distinct from, but closely linked to, funding liquidity.²

Liquid financial markets are essential to any well-functioning financial system and are an important element in the provision of “market-based finance”. The ability to safely and reliably trade securities issued by sovereigns and non-financial and financial institutions helps facilitate the financing of investments in the real economy and so support economic growth and stability.

There has been growing concern that liquidity in some markets in the EU has deteriorated. While this concern is most pronounced in the European corporate bond market, it also applies to other markets including securitisation, government bonds and foreign exchange.³ Market illiquidity is seen as a potential amplifier in a scenario where there is an abrupt reassessment of risk premia with possible systemic implications. If market liquidity is assessed insufficient to absorb sudden spikes in the demand or supply of certain securities, this may pose a risk to financial stability and warrant pre-emptive macroprudential action.

A number of regulatory, competitive and technological developments are said to have reduced market-makers’ willingness and ability to act as counterparties for immediate trading needs.⁴ First, the provision of liquidity is increasingly viewed as a stand-alone profit centre and less as a client service that adds to the franchise value of banks and broker-dealers. Second, regulatory changes have increased inventory management costs for certain financial instruments, possibly encouraging liquidity providers to concentrate on more homogeneous instruments in liquid markets.^{5,6}

This report provides new evidence on the supply of liquidity services by market-makers in Europe based on an ESRB data collection. Empirical analysis on market liquidity has, so far, primarily focused on US markets. The ESRB’s data collection exercise covers 13 significant market-making banks in Europe and includes both a quantitative and a qualitative part. The quantitative data covers market-makers’ inventories, average trade size and volume of market-making activity. The

¹ The work presented in this report has been conducted by the ESRB Expert Group on Market Liquidity.

² A theoretical explanation of the interaction between funding and market liquidity is given in Brunnermeier and Pederson (2008).

³ There has been a considerable amount of research into current market liquidity dynamics by a range of national, regional and international bodies. See, among others, International Monetary Fund (IMF, 2015); Bank for International Settlement (BIS, 2016); European Supervisory Authorities (ESAs, 2016); Bank of England (2015), “The Resilience of Financial Market Liquidity”, *Financial Stability Papers*, No 34, October; and [the testimony of Federal Reserve System](#) Governor Jerome Powell of 14 April 2016.

⁴ See, for example, BIS (2014).

⁵ Homogeneous securities include most government bonds, large cap equities and standardised derivatives, whereas corporate bonds, small cap equities and asset-backed securities are often considered heterogeneous.

⁶ Meanwhile, there have also been changes in the demand for liquidity services by asset managers (see Section 3).



qualitative part contains questions on the participants' perception of market shares and potential impediments to their market-making activities.

The remainder of the report is structured as follows. Section 2 presents a brief empirical assessment of the latest developments in market liquidity, focusing on sovereign and corporate bonds. This section also includes an analysis of the links with derivatives markets and potential problems in cash markets. Section 3 presents the results from the ESRB's data collection on market-makers, focusing on inventory and trading volume data and on market-makers' perception and management of market liquidity risk. Section 4 provides a summary and concluding remarks.



Section 2

Developments in market liquidity

This section provides a brief summary of the current state of secondary market liquidity drawing on market-based indicators and focusing on the sovereign and corporate segments of the European bond market. It also includes an analysis of the links with derivatives markets and potential problems in cash markets.

There is no single agreed measure for assessing liquidity across markets. Rather, there are a number of interrelated measures, which can be classified into four broad categories: (1) transaction cost measures (e.g. bid-ask spreads, round trip costs); (2) volume-based measures (e.g. trading volume, turnover); (3) price-based measures (e.g. estimated liquidity premia, on the run vs off the run spread); and (4) market impact measures (e.g. Amihud ratios⁷).

Available indicators of market liquidity in fixed income markets give mixed signals. Price-based measures suggest little or no decline in market liquidity for government bonds compared with the pre-crisis era. On the other hand, some quantity-based measures suggest a decline, and survey-based data point to a marked deterioration. Information gathered from bid-ask spreads and survey-based data point to a deterioration of liquidity conditions in the secondary corporate bond market following the onset of the global financial crisis. There have also been some signs of a decrease in the availability of repo market financing, though recent surveys of EU markets show a stabilising trend.⁸

Sovereign bond markets

Price, quantity and survey-based measures of market liquidity indicate that secondary market liquidity is lower across euro area sovereign bond markets compared with the pre-crisis era, but higher than during the peak of the banking and sovereign debt crises.⁹ While all indicators signal lower liquidity compared with the pre-crisis era, they differ in terms of the extent of the decline in market liquidity over recent years. Price-based measures (e.g. bid-ask spreads and Amihud ratios) indicate only a slight decline, quantity-based measures (e.g. turnover ratios and average deal size) show a more noticeable decline and survey-based measures show a marked decline across sovereign bond markets.

Turning to individual metrics for euro area sovereign bond markets, bid-ask spreads relative to their mid-point prices have fallen considerably from crisis peaks, but remain well above pre-crisis levels (see Chart 1). The gradual improvement in conditions has been interrupted by episodes of market

⁷ The Amihud ratio of market liquidity estimates the impact of trading on prices. The measure is constructed as the ratio of absolute returns to absolute trading volume over a given window for a particular security - which is subsequently averaged over a longer time horizon and/or a set of securities. A higher price impact measure means a greater fall in prices for a given level of sales (i.e. a less liquid market).

⁸ See European Central Bank (ECB, 2015c) and International Capital Market Association (2015).

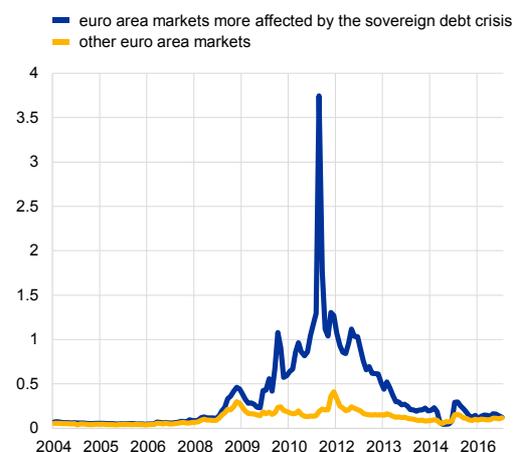
⁹ Consideration should be given to whether pre-crisis, i.e. 2007, is a valid benchmark for liquidity analysis. The pre-crisis liquidity levels may have been driven by excessive leverage, which would not have been sustainable over the long term. Moreover, as became evident during the crisis, this level of liquidity was just an illusion – it was not there when it was needed the most.



illiquidity, suggesting that liquidity can quickly disappear during rapid bouts of market tension. More recently, volatility in bid-ask spreads for euro area sovereign bonds increased and spreads widened amid the market events in early 2016. For certain markets, the widening of spreads in 2016 was more substantial than in previous episodes. A principal component analysis depicts a strong commonality in forces driving the “tightness” dimension of liquidity across euro area secondary bond markets. This analysis raises concerns that liquidity may deteriorate simultaneously across markets right when it is most needed.¹⁰

Chart 1
Bid-ask spreads relative to mid-point

(Jan. 2005 to June 2016)



Source: Iboxx
Notes: Indicators are normalised based on a cumulative distribution function. Normalised indicators range from 0 to 1, where 1 indicates high liquidity. Markets covered include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. Those more affected by the sovereign debt crisis include Greece, Ireland, Italy, Portugal and Spain.

Chart 2
Turnover ratios in euro area sovereign bond markets (normalised)

(Jan. 2005 to June 2016)



Source: MTS
Notes: Indicators are normalised based on a cumulative distribution function over individual ISINs (where granular data were available for the equivalent indicator, otherwise at country level). Normalised indicators range from 0 to 1, where 1 indicates high liquidity. Markets covered include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain.

Turnover ratios are also below their pre-crisis level for many euro area sovereigns (see Chart 2) and the average deal size traded on the largest inter-dealer trading system for euro area government bonds (MTS) is slightly below pre-crisis levels, despite having rebounded after the start of the ECB’s public sector purchase programme in March 2015. Alternative liquidity measures such as Amihud ratios and market efficiency coefficients display a similar pattern and suggest deteriorating liquidity conditions in some sovereign bond markets in the first few months of 2016 (see Chart 3).

¹⁰ See Box 4 of the [ECB’s May 2015 Financial Stability Review](#).

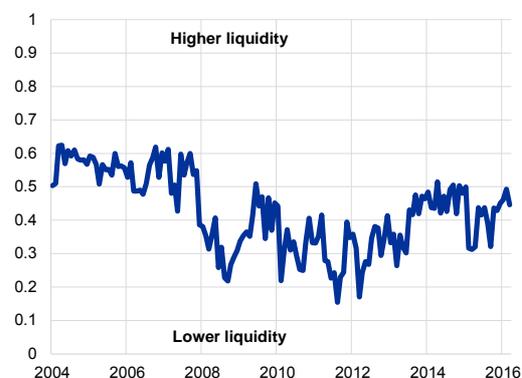


Corporate bond markets

Information gathered from bid-ask spreads, surveys of market-makers (including those described in Section 4) and market intelligence point to a deterioration in liquidity conditions in the secondary market following the onset of the global financial crisis.¹¹ Bid-ask spreads for euro area corporate bonds display a similar trend to their sovereign counterparts: they are currently slightly above levels observed prior to the onset of the financial crisis, but are markedly tighter than levels observed at the heights of the global financial and euro area sovereign debt crises (see Chart 4).

Chart 3
Amihud ratios in euro area sovereign bond markets (normalised)

(Jan. 2005 to June 2016)

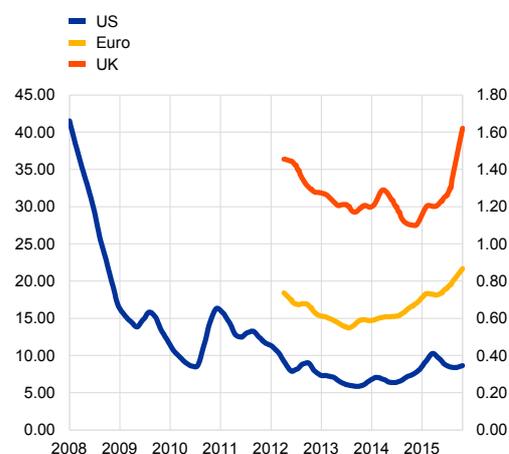


Source: MTS

Notes: Indicators are normalised based on a cumulative distribution function over individual ISINs (where granular data were available for the equivalent indicator, otherwise at country level). Normalised indicators range from 0 to 1, where 1 indicates high liquidity. Markets covered include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain.

Chart 4
Bid-ask spreads on corporate bonds

(basis points; percentage)



Source: MarketAxess

Note: TRAX bid-ask spread index (BASI) for EU; for the UK index, bid-ask spreads are as a percentage of the price; for the US index, they are absolute differences in yields.

Though most market-based liquidity indicators do not signal a material deterioration in liquidity conditions in normal times, survey-based information suggests a marked deterioration in liquidity and functioning across a broad range of euro area markets. Respondents to the ECB's survey on credit terms and conditions in euro-denominated securities financing and over-the-counter derivatives markets (SESFOD) consistently reported a worsening of liquidity conditions for corporate bonds in 2015 and anticipate a further deterioration this year.¹² Market analysts report a decline in turnover ratios and bifurcation of conditions for on-the-run and off-the-run securities. Market liquidity in the corporate bond market depends to a greater extent on the willingness of market-makers to respond to temporary imbalances. Indications of reduced confidence among market-makers in their ability to provide liquidity during periods of stress (as expressed in the

¹¹ Numerous reports suggest a decline in market liquidity across multiple asset classes. For a summary of the available evidence supporting this view, see PricewaterhouseCooper's August 2015 "Global financial markets liquidity study".

¹² See the March 2016 SESFOD survey.



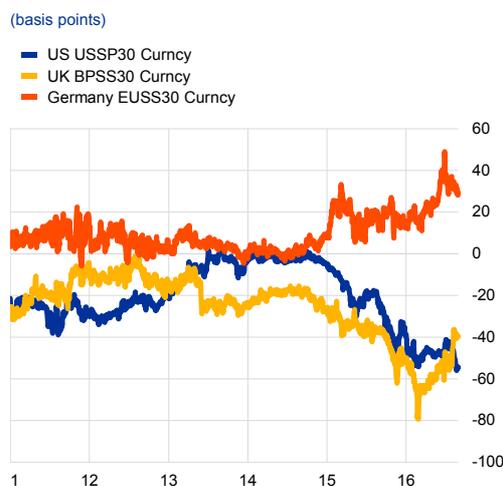
ECB's SESFOD survey) cause some concern.¹³ In addition, since the onset of the financial crisis, euro area monetary financial institutions (MFIs) have reduced their holdings of euro area corporate bonds by one-third.

The resilience of market liquidity in the post-crisis environment has yet to be tested as so far the periods of market volatility have proven to be short-lived. One explanation for the difference in how liquidity is perceived might be rooted in the fact that indicators based on available data are biased towards successfully executed orders, without taking into account the number of requests for quotes needed to execute an order.

Cash versus derivatives markets

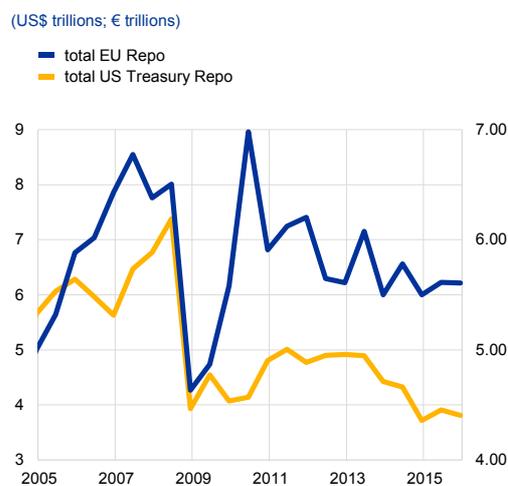
Unusually persistent pricing anomalies between cash and derivative instruments may also indicate a decline in secondary market liquidity, or in related repo markets. These anomalies are of a magnitude that might previously have been arbitrated away by (typically) leveraged investors such as fixed-income value funds. For example, across EU, US and UK markets, yields on government bonds and maturity-matched swaps have diverged recently. Yields on German government bonds are below those on same-maturity swaps, while the opposite is true in US and UK markets (see Chart 5).

Chart 5
30-year swap spreads in the United Kingdom, United States and Germany



Source: Bloomberg.

Chart 6
US primary dealers' repo financing and major European financial groups' repo business



Source: Federal Reserve Bank of New York, ICMA.
 Note: Series show sum of repo and reverse repo financing.

Repo markets mobilise funds and collateral across the financial system. An increase in the cost of repo intermediation implies higher costs of repo financing for both investors that use it to take

¹³ ECB's SESFOD survey and US Federal Reserve Board of Governors Senior Credit Officer Opinion Survey (SCOOS).



positions in fixed income markets (including pension and insurance funds) and relative value traders that need finance to take advantage of arbitrage opportunities to “correct” mis-pricings. The outstanding value of transactions in US and European repo markets have fallen since 2007, by around 20% and 40% respectively, though recent surveys of EU markets show a stabilising trend.¹⁴ Consistent with the emergence of these pricing anomalies, since mid-2014 there has been an increase in the cost of borrowing in term-repo markets in the United States and the United Kingdom, relative to near risk-free rates. Over the same period, bid-ask spreads have also widened, indicating an increase in the cost of intermediation in the market for secured funds.

Changes in the demand for market liquidity

Developments in market liquidity across different markets have occurred against a backdrop of changing demand for liquidity. On the demand side, there are concerns that the greater role investment funds are playing in financial intermediation may result in them being an amplifying factor in the event of a future systemic crisis.^{15,16} Within this context, the following two issues may affect the role and impact of investment funds in systemic crises.

1. The growth in assets under management in EU investment funds in recent years: total assets of EU investment funds amounted to €12.7 trillion in the fourth quarter of 2015. Assets managed by these funds have expanded significantly over the past few years, almost doubling since the end of 2009 (see Chart 7).¹⁷
2. Shifting portfolio composition: many funds are increasingly investing in less liquid assets while continuing to offer daily redemption opportunities to investors, creating a potential liquidity mismatch (see Chart 8).

¹⁴ See ECB (2015c) and International Capital Market Association (2015).

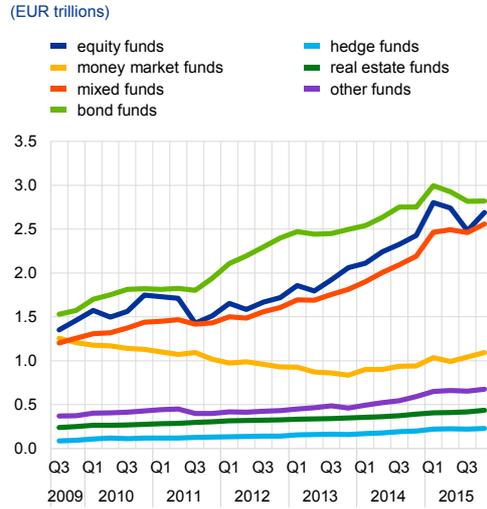
¹⁵ See FSB consultation launched 22 June 2016 on proposed policy recommendations to address structural vulnerabilities from asset management activities.

¹⁶ Risks arising from the demand for liquidity services by asset managers will be assessed in more detail by the ESRB in 2017.

¹⁷ See also ESRB (2016b).

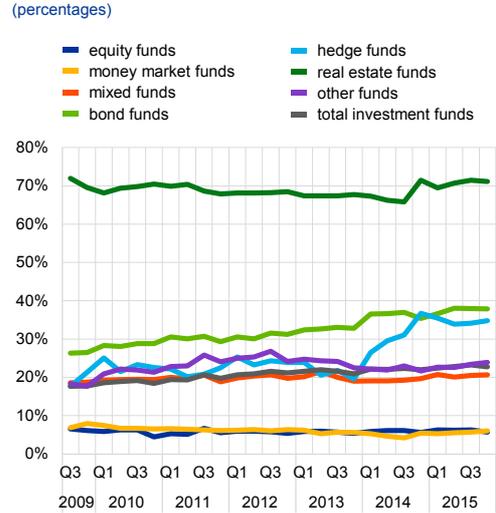


Chart 7
EU investment funds – net asset values



Sources: ESRB EU Shadow Banking Monitor, ECB.
 Note: Data refer to available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included.

Chart 8
EU investment funds – liquidity transformation¹⁸



Sources: ESRB EU Shadow Banking Monitor, ECB.
 Notes: Data refer to available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included. Total assets less liquid assets (deposits, sovereign bonds and debt securities issued by MFIs and equity and investment fund shares), as a share of total assets. Closed-end funds are not included. Estimates are made for holdings of non-euro area securities and funds not resident in the euro area.

¹⁸ A difficulty in interpreting measures of liquidity transformation that rely on the relative size of liquid assets is that funds may sell a “vertical slice” of assets to meet redemptions and avoid first-mover advantage associated with selling liquid assets first. The size of funds’ holdings of liquid assets may therefore not be a good measure of funds’ ability to handle large-scale redemptions, although they can give some idea of the overall liquidity of fund assets in some cases.



Section 3

Market-making and its implications for market liquidity: results from the ESRB's data collection exercise

This section presents the findings based on the ESRB's quantitative data collection exercise and qualitative survey of market-makers. The data collection covered the following asset classes: sovereign bonds, corporate bonds, covered bonds and asset-backed securities (ABS).

The results of the quantitative part of the exercise give mixed messages regarding the development of market-making activities. The analysis covers market-makers' aggregated¹⁹ gross and net European market-making inventories, as well as median trade size and trading volume (information which is not generally available). Net and gross inventories have decreased significantly for corporate bonds, while inventories for other asset classes have either increased or remained unchanged. Overall trading volume has been relatively stable, while median trade sizes have decreased for all asset classes, a possible sign of deterioration in market liquidity.

Overall, respondents to the qualitative survey perceive that market-makers contribute substantially to market liquidity and the functioning of markets. However, the responding banks specify that reduction in market liquidity, post-crisis regulation and changes in the general market environment are causing a reduction or even cessation in their market-making activities. Respondents point in particular to the capital and liquidity framework under the CRD IV/CRR and the increased transparency requirements under the new MiFID II/MiFIR rules as impeding their ability and willingness to act as market-makers.

3.1 Evidence on market-makers' inventories and trading behaviour

The quantitative data covers market-makers' held-for-trading inventories, average trade size and volume of market-making activities. It should be noted that data after 2010 is more representative than data before 2010.²⁰

Gross and net inventories

As a general rule, the net inventory position reflects the amount of risk that market-makers are willing or able to take.²¹ The size of gross short and long inventories reflects the ability of market-makers to take short and long positions that may be hedged by each other, or by other instruments.

¹⁹ Aggregation in this case means that all bonds of a certain type are grouped together no matter the issuer, maturity, issuance date, issuance volume, on-the-run/off-the-run and credit rating (though in some cases differentiated between high yield and investment grade), etc. If the development of market liquidity is not the same throughout the universe of certain types of bond, then aggregation may well mask such differences. However, it should be noted that this same shortcoming is present in almost all studies on market liquidity and is the result of limited data availability.

²⁰ At least three market-makers reported their numbers for each quarter/bond type included in this report. Data has been chain-linked backwards using the data from market-makers that reported for each quarter.

²¹ However, if a long position is covered by a repo or by derivatives, the market-maker may bear a different risk from what is indicated by the net position. Repos and derivatives were outside the scope of this data collection.



Overall, a decrease in either gross or net inventories would be indicative of lower market liquidity owing to a reduced ability or willingness of market-makers to warehouse assets.

Different asset classes show mixed developments in market-makers' inventories. Chart 9a shows that aggregated net inventories of European government bonds have remained stable at around €100 billion. However, this masks developments in both long and short gross inventories, which have gradually declined in absolute value. If the growth in issuance (size of the total market) is also considered, it is clear that the relative net inventory has declined.

The data shows that covered bond inventories have risen (see Chart 9b). Net inventories doubled from around €10 billion in 2013 to around €20 billion in 2015. The large increase in long covered bond inventories starting from the beginning of 2014 can, at least in part, be attributed to anticipation of the ECB's covered bond purchase programme. In anticipation of the programme, issuance of covered bonds increased and market-makers may have been convinced that they would be able to sell their inventories, leading to an increased willingness to hold covered bonds.

ABS inventories form a U-shaped curve as inventories have only recently recovered to their 2008 level (see Chart 9c). Similarly to covered bond inventories, ABS inventories started increasing in 2013. In 2015 market-makers held in their inventory around the same volume of ABSs as covered bonds. As it is difficult to short ABSs, short positions are negligible over the whole sample.

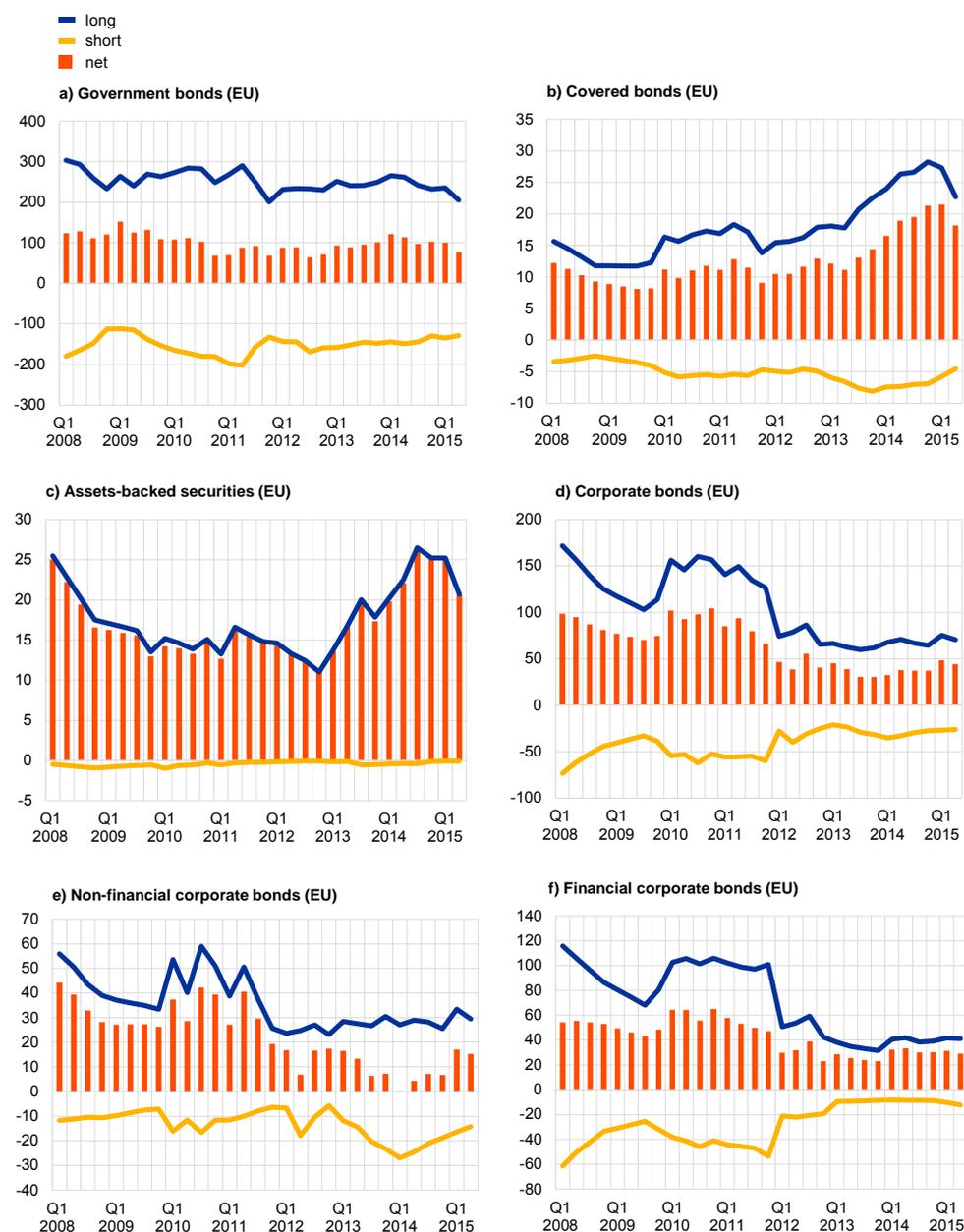
European corporate bond inventories show a striking declining trend (see Chart 9d). The decline relates to both non-financial and financial corporate bond inventories (see Chart 9e and 9f). Compared with government bonds, corporate bonds are harder to borrow and sell short, which explains the smaller portion of short positions. Overall, there seems to be a decline in both gross long and net inventories. However, it is difficult to disentangle the impact of reduced issuance from market-makers' willingness to hold inventories. Issuance by financial corporates was especially low in the second half of the period.²²

²² Reports from market participants and others (see BIS (2014)) also suggest there may have been a "bifurcation" in liquidity over recent years, i.e. a greater decrease in liquidity has been seen in less-liquid instruments, while little, or no, decrease has been seen in liquid instruments.



Chart 9

Market-makers' European government bond inventories have remained more stable than European corporate bond inventories



Source: ESRB data collection.

Trading volume and trade sizes

Aggregated trading volume is an important measure of overall market liquidity as it measures the value of spot market transactions that take place within a certain time period. Trading volume generally correlates strongly with the level of bond issuance in the primary market. Accordingly, trading volume, while informative, should not be considered an absolute measure of secondary



market liquidity. Other measures of market liquidity include median trade size and the number of trades. In illiquid markets a large trade may need to be split into smaller blocks to be able to execute the trade for a reasonable price and within an acceptable timeframe.²³

During the last 10–12 quarters most of the asset classes under review show either increasing or stable trading volumes coupled with decreasing median²⁴ trade sizes (see Chart 10). The results are broadly in line with earlier evidence from the United Kingdom and the United States which suggests that dealers may be holding less inventory, but working these inventories harder (i.e. holding the inventory for a shorter period of time).²⁵ This could explain the fact that headline measures of liquidity, show little, if any, deterioration in recent years (see Section 2).

The aggregate euro trading volume for government bonds has increased at an annual rate of 4% since 2006 (see Chart 10a). This rise can be attributed to significant issuance of government bonds during the time period. At the same time, the number of trades has increased at a faster pace while the median trade size has decreased from a peak of €18 million in the third quarter of 2008 to €9 million in the second quarter of 2015. The trading volume and median trade size of covered bonds have decreased (see Chart 10b). However, owing to the small size of the market, trading volumes are volatile. Since 2009 the median trade size for covered bonds has halved from about €8 million to about €4 million. For ABSs, the trading volume has decreased since 2008 and trade sizes have also been volatile (see Chart 10c).

For corporate bonds, median trade size has registered a clear downward trend over recent years while trading volumes decreased only slightly (see Chart 10d). According to the data, about €4 trillion worth of corporate bonds were traded by market-makers in the second quarter of 2015 making corporate bonds the second largest asset class in this study (after government bonds). Of that number, 70% (€2.8 trillion) were non-financial corporate bonds and 30% (€1.2 trillion) were financial corporate bonds. There has been a significant decline in median trade size for corporate bonds issued by both non-financial and financial corporations. For non-financial corporate bonds, the average trade size declined by about 85% between 2008 and 2015 (from around €12 million in 2006-08 to around €2 million in 2015). For financial corporate bonds, the decline was about 80% (from around €10 million in 2006-08 to around €2 million in 2015).

²³ However, one should keep in mind that the number of outstanding bonds is not constant and for the purpose of the analysis presented here the number of outstanding bonds relative to market-makers' portfolios is not available. In addition, the difficulty of getting an order successfully executed is not reflected in the current data, apart from the impact that it may have on the trading volume.

²⁴ The median is the median of average trade sizes reported by the market-makers. To reduce the noise, the four-quarter moving average for each variable is used.

²⁵ Bank of England (2015) and Bank for International Settlements (2016).

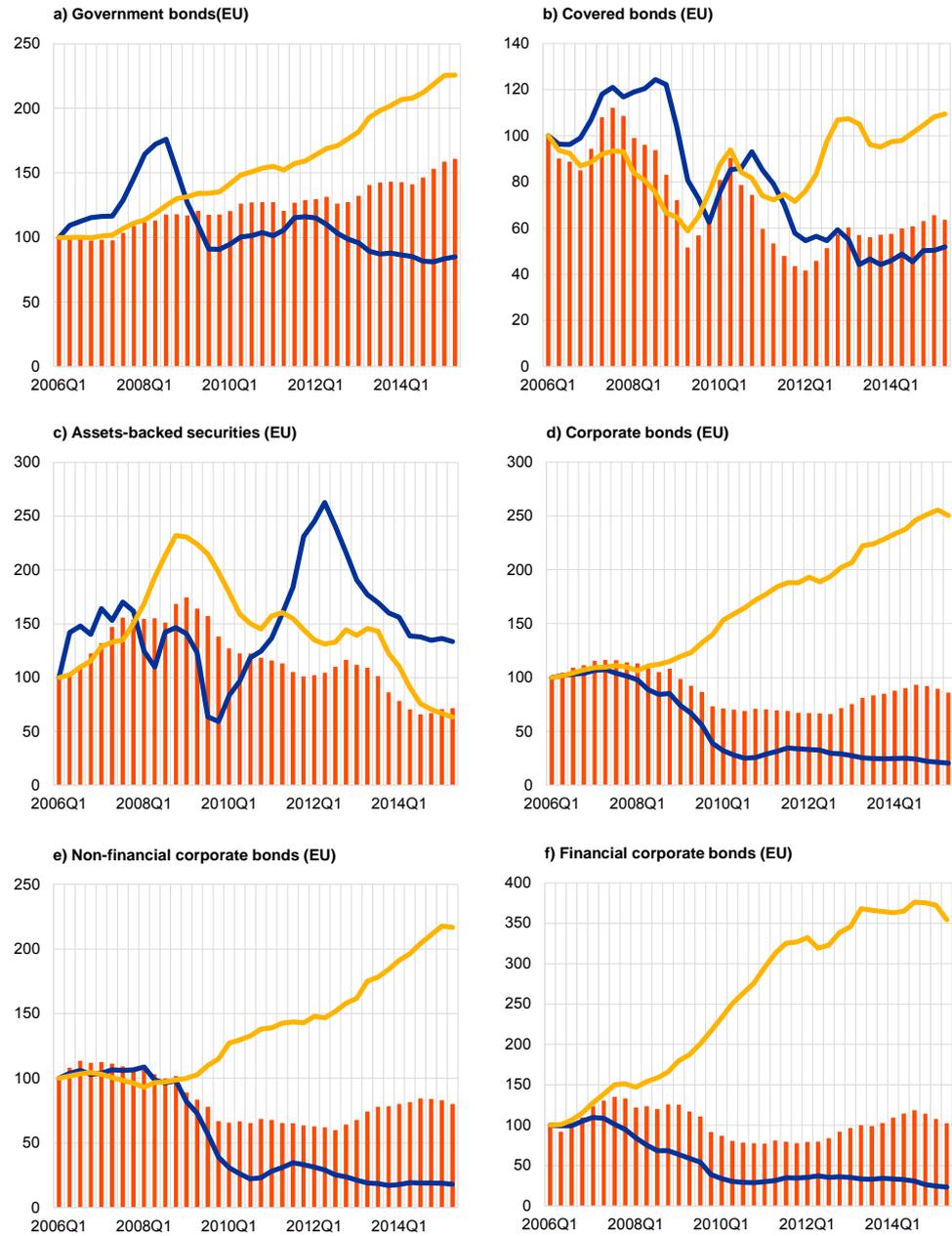


Chart 10

Volume, median trade size and number of trades by market-makers for different asset classes

(indexed, 2006Q1 = 100)

- median trade size
- number of trades
- volume



Source: ESRB data collection.



Implications for liquidity resilience

It is important to consider how trade sizes, volumes and inventories should be interpreted as a whole²⁶ and what conclusions can be drawn about liquidity resilience.²⁷ To illustrate the simultaneous changes in trading and inventory indicators, Table 1 displays all individual changes for two time periods: from 2008 to 2010 and from 2008 to 2015.²⁸

Table 1
Summary of changes in market-makers' median trade sizes, volumes and inventories

	% change in median trade size	% change in trading volume	% change in net inventories	% change in sum of long/short inventories
Government bonds				
2008 to 2010	-31	18	-19	5
2008 to 2015	-17	53	-9	-21
Covered bonds				
2008 to 2010	-24	23	2	31
2008 to 2015	-46	37	81	37
Asset-backed securities				
2008 to 2010	-15	-38	-32	-31
2008 to 2015	0	-58	63	50
Corporate bonds				
2008 to 2010	-58	66	15	2
2008 to 2015	-17	28	-52	-53
Non-financial corporate bonds				
2008 to 2010	-77	40	2	11
2008 to 2015	-19	64	-56	-28
Financial corporate bonds				
2008 to 2010	-70	49	10	-2
2008 to 2015	-18	50	-53	-64

Note: % change in sum of long/short inventories refers to the percentage change in the total value of long positions and total value of short positions.

While these data offer only a limited perspective, they suggest that liquidity resilience may have decreased in both government bond and corporate bond markets, with all four indicators pointing towards a deterioration in market liquidity. For corporate bonds, the deterioration has mainly occurred since 2010, while for government bonds about half of the change was already visible over the time period beginning in 2008. The percentage decline in both gross and net inventories has been more pronounced for corporate bonds, while the percentage changes in median trade size

²⁶ For example, when viewed individually a larger trading volume would be considered positive for liquidity. However, if the size of the market and the trading volumes grow while the size of market-makers' inventories remain the same or even decrease, this could pose a risk to liquidity resilience.

²⁷ Liquidity resilience refers to how much market liquidity is available during times of market stress. Care should be taken when drawing conclusions on liquidity resilience based on data from normal times – there is no guarantee that ample liquidity in normal times means there will be ample liquidity in stressed times.

²⁸ The average value of indicators for the starting year (2008) and for the ending year (2010 or 2015) was used. For 2015, only data for the first two quarters was available.

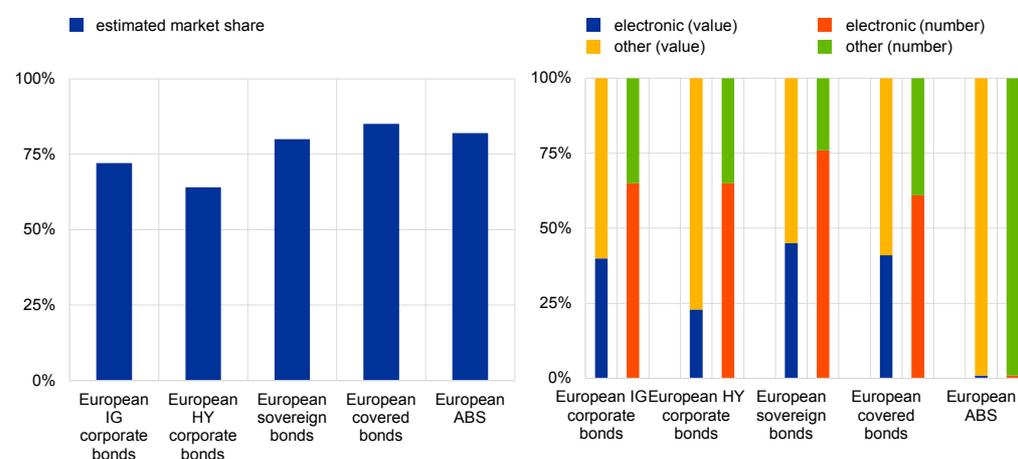


and trading volume have been of similar magnitude. For covered bonds and ABSs, there is no similar deterioration in market liquidity conditions.

3.2 Review of market-makers' perception and management of market liquidity risk

The banks covered by the qualitative survey trade a substantial share of bonds in major fixed income markets (see Chart 11). Aggregating banks' own estimates of their market share gives a total market share of the respondents. This share ranges from 64% in high-yield corporate bond markets to 85% in covered bond markets.²⁹ The survey can therefore be viewed as representative for market-makers in Europe.³⁰

Chart 11
Estimated market share and market breakdown



Market liquidity is perceived to have decreased steadily and to have been more frequently disrupted in recent times. Survey participants more frequently observed temporary, event-driven phases of illiquidity, such as during the Greek referendum, or unexpected events, such as during the US Treasury flash crash in 2014. According to most respondents, lower market liquidity has its origin in a reduction in the number of market participants, investors in general and market-makers in particular, as well as capital and balance sheet constraints potentially as a result of regulation (see Chart 12). Other determinants of market illiquidity relate mostly to changes in the market structure.

However, some regulatory interventions are seen to effectively counter the negative effects on market liquidity. Most survey respondents perceive the ECB's quantitative easing (QE) programme

²⁹ In terms of volume, most market-making seems to happen outside electronic markets (presumably over the counter), while the tickets traded in electronic markets seem to be smaller in value but greater in number.

³⁰ The results shown here represent the views of market-makers and should be interpreted as such (also with regard to banks' own estimates of their market shares). There are furthermore some limitations when interpreting the survey results because responses were provided in open text format and are therefore not always precise or easily comparable.



as an effective intervention measure, while some state that the QE programme has had detrimental effects on market liquidity because it has led to excessive supply-demand imbalances in European government bond markets (see Chart 12 and 13). Further, a review of the current regulation, in particular a relaxation of capital requirements for market-making activities but also for securitisation and repos, is expected to have a positive effect on market liquidity (see Chart 13).

Chart 12
Main determinants of market illiquidity as perceived by respondents

(share of respondents)

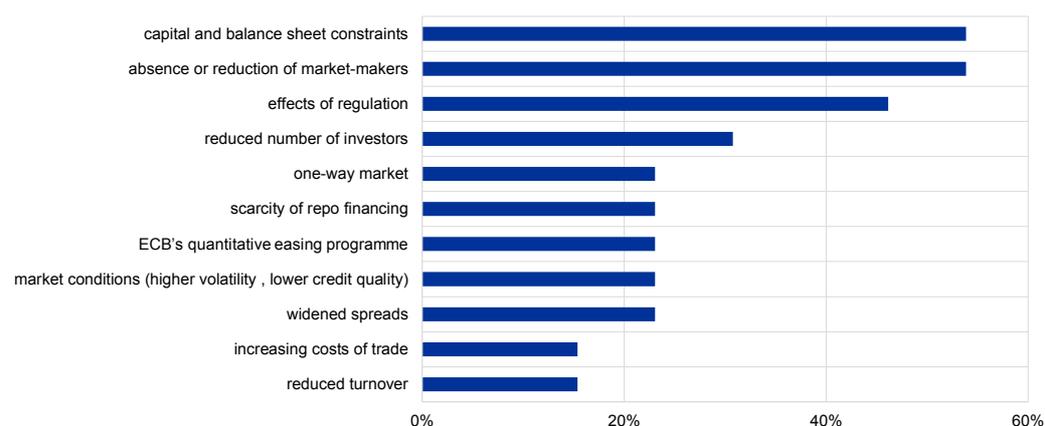
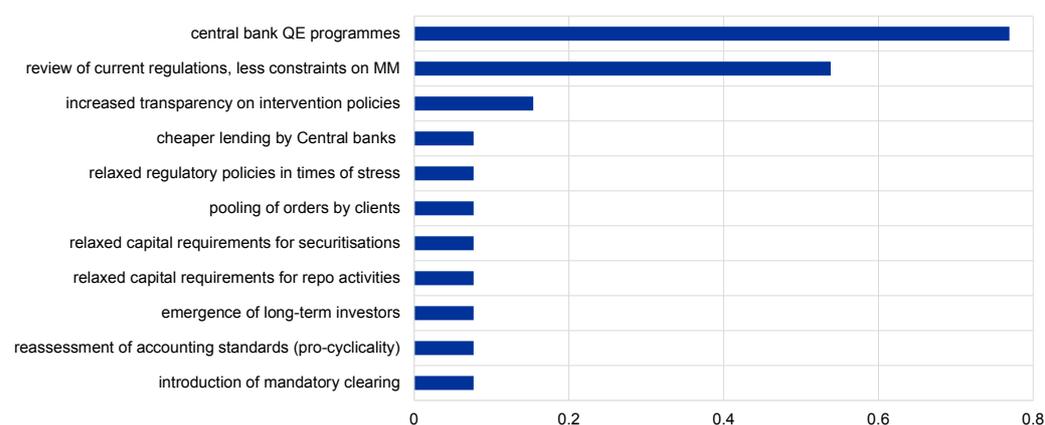


Chart 13
Most effective intervention measures against illiquidity as perceived by respondents

(share of respondents)



According to survey participants, changes in market-makers' activities were caused by changes in market liquidity, market conditions and regulatory requirements.

First, survey respondents perceive market-making operations and functioning to be negatively affected by the deterioration in liquidity. As respondents also indicate that liquidity is negatively affected by a reduction in market-making activity, this suggests a negative feedback loop: less market-making results in less liquidity, which results in less market-making and so on. In particular,

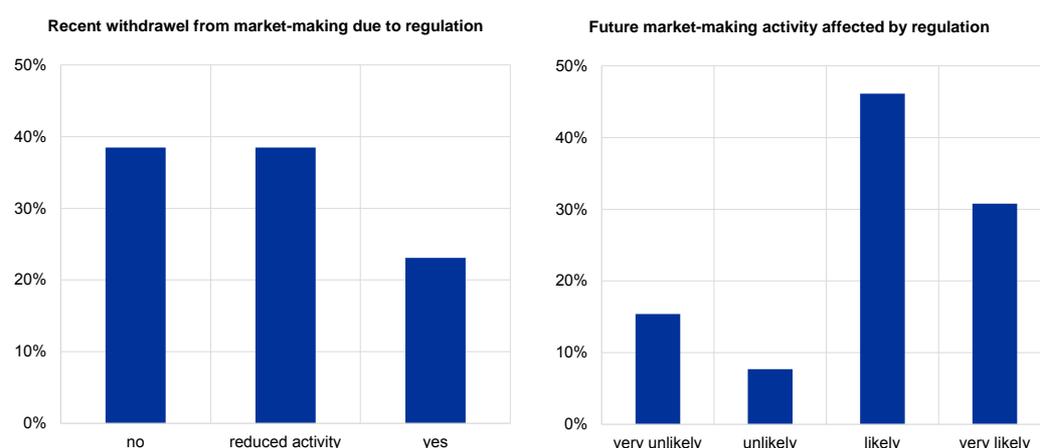


some market-makers indicate that they reacted to recent market liquidity disruptions with a stricter selection of clients and trades and a wider spread for quotes. Further, they perceive larger inventory ageing in many asset classes and a reduction of the number of banks serving as primary dealers in sovereign bond markets.

Second, changes in market conditions are said to have led to a reduction in market-making activities. In particular, market disruptions such as those arising from the Greek debt crisis, changes in the type of market participants³¹, a reduction in dealers' ability to take principal risks and an increase in smaller-sized bond issuers are reported to have reduced market-making activities.³²

Third, respondents view new regulatory requirements for banks and markets as reducing market-making activities. As shown in the left panel of Chart 14, more than one-third of the banks questioned claim to have partially reduced their activities in the past and almost a quarter of the responding banks report to have withdrawn completely from market-making in at least one market owing to regulation.³³ Put differently, more than one-third of the respondents have not changed their market-making behaviour as a result of regulation. However, more than three-quarters of the respondents remark that regulatory requirements are "likely" or "very likely" to interfere with their market-making activities in the future (see right hand panel of Chart 14).

Chart 14
Perceived impact of regulation on market-making banks



Respondents note that regulatory initiatives would alter the revenue-cost basis underlying their market-making activities. In particular, they most prominently mention capital and liquidity requirements for banks and capital market requirements as presenting the greatest challenges in terms of disincentivising market-making (see Chart 15). Additional capital and liquidity

³¹ In particular, banks mention a trend towards "real money asset managers" and away from "fast money traders". Moreover, they observe funds which offer daily liquidity to be taking a more central role, e.g. in corporate bond markets.

³² Another notable factor is the increased share of corporate bonds held by funds offering daily liquidity. It is not clear whether the increased share of corporate bonds or the fact they are held by funds would lead to a reduction in market liquidity.

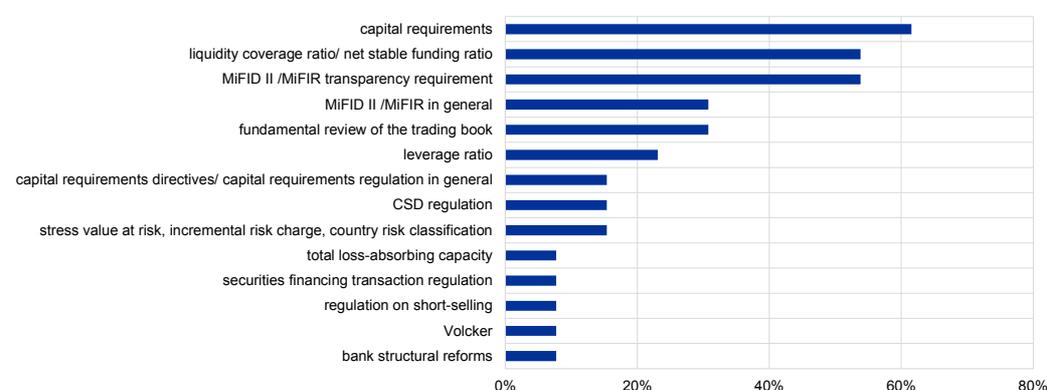
³³ Respondents particularly name the ABS and credit markets as being affected.



requirements³⁴, with explicit mention of the liquidity coverage ratio, the net stable funding ratio and to a lesser degree the fundamental review of the trading book and the leverage ratio, have increased the cost of providing liquidity for market-makers. At the same time, these costs have not been balanced by additional revenues and have so disincentivised market-making. Further, respondents argue that additional transparency requirements under the MiFID II/MiFIR/EMIR framework reduce profit as other market participants will be better informed about the risk positions held by market-makers. A few banks also mention other market reforms such as the CSD Regulation, the Securities Financing Transaction Regulation and the regulation on short-selling as disincentivising market-making. Lastly, the Volcker rule and bank structural reforms in general are also mentioned.

Chart 15
Regulatory issues which are described as disincentivising market-making

(share of respondent)



It is important to remember that the survey only provides some indication of which type of market would primarily be affected by a reduction or withdrawal in liquidity supply. Many respondents note that periods of distress reduce their risk appetite and their ability to exit positions in general, and that spreads widen temporarily for all asset classes. Others state that their reaction will most likely depend on the specific distress scenario. Some conclusions can nevertheless be drawn on the type of market which may be most affected. Less liquid and generally more risky bond markets (i.e. high yield) are among those where many respondents would reduce their liquidity provision first. Moreover, some respondents also list non-domestic sovereign bond markets, investment-grade corporate bonds, long-dated bonds in general and legacy residential mortgage-backed securities among the potentially more affected markets.

³⁴ Note that some of the respondents' answers are not precise enough to distinguish between different regulations. In particular, references to "capital requirements" may or may not include the leverage ratio or the fundamental review of the trading book. Similarly, some banks refer to the CRD IV/CRR framework in general while others distinguish different macroprudential measures specified in those packages.



Section 4

Summary and conclusions

At a time when demand for liquidity is increasing, the provision of market liquidity has wide-reaching implications. Market liquidity has an impact on the financing of corporates and governments and therefore the general economy. Moreover, the resilience of liquidity, i.e. how much liquidity is available during stressed market conditions, is crucial, as a shock to market liquidity can lead to fire-sale externalities in asset prices.

Liquidity illusion remains a risk to financial stability. The experience from the financial crisis has shown that, in normal times, liquidity conditions may be perceived to be ample, but a sudden lack of liquidity can occur during times of stress.

Market-making plays an important role in a market functioning correctly. A key element of market liquidity in bond markets, and in corporate bond markets in particular, is market-makers' ability to absorb temporary order imbalances by warehousing risk for short periods of time. Market-makers themselves may finance these positions through repo markets, providing a connection between market liquidity and funding liquidity. There have been some signs of a decrease in the availability of repo market financing, though recent surveys for EU markets are showing a stabilising trend.

Measuring market liquidity raises important methodological issues. It is impossible to capture market liquidity comprehensively using only one measure as every indicator has its own advantages and disadvantages. Moreover, there is a significant information gap in terms of financial reporting in the EU that hampers a full assessment of the level of market liquidity and any related systemic risks. The new data collected for this report are able to shed more light on these issues.

The extent to which regulation has directly affected market-making capacity is still subject to debate. Regulation has aimed at strengthening the resilience of market-makers, decreasing their leverage and containing risks of liquidity illusion. However, market-makers responding to the qualitative survey believe that regulation may have also had unintended consequences. Banks perceive especially the capital and liquidity regulation as well as increased transparency requirements under the new MiFID II/MiFIR regulation as affecting their market-making function. Anecdotal evidence suggests that market-makers may have shifted their focus towards less capital-intensive services, while also reducing risk-taking and carrying out a more granular assessment of risks within each of their business lines.

The quantitative data gathered by the ESRB show mixed evidence regarding developments in market liquidity. A decreasing trend in both gross and net inventories was observable in corporate bond markets – possibly indicating a reduced ability or willingness of market-makers to act as intermediaries in these markets. However, trends in market-making inventories for other asset classes were more mixed, and trading volumes have remained relatively constant across asset classes. Median trade sizes have decreased across asset classes, indicating a potential reduction in liquidity and changes in market behaviour. These changes suggest that it will take longer to execute a large order.



The findings are supported by similar developments in the market data on headline measures of liquidity. Across asset classes the results are mixed with most measures suggesting little or no decline in market liquidity over recent years. However, alternative measures suggest a possible deterioration in market functioning, especially for corporate bonds.^{35,36}

³⁵ These results are in line with the available research which suggests that there is no clear consensus as to whether or not liquidity in fixed income markets is diminishing. For example, the IMF has highlighted signs of reduced liquidity in certain markets, but noted that dynamics vary across bond classes (see IMF (2015)). The BIS (see BIS (2016)) and Joint Committee of the ESAs (see Joint Committee report (2016)) have also noted the potential for reduced liquidity in some markets. However, research from the UK's Financial Conduct Authority states that no significant deterioration in market liquidity in recent years is observable (see FCA (2016)) and the French Autorité des Marché Financiers has noted improved liquidity in French bond markets since the start of 2012, though levels remain below pre-crisis levels (see AMF (2015)).

³⁶ Some of these developments may reflect structural trends owing to increased use of electronic trading, changes in market participants' behaviour or changes in regulation, the effects of which would be difficult to separate.



References

- Anderson, N., Webber, L., Noss, J., Beale, D., and Crowley-Reidy, L. (2015), *The resilience of financial market liquidity*, Bank of England Financial Stability Paper 34.
- Autorité des marchés financiers (2015), *Study of liquidity in French bond markets*.
- Bank of England (2015), **Financial Policy Committee statement from its policy meeting**, 23 September.
- Bank for International Settlements (2014), *Market-making and proprietary trading: industry trends drivers and policy implications*, CGFS Publications No 52.
- Bank for International Settlements (2016), *Fixed income market liquidity*, CGFS Publications No 55.
- Board of Governors of the Federal Reserve System (2016), **Senior Credit Officer Opinion Survey on Dealer Financing Terms (SCOOS)**.
- Brunnermeier, M. K. and Pedersen, L. H. (2008), *Market Liquidity and Funding Liquidity*, The Review of Financial Studies 10 1093.
- European Central Bank (2015a), *Financial Stability Review*, May.
- European Central Bank (2015b), *Euro money market survey*, September.
- European Central Bank (2016), **Survey on credit terms and conditions in euro-denominated securities financing and OTC derivatives markets (SESFOD)**.
- European Supervisory Authorities (2016), *Joint Committee Report on Risks and Vulnerabilities in the EU Financial System*.
- European Systemic Risk Board (2016a), *EU Shadow Banking Monitor*, No 1.
- European Systemic Risk Board (2016b), *Assessing shadow banking – non-bank financial intermediation in Europe*, Occasional Paper 10.
- Financial Conduct Authority (2016), *Liquidity in the UK corporate bond markets: evidence from trade data*, Occasional Paper 14.
- Financial Stability Board (2016), **Proposed Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities**.
- International Capital Market Association (2015), *European repo market survey*.
- International Monetary Fund (2015), *Vulnerabilities, Legacies and Policy Challenges: Risks Rotating to Emerging Markets*. Global Financial Stability Report.
- Powell, J. H., (2016), *Trends in Fixed-Income Markets*. Testimony before the Subcommittee on Securities, Insurance, and Investment, and Subcommittee on Economic Policy, Committee on Banking, Housing, and Urban Affairs, U.S. Senate, Washington, D.C.
- PWC (2015), *Global financial markets liquidity study*.



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