

# Liquidity in Fixed Income Markets

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Fixed income markets in many jurisdictions have been going through a period of change, resulting in a debate as to whether they are continuing to function effectively, or will function effectively in times of stress. Changes in dealer business models and increased use of electronic trading platforms are influencing the nature of liquidity in bond markets. These changes are not as prevalent in Australia as they are in some overseas markets. For instance, while dealer inventories in US and European banks have fallen, in Australia they have been broadly steady, although they have undergone some substantial compositional shifts. Similarly, electronic trading and, in particular, high frequency trading (HFT), does not account for as large a share of trading in Australian financial markets as it does in US and some European markets. As these changes have occurred, market liquidity in some bond market segments in Australia has declined and is lower than it has been in the past. In contrast, market liquidity in derivative markets appears to have improved, such that overall market liquidity across bond and related derivative markets does not appear to have deteriorated. While this is a positive assessment, it is also likely that accommodative monetary policies in many major economies have supported market liquidity in recent years and it is difficult to determine how robust market liquidity would be in the absence of these policies.

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## Introduction

This article discusses developments in market liquidity and the factors driving change, drawing on recent publications from Bank for International Settlements (BIS) committees in which the Reserve Bank of Australia participated (Markets Committee 2016 and CGFS (2014, 2016)). The first section contains a discussion of some of the developments in market liquidity affecting global bond markets. The next section discusses liquidity in Australian bond markets. The third and fourth sections look at the main factors driving change in bond markets, namely, changes in dealer business models and increased use of electronic trading platforms. This is followed by a discussion of HFT in bond markets.

## Global Developments in Market Liquidity

Market liquidity is considered to be the ability to execute large transactions immediately, at low cost and with limited price impact. As it has multiple dimensions, it is difficult to measure precisely. One dimension is the price of liquidity, which is the difference between the highest price that a buyer is willing to pay for a typical amount of an asset and the lowest price for which a seller is willing to sell it. This is often estimated by the bid-offer spread, and is also referred to as a market's tightness. A market's depth is defined as the size of a trade that can be executed for a given price change. A market's resilience is the speed at which a market's tightness and depth recover after an event.

Changes in bond market liquidity in recent years have been well documented (Markets Committee 2016 and CGFS 2016). In many bond markets,

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## LIQUIDITY IN FIXED INCOME MARKETS

liquidity was oversupplied and underpriced in the years prior to the global financial crisis. Since then, liquidity has decreased across many bond markets. In general, quantity metrics of liquidity have provided a stronger indication than price metrics that liquidity has declined. Quantity metrics, such as turnover ratios, average transaction sizes and market depth, are generally lower than in the past across a range of markets. These developments indicate that it is more costly to transact in the same volumes than was possible in the past. This is partly because dealers are less able and willing to warehouse large positions for a long period of time. In contrast, developments in measures of the price of transacting in bond markets have generally suggested that liquidity has remained ample. For instance, bid-ask spreads have been narrowing or are around their narrowest in many bond markets. This is partly a consequence of both increased electronic trading, which has resulted in increased competition over the price of transacting, and a reduction in principal-based market making, which has decreased quoted volumes.<sup>1</sup> That is, the narrowing in bid-ask spreads reflects a fall in the volume that can be transacted at these spreads.

Another measure of the price of transacting is the volatility of prices and the size of the risk premiums (such as credit spreads or spreads to swap rates). The low volatility and compressed risk premiums evident across a range of bond markets over the period since the crises in the United States and Europe to around mid 2015 was also consistent with ample liquidity. More recently, these indicators of the price of liquidity have increased. This cycle in risk premiums and volatility is likely to be partly a result of global macroeconomic and financial conditions, and of supportive global monetary

policy settings.<sup>2</sup> It remains to be seen whether markets, particularly those that have seen some structural change, are resilient and function effectively in all conditions.

One perspective is that the decrease in market maker involvement and increased use of electronic trading platforms that has been seen in recent years may result in bond market liquidity conditions which are more fragile and less resilient. That is, bond markets may be subject to bouts of volatility that cannot be explained by fundamental drivers as large orders are executed. On the other hand, market makers may have been providing liquidity at below what it cost them, with the consequence that market volatility was dampened and other market participants were not exposed to the true costs of liquidity. This may have led them to make poor investment decisions. It is clear that in the pre-crisis years many dealers were providing bond market liquidity through a build-up of leveraged market and credit risk exposures. As these large positions became unprofitable they were unwound and contributed to a significant period of stress in financial markets. It is the intention of new regulations to ensure that liquidity is priced appropriately. It is notable that, while there has been some rise in volatility and risk premiums over the past year, most of these metrics are not close to the levels observed during the period of crisis in the United States and Europe.

A recent feature of liquidity in some markets has been bouts of large intraday movements. Examples of this include the US 'flash rally' on 15 October 2014, and the German 'bund tantrum', which occurred between May and June 2015 and resulted in large intraday volatility on 7 May. While no single cause of the events has been identified, in both of these markets HFT was prevalent.<sup>3</sup> A concentration of activity within a segment of market participants, as is the case with HFT in these markets, is a risk to the efficient functioning markets (Cheshire 2015).

1 Principal-based market making involves a dealer matching supply and demand in a market by acquiring positions themselves. The dealer holds inventories of securities and commits their own capital for which they expect to earn an appropriate return. When acting as an agent, the dealer's role is to place a customer order in a market and to find another participant willing to take the opposite position. Changes in dealer business models are discussed in detail in CGFS (2014) and Cheshire (2015).

2 For more discussion of how monetary policy affects market liquidity see section 6.2 in CGFS (2014).

3 See the Joint Staff (2015) and Markets Committee (2016).

Another trend in market liquidity across bond markets is increased bifurcation, whereby liquidity is concentrated in more liquid instruments and is declining in less liquid instruments. This may be explained by the fact that there has been a larger withdrawal from less liquid markets by dealers and that electronic trading is yet to prove to be a viable model for these market segments. This is not for want of effort by companies looking to promote electronic trading. There have been a significant number of new trading platforms seeking to facilitate trading in less liquid markets. The challenge for these innovators is that the cost of information leakage in small markets is high and there are limited efficiency gains to be made, due to the small size of and limited turnover in these markets.<sup>4</sup> Innovations include all-to-all platforms, platforms that enable buy-side firms to respond to trade enquiries and platforms that seek to match interest anonymously.<sup>5</sup>

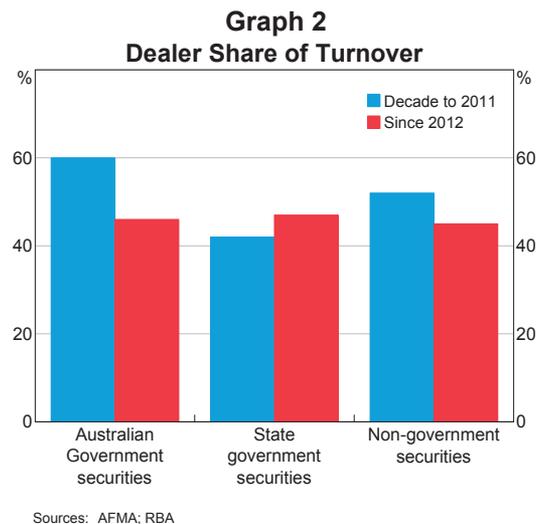
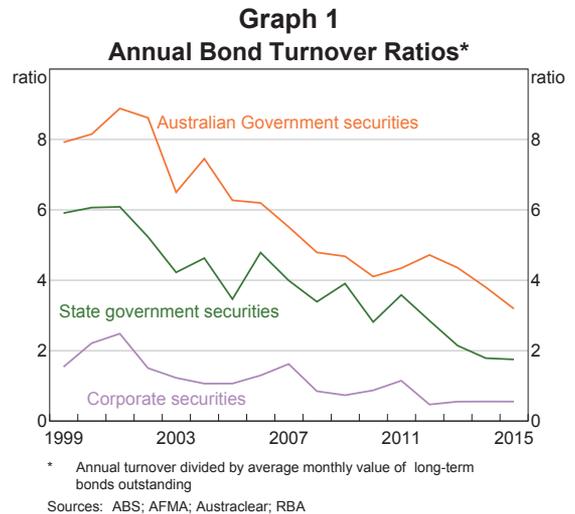
## Liquidity in Australian Markets

Consistent with the global trend, liquidity in Australian bond markets, as measured by turnover, is lower now than it was in the years leading up to the financial crisis (Graph 1). Market makers have withdrawn or reduced activity from markets and generally account for a smaller share of turnover in many segments (Graph 2).<sup>6</sup> There has also been an increase in the concentration of market making, with foreign banks reducing their presence. As market makers in bond markets have pulled back, use of electronic trading has generally increased. Discussions with market participants in Australia indicate that electronic trading accounts for a greater share of turnover within many market

4 Information leakage occurs if transaction information is available to participants other than those directly involved in the transaction.

5 An all-to-all platform enables a participant to transact with any other participant. A buy-side firm is one engaged with investing or buying financial services. A sell-side firm is one selling or providing financial services such as market making. A trade enquiry, such as a request for quote, is typically made to a market maker or dealer by a customer.

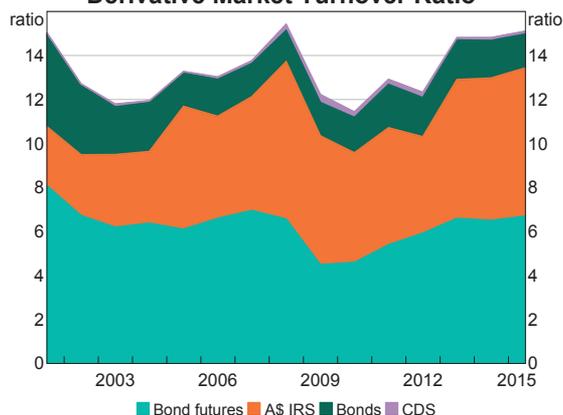
6 The increased dealer share of turnover in the semi-government market may be related to increases in holdings of these securities by banks that have to meet the Liquidity Coverage Ratio. For a discussion of market making, see Cheshire (2015).



segments, although it remains well below that seen in large developed markets elsewhere, including those in Europe and the United States.

One important feature of bond markets in Australia is that, in comparison to their associated derivative markets, there is significantly less market turnover. While turnover in bond markets in Australia has been declining, aggregate activity across bond and related derivative markets has been fairly steady such that the overall level of turnover in bond and related derivative markets, as a share of bonds outstanding, is around the highest level of the past 15 years (Graph 3).

**Graph 3**  
Australia Bond and  
Derivative Market Turnover Ratio\*



\* Annual bond, interest rate swap, bond futures and credit default swap turnover divided by government bonds and bank, corporate and mortgage-backed securities outstanding

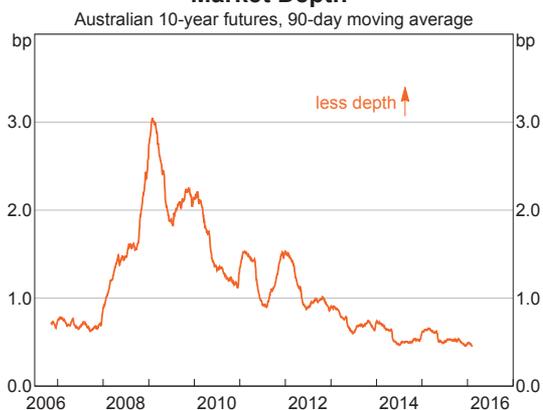
Sources: AFMA; ASX; RBA

This development also provides some insight on the issue of the bifurcation of liquidity, whereby activity is concentrated in more liquid instruments and declining in less liquid instruments. The bifurcation of liquidity has been ongoing in Australia over a longer period of time than just the past few years. Bond futures and interest rate swaps have been used increasingly by bond issuers and investors to manage risk, rather than trading in the underlying securities. This is because these instruments are significantly cheaper to transact than physical securities.

Looking in more detail at the bond futures market, the decline in turnover and market depth that occurred in 2008/09 has been reversed. Turnover as a proportion of all bonds on issue is now at least equal to what it was in the years prior to the financial crisis and market depth in the bond futures market has also recovered to around the levels seen in the years prior to the financial crisis (Graph 4).<sup>7</sup> As noted earlier, HFT represents a growing but modest share of this market.

<sup>7</sup> For a discussion of Australian bond futures liquidity during 2012, see Lien and Zurawski (2012).

**Graph 4**  
Market Depth\*



\* Basis point movement per \$100 million of contracts at market value during the day session

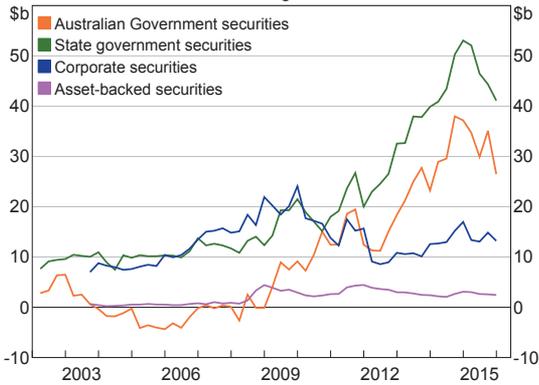
Sources: AFMA; ASX; RBA

## Dealer Business Models Have Changed

As outlined in the BIS report on market making (CGFS 2014), dealer activity is an important source of liquidity in fixed income markets. Since the financial crisis, dealers in many jurisdictions have reduced the size and risk of their market-making businesses. They have done this by withdrawing from these activities or reducing the amount of risk they are willing to hold. This has resulted in an overall reduction in the amount of principal-based market making that dealers undertake in many markets. Furthermore, in many of these markets it appears as though this reduction is probably long lasting: CGFS (2016) found that market-making capacity has not recovered to pre-crisis levels.

The situation is different in Australia. Here, there has not been a dramatic reduction in overall market-making capacity, measured by banks' holdings of securities, as there was in the United States and Europe (Graph 5). However, there have been significant compositional shifts, with a general reduction in risk exposure in the bonds held by market makers and a shift in inventories from foreign to domestic banks as many foreign banks reduced their activity in Australia. This change in composition has resulted in some increase in the concentration

**Graph 5**  
**Australian Bank Bond Holdings**  
 Net debt trading securities\*



\* Consolidated operations, selected securities  
 Sources: APRA; RBA

of market-making activity. This may make the redistribution of securities more difficult during periods of adjustment in markets (CGFS 2014).

One consequence of reduced market-making activity is that the cost of trading and issuing debt may increase. If market makers are unable to hold bonds until a willing buyer or seller emerges, a larger adjustment in market prices may be required to attract the next willing buyer or seller. For a bond issuer, this might mean issuing at a higher cost. For a bond holder looking to buy or sell, this might mean that they face greater transaction costs or increased market volatility.

This increase in the cost of market liquidity is a positive development to the extent that it better reflects the costs market makers face in providing liquidity. Prior to the financial crisis, risk premiums and market volatility were compressed, partly because of an oversupply of market-making services. Market makers were warehousing large amounts of risk on their balance sheets, and their activities were not supported by adequate capital or risk management practices. During the financial crisis, market makers found that parts of their business were not profitable. As a consequence, they withdrew their services and in many cases sold securities at a time when liquidity provision services

were most needed. This process contributed to market stress.<sup>8</sup>

The regulatory reforms implemented since the crisis have sought to ensure that market makers are more resilient and are not a source of liquidity contagion in markets. The reforms have increased the cost of providing market-making services – mainly through requiring more capital and restrictions on leverage – with the aim that they are more closely aligned to the risks. The increased regulatory costs have reduced the level of activity and profitability of market-making activities, although the impact of the regulations has varied across jurisdictions and institutions. Survey information collected by the Committee on the Global Financial System (CGFS) in 2014 showed that US and UK banks reported a larger expected impact on the level of activity from the leverage ratio requirement than other banks.<sup>9</sup> While estimating the reduction in profitability is difficult, another more recent CGFS survey indicates that in the period prior to the financial crisis, market makers would have made a return on capital of over 20 per cent in sovereign and corporate bond trading businesses. Under the Basel III framework, the return on capital is estimated to be 8 per cent.<sup>10</sup> As with the first survey, results varied across jurisdictions and banks, with some assessing the leverage ratio requirement to have had the largest impact on their business and others the higher risk-weighted capital requirements (CGFS 2016, pp 19–20).

Most market makers have made changes to their business models in order to maintain their profitability. As already noted, many market makers have reduced the amount of risk they hold by

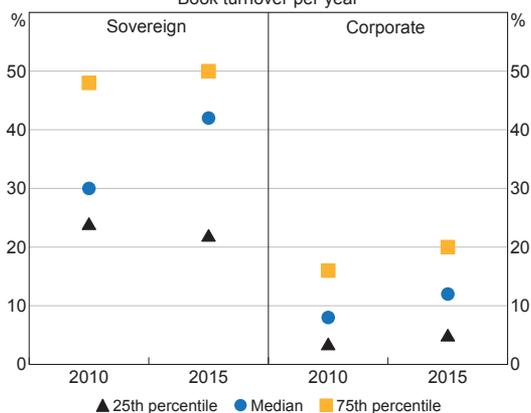
<sup>8</sup> For a more detailed discussion of the market forces that drive the supply of market making services see CGFS (2014) and Cheshire (2015).

<sup>9</sup> For more detail on the impact of other regulations, see Cheshire (2015) and CGFS (2014, Appendix 4: Surveying market makers on the expected impact of regulation pp 54–55).

<sup>10</sup> The findings in CGFS (2016) were consistent with other studies in reporting that the leverage ratio requirement and higher risk-weighted capital charges were having the largest impact on sovereign bond market making businesses. Changes to the market risk framework (Basel 2.5) were reported to have the greatest impact on corporate credit market making. See PricewaterhouseCoopers (2015).

reducing their bond inventories. However, they have also attempted to raise their inventory turnover which, other things equal, boosts revenue and adds to market liquidity (Graph 6). In less liquid markets, which are generally less competitive, market makers are also targeting higher bid-ask spreads. Finally, many dealers have looked to lower the cost of market-making businesses by reducing their use of labour and increasing their use of capital. They have done this through increased use of electronic trading platforms.

**Graph 6**  
**Estimated Trading Book Turnover**  
Book turnover per year



Source: BIS

## Electronic Trading Is Advancing

As dealers have withdrawn from principal-based market making, some have sought to replace this capacity with an agency style business with a greater share of electronic trading. This transition has enabled dealers to reduce the risk and cost of their market-making business. Costs are reduced because dealers can effectively distribute their services to a larger number of market participants and process transactions more efficiently. The greater use of electronic platforms enables dealers to reduce costs by substituting capital for labour. One way in which this is occurring in some markets is that dealers are automating more of the trading

process, including the quoting and hedging of certain positions.<sup>11</sup>

Other market participants, such as asset managers and hedge funds, have also turned increasingly to electronic trading. In addition, in some highly liquid markets, firms specialising in automated trading (AT) and HFT have gained a significant market share.<sup>12</sup> This activity is discussed in more detail in the next section.

In general, there are benefits from moving to a market structure that has electronic trading at its core. Electronic trading improves market quality by lowering transaction and search costs involved in trading.<sup>13</sup> This can be achieved by electronic trading venues if they concentrate the trading activity within a single venue. Such venues bring together a large and diversified set of market participants by broadening market access and lowering barriers to entry. With less segmentation between market participants, there is less need for intermediaries to match buyers and sellers, and competition is increased. Price transparency is improved because trade information can be distributed more efficiently to more participants.<sup>14</sup>

11 For instance, algorithms can be used to generate live quotes or be used to reply to requests for quote. The use of automated and high frequency trading is discussed in more detail in Markets Committee (2016).

12 AT occurs when order and trading decisions are made electronically and autonomously. HFT is a subset of AT in which orders and trades are executed at high speeds. HFT gains an advantage from processing information on market conditions quickly. AT and HFT are used for trade execution and market making as well as being employed by firms (sometimes referred to as proprietary trading firms) to generate profits by using strategies to predict the direction of prices or arbitrage differences between prices of related instruments. These advanced forms of AT and HFT require markets which operate on central limit order books whereby outstanding orders to buy and sell a security are ordered and filled according to price and time of entry.

13 Market quality refers to the ability to transact in a market at a price that accurately reflects the value of an asset. Two components of market quality are distinguished. The ability to transact in a market is the liquidity of the market; the capacity to transact with immediacy, in volume and with little price impact. The accuracy of the price is the degree to which the price of an asset reflects all available information. For more information, see Markets Committee (2016, Box 4).

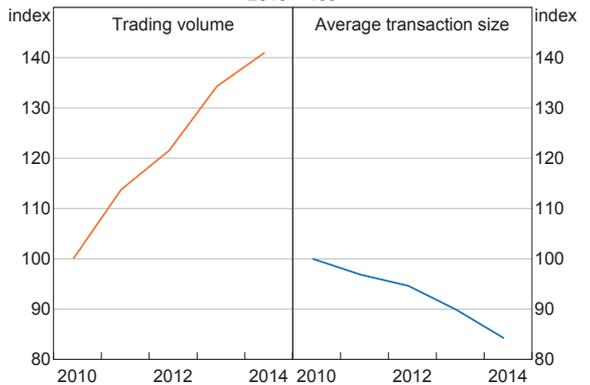
14 For a discussion of how fixed income market structures have evolved, see Markets Committee (2016).

However, electronic trading platforms have not been adopted by a number of markets. Small markets and those with low turnover or few investors may not generate sufficient economies of scale needed to make an electronic platform cost effective. Furthermore, the greater transparency of electronic platforms increases the chance that prices can move quickly against participants who enter large transactions. This creates incentives for market makers to reduce the volumes they are willing to trade at quoted prices, and for participants to break transactions up into pieces or to transact in off-market venues.

Trading activity on electronic platforms has increased significantly in recent years. A survey conducted by the BIS Markets Committee indicates that electronic trading has increased steadily across a range of markets and jurisdictions (Graph 7).<sup>15</sup> Consistent with the pull-back by dealers in recent years, the survey also found that there has been little growth in turnover on inter-dealer platforms. Much of the growth in electronic trading activity has been in dealer-client and in all-to-all platforms.<sup>16</sup> By providing an alternative, the growth in electronic trading activity has helped, at least in some markets, to offset the effect on trading activity of the decline in principal-based market making. The survey also showed that the average transaction size on electronic platforms has declined over the past five years in response to an increase in the costs of trading in large sizes.

While increased use of electronic platforms is apparent across most fixed income segments, it remains highly varied by jurisdiction and instrument. Consistent with the costs and benefits of electronic platforms described above, electronic trading is more prevalent in the largest and most

**Graph 7**  
**Fixed Income Electronic Platforms**  
2010 = 100



Source: BIS

standardised markets, such as futures markets in many countries and in US and European government bond markets. It is not as prevalent in Australian government bond markets, with usage varying significantly across market participants.<sup>17</sup> In many bond futures markets, electronic trading accounts for around 90 per cent of transactions, a similar share as in advanced equity and foreign exchange markets. Across the fixed income landscape, many interest rate swap markets have undergone the most significant increase in the use of electronic trading platforms, driven by regulations that have mandated that trading be centrally cleared and executed. This trend is also apparent in Australia, although it is estimated that the share of electronic trading locally is lower than in major markets. The use of electronic trading platforms in less liquid markets, such as corporate credit markets and non-standardised derivatives markets, remains low because the efficiency gains are small and trading costs associated with increased transparency are greatest.

<sup>15</sup> For more information on the survey see Markets Committee (2016). Developments in trading activity on electronic platforms in Australia are broadly consistent with the aggregate international data.

<sup>16</sup> Inter-dealer platforms are venues that are only accessible to dealers. On dealer-client platforms trading occurs between dealers and clients but not within each of these groups. On all-to-all platforms any participant can transact with any other participant.

<sup>17</sup> For US Treasuries and European government bonds the share of electronic trading is estimated at 60–70 per cent. In Australia, the share of Australian Government bond trading that is estimated to go through electronic platforms, based on informal discussions with dealers, ranges from 25 to 70 per cent. See Markets Committee (2016) and PricewaterhouseCoopers (2015) for survey data on the share of electronic trading in a range of markets.

### Automation and high frequency trading

Along with the increase in electronic trading, there has also been a pronounced increase in AT/HFT in the liquid segments of fixed income markets. Firms employing AT/HFT models now account for the largest share of transactions in the US Treasury bond and futures markets and a large share of turnover in the German bond futures market. In Australia, AT/HFT is not as prevalent. AT/HFT has limited or no presence in most Australian bond markets and accounted for 14 per cent of Australian bond futures volumes in March 2015 up from 6 per cent in December 2013 (ASIC 2015 and Joint Staff 2015).

HFT firms gained direct access to traditional dealer markets in the United States and, as a result, have increased competition for this business and reduced market segmentation. Traditional dealers have reacted to this competition, with those that have a technological disadvantage exiting or reducing their traditional market making business, or outsourcing their market making activity to HFT firms. Others have looked to compete by employing their own AT/HFT or by matching customer orders internally rather than clearing them in the public market.<sup>18</sup>

The increase in AT/HFT has had an effect on liquidity in these markets, although whether this effect has been beneficial or not is a matter of contention.<sup>19</sup> The objective of HFT is to profit from having a speed advantage by earning a narrower margin on a very large number of small positions. Research has highlighted that HFT accelerates the process of price discovery, but results in price adjustments on lower turnover. However, some studies have found that HFT can improve many of the metrics of market liquidity, such as bid-ask spreads, market depth, volatility and the price impact of trades, at least in normal times.<sup>20</sup>

<sup>18</sup> This process is often referred to as internalising transactions and has occurred in other markets such as the foreign exchange market, see Heath and Whitelaw RBA (2011).

<sup>19</sup> For a detailed discussion of how these trading strategies affect markets, see Markets Committee (2016).

<sup>20</sup> See Markets Committee (2016), section 4.3 and Appendix B.

One concern with HFT is that it may contribute to market dysfunction during volatile periods. This may be for several reasons. One is that these firms do not have broader client relationships since they operate for their own profit through trading alone. If periods of higher volatility in markets are less profitable for them, they may withdraw their activity. In contrast, a traditional dealer often has a deeper client relationship such that it is willing to undertake loss-making activities in the short run, provided profitability returns in the medium term or that other profitable business is undertaken.

Another reason why HFT might not offer the same benefits in times of stress is that these firms do not hold trading positions for longer than a fraction of a second. In contrast, dealers that act as principal market makers have longer holding periods. When market prices are adjusting, this longer holding period is beneficial because some of the order imbalance between demand and supply is absorbed. If traditional market makers have exited the business because they cannot compete with HFT in normal times, then, when stress periods occur, there may be fewer market participants willing to absorb temporary order imbalances. With this market structure it is likely that volatility will increase.

As noted earlier, there is some evidence that markets with a concentration of activity within HFT firms have been subjected to large intraday volatility. For instance, during the flash rally in the US Treasury bond market on 15 October 2014, reduced participation by proprietary trading firms from the market was the largest contributor to the decline in market depth (Joint Staff 2015). Concentration of market activity within a group of firms that have a very short time horizon may not be a good development for markets.

A further criticism of HFT is that many trading strategies amount to manipulative or predatory trading in which the strategy is to create a misleading impression of the intended trading

volume or induce others to trade. Again, the investigation of the US flash event found a high incidence of self-trading and order cancellations.<sup>21</sup> Many regulators have increasingly focused on identifying these strategies with a view to ensuring that trading strategies are not illegal (ASIC 2015).

The BIS Markets Committee's 2016 report on electronic trading noted that the increased use of automated trading poses challenges for policymakers and that it needs to be appropriately monitored. This includes ensuring that there is appropriate risk management and regulation around AT/HFT, and that trading strategies follow best practice guidelines.

## Conclusion

Fixed income markets in Australia and in other countries have been going through a period of change as a consequence of a reduction in principal-based market making and an increase in the use of electronic trading platforms. While the initial cause of these changes may have been the response of markets to the financial crises in the United States and Europe, regulations subsequently introduced have brought about more change as they have sought to ensure that the provision of market making services better reflects the costs and risks associated with these activities. These developments have changed the nature of liquidity in many markets and raised questions about how robust it might be in times of stress. The impact of the changes on traditional market makers and markets in Australia has not been as great as in some other markets in the United States and Europe, where there has been an unwinding of large inventory and risk positions held by traditional market makers. The increased prevalence of electronic trading platforms and of high frequency trading firms, which have been

associated with bouts of intraday volatility, has also been less in Australian markets. As a consequence, current liquidity conditions in Australian bond and associated derivative markets overall appear more robust than in some overseas markets. While there has been an increase in volatility and some risk premiums in the period since mid 2015, these measures remain below levels seen during periods of the global financial crisis. However, it is possible that current market liquidity conditions, both in Australia and globally, are being supported by generally accommodative macroeconomic and financial conditions and monetary policies that have prevailed in recent years. As these forces continue to evolve, ongoing monitoring of liquidity conditions, the advance of electronic trading, and the management of liquidity risks by market participants will be important in order to assess the ability of markets to function effectively under all conditions. ✎

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<sup>21</sup> Self-trading occurs when the same entity takes both sides of the trade. Order cancellation occurs when trade orders are entered and cancelled in quick succession, preventing others from prioritising their trades.

## LIQUIDITY IN FIXED INCOME MARKETS

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