ASIC
Australian Securities & Investments Commission

REPORT 331

Dark liquidity and high-frequency trading

March 2013

About this report

This report presents findings from the analytical work done by ASIC's internal taskforces to assess the impact of dark liquidity and high-frequency trading on market quality and integrity.

This report:

- identifies and analyses specific trading attributes associated with dark liquidity and high-frequency trading;
- informs consumers and investors, market participants and listed companies about the markets in which they invest and raise capital; and
- provides background and supplementary information and analysis on selected issues identified by the two taskforces and discussed in Consultation Paper 202 *Dark liquidity and high-frequency trading: Proposals* (CP 202).

About ASIC regulatory documents

In administering legislation ASIC issues the following types of regulatory documents.

Consultation papers: seek feedback from stakeholders on matters ASIC is considering, such as proposed relief or proposed regulatory guidance.

Regulatory guides: give guidance to regulated entities by:

- explaining when and how ASIC will exercise specific powers under legislation (primarily the Corporations Act)
- explaining how ASIC interprets the law
- describing the principles underlying ASIC's approach
- giving practical guidance (e.g. describing the steps of a process such as applying for a licence or giving practical examples of how regulated entities may decide to meet their obligations).

Information sheets: provide concise guidance on a specific process or compliance issue or an overview of detailed guidance.

Reports: describe ASIC compliance or relief activity or the results of a research project.

Disclaimer

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Contents

Executive summary

1 In recent years, there have been significant structural and behavioural changes in Australia's financial markets. Our markets have become increasingly automated and innovative. We also now have competition between licensed equity markets.

2 Advances in technology have made it easier to trade away from exchange markets and have facilitated a proliferation of dark trading venues known as 'crossing systems' and 'dark pools'—there are currently over 20 venues. These venues mostly trade in the largest 200 securities and collectively account for around 7% of total equity market share.

3 Advances in technology have also fundamentally changed the way orders are generated and executed by all users of the market. Rather than orders being generated and executed manually, most orders are now generated and executed by computer programs running decision and execution algorithms.

4 Dark liquidity and high-frequency trading have been the subject of significant public commentary both in Australia and overseas:

(a) There are concerns about the changing nature of dark liquidity and its impact on optimal price formation. There are also questions about the fairness of dark venues for investors, with concerns that they are not regulated as markets and 'free ride' on the pricing and information set on exchange markets.

(b) There are questions about the value that high-frequency trading brings to market quality. There are concerns about the 'noise' created from excessive trading messages and concerns that high-frequency traders are predatory or that they 'game' the orders of fundamental investors, manipulate prices and may contribute to market instability.

5 In mid-2012, ASIC established two internal taskforces to consider the impact of these developments on the quality and integrity of our financial markets. Our focus was on the interests of listed companies, fundamental investors and Australia's competitiveness as a regional financial centre.

6 This report presents the findings of the two taskforces. It will assist to inform investors, market participants and listed companies about the markets in which they invest and raise capital.

7 The taskforces have developed proposals to address identified issues. The proposals are in Consultation Paper 202 *Dark liquidity and high-frequency trading: Proposals* (CP 202).

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Dark liquidity taskforce—Key findings

8 The dark liquidity taskforce found that:

(a) while the volume of dark trading has remained around 25–30% of total equity market share, there has been a change in its composition and there is anecdotal evidence that there is less trading by fundamental investors on pre-trade transparent ('lit') exchange markets;

(b) growth in dark trading (below block size) has led to a widening of bid–offer spreads on lit exchange markets for a number of securities. There is also evidence that the quality of price formation has been adversely affected in securities with high levels of dark trading below block size;

(c) market participant operated dark venues (i.e. crossing systems) are becoming multilateral and more 'market-like';

(d) a considerable proportion of trading in crossing systems is the crossing system operator or a related body corporate trading with clients against its own account; and

(e) while market participants and crossing system operators appear to be complying with their obligations related to off-market trading and dealing with clients, we have identified some issues that cause us concern (e.g. we have found that clients have limited visibility of the operation of crossing systems).

High-frequency trading taskforce—Key findings

9 The high-frequency trading taskforce found that:

(a) some of the commonly held negative perceptions about high-frequency trading are not supported by our analysis of Australian markets—for example:

(i) that high-frequency traders exhibit unacceptably high order-to-trade ratios. Increases in order-to-trade ratios in Australia have been moderate compared with overseas markets, and other algorithmic traders operate at similar levels; and

(ii) that high-frequency traders' holding times are often a matter of seconds and therefore that they make no contribution to deep, liquid markets. Our analysis shows that only 1.2% of high-frequency traders held positions for an average of two minutes or less, 18% for less than 10 minutes and 51% for less than 30 minutes; and

(b) there is some basis in fact for other perceptions (e.g. about high-frequency trading creating excessive noise and exhibiting predatory or 'gaming' behaviours), but other traders are also contributing to the problem.

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10 Both taskforces have found evidence of potential breaches of ASIC Market Integrity Rules and the *Corporations Act 2001* (Corporations Act), and some matters have been referred to our Enforcement teams for investigation. We have also seen a change in behaviour as a result of our inquiries. For example:

(a) fundamental investors are asking more questions about where and how their orders are executed;

(b) there have been improvements to automated trading risk management controls; and

(c) at least one high-frequency trader has ceased trading in Australia.

Summary of findings, conclusions and recommendations

11 The findings of the two taskforces, and our proposals in CP 202, are summarised in Table 1 and Table 2.

Table 1: Dark liquidity taskforce—Summary of findings, conclusions and recommendations

Findings	Conclusions	Recommendations
Market quality		
Dark liquidity is having an impact on market quality for a number of securities. Fundamental investors are contributing less to prices. See paragraphs 100–119.	The new price improvement rule will address this, but there needs to be a safety net.	We are proposing a trigger for implementing a tiered minimum size threshold where there is evidence that dark liquidity has caused degradation in the market quality of a security or group of securities. See proposal B1 in CP 202.
Tick sizes are driving trading activity into the dark. See paragraphs 124–132.	Tick sizes should not be an incentive for dark trading.	We are seeking industry views on lowering tick sizes for: • S&P/ASX 200 securities priced between $2 and $5; or • the 25 most tick-constrained securities. See issue D1 in CP 202.
Market integrity		
Crossing systems are becoming multilateral. See paragraphs 147–150.	These are more like traditional markets, but are not regulated as markets.	We are proposing a number of Market Integrity Rules, as described below (e.g. transparency, monitoring, systems and controls, fairness, conflict management).

Findings	Conclusions	Recommendations
Limited transparency and disclosure by crossing system operators. See paragraphs 151–157.	Clients may make uninformed decisions; it is harder to locate liquidity; listed companies are unaware where their securities are trading.	We are proposing that crossing system operators must: • have transparent procedures about their operation (e.g. products, access criteria, order types, fees, monthly turnover statistics); and • make disclosures to users about users' obligations, execution risks and operation of the crossing system, and disclose the venue on confirmations (see proposals C1–C4 in CP 202). We are proposing that market operators must publish course-of-sales reports: see proposal D2 in CP 202. We are seeking feedback on indications of interest: see issue D5 in CP 202.
Limited monitoring for misconduct in crossing systems. See paragraphs 176–182.	Misconduct may go undetected, which affects market integrity.	We are proposing that crossing system operators must: • monitor and examine orders and trades on the crossing system for misconduct, and report instances to ASIC; and • enhance record-keeping. See proposals C7–C8 in CP 202.
Limitations with systems and controls for crossing systems. See paragraphs 183–187.	There may be inadequate resources to ensure integrity and efficiency.	We are proposing that: • the system and control requirements that currently apply to automated order processing should be extended to all crossing systems; and • crossing system operators should be required to have adequate arrangements for stressed market conditions, and notify users and ASIC about system issues. See proposal C9 in CP 202.
Potential conduct issues: • misleading statements about crossing systems; • failure to make disclosures to clients; • representations about the regulation of crossing systems; • conflicts of interest not adequately managed; and • omissions/errors in crossing system reports. See paragraphs 223–254.	Generally, there is integrity, but there are some areas of concern.	No specific recommendations. Where there is evidence of rule breaches, we are considering enforcement action.

Findings	Conclusions	Recommendations
Fairness		
Preferential treatment in crossing systems. See paragraphs 230–232.	Generally, operations are fair, but there are some areas of concern.	We are proposing that crossing system operators must not unfairly discriminate between users. See proposal C5 in CP 202.
Limitations for clients to opt out. See paragraph 166.	Generally, operations are fair, but there are some areas of concern.	We are proposing that crossing system operators must provide clients with a choice to opt out of using the crossing system with no additional cost and no additional operational or administrative requirements. See proposal C6 in CP 202.
Conflicts of interest when dealing as principal and emergence of payment for order flow. See paragraphs 189–194 and 204–213.	Generally, operations are fair, but there are some areas of concern.	We are proposing to enhance conflicts of interest obligations (e.g. protect client information when outsourcing services, market participants to give client orders priority when trading as principal). We are also proposing to prevent direct cash payments for order flow and put controls around soft dollar incentives. See proposals D3–D4 in CP 202.

Table 2: High-frequency trading taskforce—Summary of findings, conclusions and recommendations

Findings	Conclusions	Recommendations
Market quality		
High-frequency trading does not appear to be a key driver for changes seen in price formation, liquidity and execution costs. See paragraphs 320–327.	Our analysis suggests that high-frequency trading does not have a significant effect on price formation, liquidity and execution costs, and that systemic factors, including the wider adoption of automated trading technology, are more significant.	No recommendation.
High-frequency trading does not exacerbate market instability. See paragraphs 347–358.	High-frequency traders reduce their passive liquidity provision (price-making) during relatively volatile periods, but remain active as liquidity takers.	No recommendation. However, we remain concerned that liquidity may evaporate in periods of extreme volatility. We will continue to assess the potential impacts in Australia, and consider effective measures to mitigate the negative repercussions of a market crisis or event.

Findings	Conclusions	Recommendations
Market integrity		
Algorithms in general contribute to excessive order messages, fleeting orders and market 'noise'. See paragraphs 276–288, 339–343.	The 'noise' of excess messages and small fleeting orders is disruptive to the market and has damaged investor confidence.	We are proposing to: • require a minimum resting time of 500 milliseconds for small orders of $500 or less; and • issue guidance to participants around ensuring they pay due consideration to what may be excessive order-to-trade ratios. See proposals E1 and E2 in CP 202.
Some trading practices (e.g. layering, quote stuffing) are forms of market manipulation. See paragraphs 378–401.	The market misconduct (manipulation, false trading) provisions within Div 2 of Pt 7.10 of the Corporations Act cover activities conducted by algorithms. Although there was some evidence of one-off instances, we did not find a significant or systemic issue around predatory trading practices in our markets.	We are proposing an amendment to Rule 5.7.2 of ASIC Market Integrity Rules (ASX Market) 2010 and ASIC Market Integrity Rules (Chi-X Australia Market) 2011 on 'circumstances of order', and a new rule in ASIC Market Integrity Rules (ASX 24 Market) 2010 to include additional factors to consider when assessing the impact of an order or series of orders. We are also proposing to issue guidance around indicators that may be considered indicative of misconduct via algorithmic trading. See proposal E3 in CP 202.
Poor programming of algorithms has the potential to disrupt markets. See paragraphs 300–304.	Despite our work, we continue to see examples where disruptions to our market have occurred, or have the potential to occur. A lot of work has been done, and continues, in this area, including: • referring a number of alleged breaches of Market Integrity Rules to ASIC's Enforcement teams; • increasing bilateral communications with market participants, which has enabled us to identify and deal with issues as they arise; and • continuing our work around automated order processing systems.	No recommendations. Significant work has already been done, including: • our proposals for new Market Integrity Rules for ASX 24 (futures) on risk management, which have been sent to the Minister for approval; and • the introduction of new rules on electronic trading announced in October 2012, which will commence in May 2014.

A Introduction

Purpose of this report

12 ASIC is Australia's corporate, markets and financial services regulator. Since August 2010 we have had responsibility for supervision of Australia's domestic licensed markets and market participants.

13 Financial markets operate to facilitate capital growth and so act as the 'engine room' of the economy. This report presents findings from the analytical work done by ASIC's internal taskforces on dark liquidity and high-frequency trading.

14 The report identifies and analyses specific trading attributes associated with dark liquidity and high-frequency trading, to determine whether these are adversely affecting the capital generation function of the markets.

15 The report aligns with two of our three strategic priorities:

(a) to ensure that Australia's financial markets are fair and efficient; and

(b) to ensure that consumers and investors are confident and informed.

16 Specifically, we aim to ensure that Australian markets operate on the basis of:

(a) quality—which includes orderliness of trading and efficiency of price formation;

(b) integrity—which includes freedom from market manipulation and other misconduct, such as insider trading; and

(c) fairness—which includes the ability of investors to assess the benefits and risks of securities being traded in certain venues.

17 Confident and informed investors are critical to the operation of financial markets. A reduction in investor confidence (e.g. because investors believe they are not getting honest, efficient and fair services from market participants) is likely to reduce the level of investor participation in the market. Lower participation will reduce liquidity and potentially increase the costs of trading in the market and of raising capital.

18 Dark liquidity and high-frequency trading have generated a great deal of media attention and concern among investors and consumers. This report will help consumers and investors to better understand these issues and assist investors to make well-informed and confident investment decisions.

19 This report has informed the regulatory proposals outlined in the accompanying CP 202, and we anticipate that it will also inform the review of Australia's financial market licensing regime currently being conducted by Treasury.

Key terms used in this report

20 This report analyses dark liquidity and high-frequency trading as they currently operate in Australian markets.

21 Dark liquidity and high-frequency trading are separate but related phenomena. Each has emerged in the context of sophisticated market trading and operating technology, and they interact with each other and influence investor activity.

Dark liquidity

22 Dark liquidity refers to orders that are not known to the rest of the market before the orders are matched as executed trades. Such trades, known as 'dark trades', can occur on exchange markets (e.g. ASX's Centre Point and hidden orders on Chi-X's order book) and in venues other than exchange markets. Rather than routing an order to a market, a market participant may choose to fill the order from its own inventory (known as internalisation), or may choose to 'cross' it with other client orders.

High-frequency trading

23 High-frequency trading is not a technical term and has been described in various ways.

24 As the International Organization of Securities Commissions (IOSCO) has acknowledged, defining high-frequency trading for regulatory purposes is particularly challenging, given the pace of technological change in markets and trading practices, and the fact that it encompasses many players, different organisational and legal arrangements, and a wide number of diverse strategies.

25 We propose to settle and make public a definition of high-frequency trading for the purposes of an industry benchmark. We believe that this will allow investors greater ability to conduct due diligence when making trading and execution venue decisions, particularly about trading activity in crossing systems, where there are differing views about what constitutes high-frequency trading in a crossing system.

26 IOSCO describes high-frequency trading as follows:

> High-frequency trading is frequently equated to algorithmic trading. However, whilst HFT is a type of algorithmic trading, not all forms of algorithmic trading can be described as high frequency. Algorithmic trading predates HFT and has been extensively used as a tool to determine some or all aspects of trade execution like timing, price, quantity and venue. Algorithmic trading is used by many intermediaries for their own proprietary trading or offered to their clients and has also become a standard feature in many buy-side firms, mainly with the purpose of devising execution strategies that minimise price impact or to rebalance large portfolios of securities as market conditions change. A number of

common features and trading characteristics related to HFT can be identified:

- It involves the use of sophisticated technological tools for pursuing a number of different strategies, ranging from market making to arbitrage;
- It is a highly quantitative tool that employs algorithms along the whole investment chain: analysis of market data, deployment of appropriate trading strategies, minimisation of trading costs and execution of trades;
- It is characterised by a high daily portfolio turnover and order-to-trade ratio (i.e. a large number of orders are cancelled in comparison to trades executed);
- It usually involves flat or near flat positions at the end of the trading day, meaning that little or no risk is carried overnight, with obvious savings on the cost of capital associated with margined positions. Positions are often held for as little as seconds or even fractions of a second;
- It is mostly employed by proprietary trading firms or desks; and
- It is latency sensitive. The implementation and execution of successful HFT strategies depend crucially on the ability to be faster than competitors and to take advantage of services such as direct electronic access and co-location.[1]

27 It is important to note that several of these attributes are not confined to those entities that identify themselves, or are identified by others, as 'high-frequency traders'. Many investors and securities dealers exhibit a number of these attributes, and use sophisticated technologies for trading, including algorithms to trade and make execution decisions according to predetermined parameters.

28 Our analysis shows that a small group of entities dominate high-frequency trading both in volume and value of trades. They are specialised trading desks within major investment banks, proprietary trading firms and some hedge funds. We refer to these entities as 'high-frequency trading entities' in this report.

Market operator

29 A market operator is an operator of a lit exchange market that holds an Australian market licence granted by the Minister. Market operators are subject to the relevant provisions in the Corporations Act, Market Integrity Rules and the specific conditions on their licence. Each market operator sets the operating rules that govern the operation of their respective market, which the Minister may disallow within 28 days of making.

[1] Technical Committee of IOSCO, *Regulatory issues raised by the impact of technological changes on market integrity and efficiency* (IOSCOPD354), report, July 2011 http://www.iosco.org/library/pubdocs/pdf/IOSCOPD354.pdf.

Market participant

30 A market participant is a person admitted as a participant of a licensed market. Market participants are given a trading permission to directly access the market to trade on behalf of their clients and/or themselves. Market participants are typically holders of Australian financial services (AFS) licences, which are administered by ASIC, and are also subject to the market operator's operating rules and ASIC's Market Integrity Rules.

Principal trader

31 A principal trader is a market participant that can only trade on behalf of itself. 'Principal trader' is the term used in the Market Integrity Rules.

Crossing system operator

32 Some market participants operate crossing systems, which are automated systems to match orders away from lit exchange markets. In this report, we refer to them as 'crossing system operators'.

Fundamental investor

33 A fundamental investor is a person who buys or sells a security based on an assessment of the intrinsic value of the security. They are sometimes referred to as long-term investors.

Recent developments in Australian financial markets

34 In recent years, there has been significant structural and behavioural change in Australian financial markets. This report is part of ASIC's ongoing work to monitor and analyse these changes, to determine whether our regulatory position is appropriate. The report will also inform listed companies and financial consumers about the markets in which they raise capital and invest.

35 Advances in technology have facilitated more trading away from lit exchange markets. It is now easier and more common for market participants to trade directly with clients, or to match client orders with each other. As a result, there has been a proliferation of new types of trading venues known as 'crossing systems' and 'dark pools'. Many of these are not licensed markets and are characterised by the fact that orders are not pre-trade transparent.

36 While the proportion of total trading that is occurring 'in the dark' has remained fairly constant (at around 25–30% of total trading), the nature of this trading has changed significantly, with fewer large block trades, and many more small trades, being conducted in the dark. We examine the

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factors responsible for these changes, and the consequences for market quality and integrity, in Section B of this report.

37 Technology has also fundamentally changed the way orders are generated and executed by all users of the market. Human decision-making has largely been replaced by computers. Computer algorithms now generate a large proportion of all orders on Australian financial markets.

38 Increased automation has provided an ideal platform for high-frequency traders and other users of algorithmic logic. It has enabled fundamental investors, who are also users of algorithms, to more easily break up larger orders, so as to limit their market impact. We examine these changes, and the consequences for market quality and integrity, in Section C of this report.

39 The introduction of competition between equity exchange markets in October 2011 has also accelerated the adoption of new trading technology, as market participants seek to consolidate fragmented information and search for liquidity across markets.

40 Developments in dark liquidity and automated trading make market supervision more complex and challenging. We have enhanced our skills and expertise to ensure we have the capability to do this. We have no tolerance for any form of market misconduct or other activity that undermines the integrity and quality of Australian markets. We are also investing in new market surveillance technology that will further promote the integrity of our financial markets through the detection and deterrence of market misconduct. The new surveillance technology will provide a greater capability to monitor all types of trading across markets as well as across different products.

41 We are already seeing a change in the behaviour of market participants in response to our inquiries. Further, our Enforcement teams are considering a number of related potential breaches of the Corporations Act and Market Integrity Rules.

Public perceptions and investor confidence

42 Dark liquidity and high-frequency trading have received much attention from financial commentators and mainstream media, particularly in the past year. There have been numerous calls from a variety of stakeholders for more regulation.

43 Dark liquidity is often painted in a negative light. It has been suggested that dark liquidity is actually more a shade of grey, with concerns about the transparency of, and accessibility to, these typically unlicensed dark venues. There are also concerns about the ‘toxicity’ of crossing systems—that is, the extent to which a market participant’s own principal trading desks or

'favoured' clients receive privileged treatment and insights into other clients' trading intentions.

44 Our research has identified some issues in this regard, and CP 202 contains some proposals to address these.

45 The concerns about high-frequency trading relate to the market 'noise' generated by trading patterns characterised by low latency (speed to market) and small orders that rest briefly in the market.

46 There are complaints that the activity of high-frequency traders is disrupting the trading of fundamental investors, who buy or sell securities based on an assessment of their intrinsic value.

47 This market 'noise' is causing considerable anxiety, but in our view it is an unavoidable consequence of advances in technology, and cannot readily be halted. It can be tempered, however, and CP 202 contains some proposals to address this issue.

48 There is a belief by some that high-frequency trading is manipulative in a legal sense, or at least predatory in nature, and there is a perception that high-frequency traders uniformly have less regard for market integrity. That perception is not supported by our study.

49 A related area of concern is the perceived threat to orderly trading caused by a dysfunctional algorithm. Examples are the US 'flash crash' of 6 May 2010 and the spike caused by Knight Capital's errant algorithm on 1 August 2012. ASIC recently made amendments to the Market Integrity Rules and issued Regulatory Guide 241 *Electronic trading* (RG 241) to improve the regulation of algorithms and automated order processing systems in order to limit volatility arising from technical errors.

Responding to recent developments

50 The Government and ASIC are monitoring recent developments in financial markets and undertaking analysis and consultation to determine whether legislative or regulatory responses are required.

Review of Australia's financial market licensing regime

51 The Government has asked Treasury to conduct a review of Australia's financial market licensing regime. The review will examine the licensing of

new types of markets, and whether the market licensing regime is generally fit for purpose.[2]

52 As part of its review, Treasury released a consultation paper in November 2012, *Australia's financial market licensing regime: Addressing market evolution*.

53 The consultation paper sought stakeholder feedback on two possible options:

> [T]o amend the current market licensing regime by:
>
> (a) creating flexibility in the Corporations Act, augmented by ASIC rules and guidance, which would create a number of market categories with tailored licensing requirements; or
>
> (b) constructing an alternative trading systems regime within the legislation by creating a new, more targeted licensing regime that could cater for the various types of venues and trading systems.

54 Treasury's consultation paper focused on whether and what legislative changes are required to regulate new types of markets such as crossing systems and dark pools, and new forms of trading such as high-frequency trading. ASIC supports the principle of flexible licensing and supports proposals in the Treasury consultation paper for the introduction of specific Market Integrity Rules relating to some dark pool activities.

55 Treasury's consultation paper also considers an option to make high-frequency traders directly subject to the Market Integrity Rules that apply to automated trading activity. The aim is to improve risk management. We support the position that traders that design and use algorithms should be subject directly to Market Integrity Rules.

Treasury consultation on proposed changes to cost-recovery regime

56 In December 2012, Treasury released a consultation paper, *Options for amending the ASIC market supervision cost recovery arrangements*,[3] proposing changes to the model for recovering ASIC's market supervision costs from industry. Treasury proposed to recover more of the costs from fees on trading messages and less from fees on trades than the current model. This reflects changes in the drivers of the costs of supervision, which has seen a greater proportion of resources expended supervising trading messages across the licensed markets.

[2] www.treasury.gov.au/ConsultationsandReviews/Submissions/2012/Australias-financial-market-regime-Addressing-market-evolution.
[3] http://www.treasury.gov.au/ConsultationsandReviews/Submissions/2012/Amending-the-ASIC-market-supervision-cost-recovery-arrangements

ASIC's work

57 We have monitored, analysed and consulted on market structure developments, including dark liquidity and automated trading, since the Government's announcement in August 2009 that ASIC would take over the supervision of real-time trading on Australia's domestic licensed markets. Responsibility for market supervision transferred from ASX and a number of other domestic market operators to ASIC on 1 August 2010. See:

(a) Consultation Paper 145 *Australian equity market structure: Proposals* (CP 145), issued in November 2010;

(b) Report 215 *Australian equity market structure* (REP 215), issued in November 2010;

(c) Consultation Paper 168 *Australian equity market structure: Further proposals* (CP 168), issued in October 2011;

(d) Consultation Paper 179 *Australian market structure: Draft market integrity rules and guidance* (CP 179), issued in June 2012; and

(e) Consultation Paper 184 *Australian market structure: Draft market integrity rules and guidance on automated trading* (CP 184), issued in August 2012.

58 This work resulted in amendments to the ASIC Market Integrity Rules (Competition in Exchange Markets) 2011, ASIC Market Integrity Rules (ASX Market) 2010 and ASIC Market Integrity Rules (Chi-X Australia Market) 2011. Amendments were also made to Regulatory Guide 223 *Guidance on ASIC market integrity rules for competition in exchange markets* (RG 223), and RG 241 was released (the key obligations are described below).

> Note: In this document, 'ASIC Market Integrity Rules (Competition)' refers to ASIC Market Integrity Rules (Competition in Exchange Markets) 2011, 'ASIC Market Integrity Rules (ASX)' refers to ASIC Market Integrity Rules (ASX Market) 2010 and 'ASIC Market Integrity Rules (Chi-X)' refers to ASIC Market Integrity Rules (Chi-X Australia Market) 2011.

New Market Integrity Rules for dark liquidity and automated trading

59 New Market Integrity Rules relating to dark liquidity and automated trading (referred to in paragraphs 58 and 61) are due to take effect between May 2013 and May 2014.

60 These new rules are based on consultation undertaken in CP 179 and CP 184 and reported to the market in RG 223 and RG 241.

61 The new rules will introduce:

(a) a price improvement requirement for dark trades, to encourage more trading to occur on lit exchange markets and support the price formation process (May 2013);

(b) enhancements to the market operator controls for extreme price movements, including automated trading pauses and extension to the ASX SPI 200 Future (i.e. the futures contract over the S&P/ASX 200) (May 2013 and 2014);

(c) enhancements to market participant filters and controls for automated trading, including a 'kill switch' to immediately shut down problematic algorithms (May 2014); and

(d) enhancements to the data ASIC receives to improve our market surveillance (March 2014).

62 We have taken the operation of these rules into account in formulating the regulatory proposals outlined in the accompanying CP 202.

The dark liquidity and high-frequency trading taskforces

63 In July 2012, ASIC established two internal taskforces, on dark liquidity and high-frequency trading, to analyse the impact of these developments on market quality and integrity and to inform ASIC's regulatory response.

64 The taskforces have engaged with stakeholders through bilateral meetings, presentations and questionnaires. The dark liquidity taskforce issued formal requests to crossing system operators to produce information under the Corporations Act. The high-frequency trading taskforce held a number of round table discussions in November 2012. There have also been discussions with overseas regulators, market operators and investors to understand relevant global developments.

65 The dark liquidity taskforce's review was based on products quoted on ASX (including trading on Chi-X and off-market trading). The high-frequency trading taskforce's review was broader and based on products admitted to quotation on ASX and ASX 24. The high-frequency trading data analysis is based on trades executed or reported to ASX and Chi-X. We used data from the surveillance feed we receive from ASX and Chi-X, and on this basis we have been able to identify the nature and extent of high-frequency trading in Australia.

66 The taskforces have also considered evidence of non-compliance with the Market Integrity Rules and the Corporations Act. Some cases have been referred to ASIC's Enforcement teams to determine whether enforcement action is required.

The dark liquidity taskforce

67 The purpose of the dark liquidity taskforce is to promote:

(a) market quality by delivering efficient price formation and ensuring that investors are well informed about how their orders are executed, and have confidence in the integrity of the market; and

(b) market integrity and fairness by appropriately regulating crossing systems, ensuring that participants act in the best interests of clients and taking appropriate action if there is evidence of misconduct occurring in relation to dark trading.

68 Since its establishment, the taskforce has been:

(a) continuing ASIC's analysis of the prevalence, nature and impact of different forms of dark liquidity in our markets, including comparisons with overseas experience. One aspect has been assessing whether dark liquidity has affected the willingness of fundamental investors to invest;

(b) reviewing the existing regulatory framework for crossing systems, and considering whether new rules are necessary;

(c) reviewing conduct in crossing systems and other trading done off market for compliance with the rules;

(d) considering whether incentives beyond the new meaningful price improvement rule (amended Rule 4.2.3 (Competition)) are required to foster price formation;

Note: In this document, 'Rule 4.2.3 (Competition)' or 'Part 6.4 (Competition)' (for example) refer to a particular rule or part of the ASIC Market Integrity Rules (Competition).

(e) reviewing the extent of payment for order flow and facilitation in our market and the impact on outcomes for clients; and

(f) assessing clearing and settlement risk of dark trades.

The high-frequency trading taskforce

69 The purpose of the high-frequency trading taskforce is to promote:

(a) market quality by analysing the prevalence, nature and impact of high-frequency trading in Australian markets and overseas, and the drivers for its growth; and

(b) market integrity by identifying and taking appropriate action against high-frequency traders if there is evidence of misconduct.

70 Since its establishment, the taskforce has been:

(a) considering whether the current regulatory framework is equipped to deal with the anticipated continued expansion of high-frequency trading;

(b) identifying whether any misconduct related to high-frequency trading has occurred;

(c) assessing whether high-frequency trading entities systematically gain a benefit to the detriment of fundamental (long-term) investors and other market users; and

(d) seeking to better understand high-frequency trading, and define behaviours that are not in accordance with fair and efficient markets. In doing so, the taskforce has:

(i) considered the nature of trading by high-frequency traders, and its impact on price formation, and assessed whether there is a systemic risk present, given their capacity to withdraw quickly from the market;

(ii) assessed algorithms employed by high-frequency trading entities and other traders who display high-frequency trading attributes, and considered whether certain types of trading or strategies should be prohibited; and

(iii) considered whether existing misconduct provisions capture inappropriate activities and behaviours of high-frequency trading entities and other traders with high-frequency trading attributes.

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B Dark liquidity and internalisation

Key points

It is important to balance pre-trade transparent ('lit') liquidity and non-pre-trade transparent ('dark') liquidity so as not to undermine the price formation process on exchange markets.

There is research that concludes that the point in the Australian market where dark liquidity (other than large block trades) harms price formation is 10% of total trading. Some securities have passed this 10% point, and there is evidence that it is harming market quality for a number of securities. However, we expect that the new price improvement rule that applies from 26 May 2013 will ameliorate this.

The nature and use of dark liquidity is changing. Crossing systems have grown in number and sophistication, and are becoming increasingly multilateral.

There are considerable conflicts of interest for market participants that may arise when internalising trades off market, including when trading as principal with clients.

We have looked at conduct in off-market trading. Market participants, for the most part, have sound operations. However, there are some areas of concern.

Purpose

71 This section outlines the dark liquidity taskforce's findings on dark liquidity and internalisation. It covers:

(a) *Context*—outlines the advantages and risks of dark liquidity (see paragraphs 72–79);

(b) *Section B1: Trends in dark liquidity and internalisation*—summarises recent trends and the emerging evidence on dark liquidity and internalisation (see paragraphs 80–134);

(c) *Section B2: Dark trading venues*—outlines how exchange operated dark venues and market participant operated crossing systems operate in the Australian market (see paragraphs 135–187);

(d) *Section B3: Other aspects of off-market trading*—discusses conflicts of interest, facilitation, payment for order flow, indications of interest and settlement risk (see paragraphs 188–222); and

(e) *Section B4: Conduct in off-market trading*—provides observations about market participant conduct when dealing off market, including through crossing systems (see paragraphs 223–254).

Context

72 Dark liquidity refers to transactions arising from orders that are not pre-trade transparent before they are executed: see paragraph 22. Dark trades are typically reported immediately to, and published by, exchange market operators, so these trades do contribute to post-trade transparency.

73 We have previously noted the importance of balancing pre-trade transparent liquidity (i.e. 'lit' liquidity) and non-pre-trade transparent liquidity (i.e. 'dark' liquidity) so as not to undermine the price formation process on exchange markets: see Section H of CP 145, Section E of REP 215 and Section G of CP 168. We noted the inherent tension between:

(a) the short-term private advantages for a subset of the market of trading in dark venues (see paragraphs 82–83); and

(b) the long-term public good of contributing to the price formation process, which gives investors confidence and promotes the interests of listed companies and the broader community through an efficient secondary market for capital.

74 In particular, we outlined the public benefits of dark liquidity, including minimising the market impact of large orders and enabling some trading to occur that otherwise may not have occurred. Dark liquidity also provides a number of private benefits—it can protect clients from other traders getting an insight into their trading intentions, and it offers the possibility of better prices or faster execution.

75 We also outlined the risks to market quality, specifically price formation, of the excessive use of dark liquidity. Prices are most efficient when there is optimal interaction between supply and demand. There is the risk that, as more order flow of fundamental investors is directed away from exchange markets, the quality of the prices on the exchange market deteriorates (i.e. wider bid–offer spreads and possibly less volume at each price). Wider spreads can result in larger price fluctuations. It is more difficult, and potentially costly, for listed companies to raise capital if security prices fluctuate considerably. Wider spreads can also reduce investor confidence, because they pay a higher price to access liquidity.

76 Dark liquidity also raises issues of fairness. Many investors do not have access to liquidity in dark venues. Further, most dark liquidity is priced by reference to the prices on the exchange markets, so dark trading is considered to 'free ride' on these markets.

77 To address some of these concerns, we have made a Market Integrity Rule to commence on 26 May 2013. It requires dark trading (other than large blocks) to be done with meaningful price improvement of one price increment within the bid–offer spread or the midpoint: amended Rule 4.2.3 (Competition). We expect this will encourage more trading to occur on lit exchange markets.

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We also reduced the size at which large block trades can be done at any price from a static $1 million to three tiers based on the liquidity of the security (i.e. $1 million, $500,000 or $200,000): Rule 4.2.1 (Competition). We did not introduce a minimum order threshold for dark trades at the time, but we said we would monitor developments and engage with industry on potential triggers.

78 Since the release of the documents referred to in paragraph 73, we have seen changes in the way dark liquidity is being used and by whom, and new findings from academic research have been published. We have a deeper understanding of the crossing systems operating in the Australian market through the taskforce work. We need to analyse these developments and their actual and potential impact on market quality and integrity to determine whether additional regulatory measures are required.

IOSCO *Principles for dark liquidity*

79 The International Organization of Securities Commissions (IOSCO) issued principles in 2011[4] to assist regulators to address issues concerning dark liquidity. These principles have helped inform our thinking about dark liquidity. They provide that:

(a) information about orders and trades should generally be transparent to the public;

(b) regulators should support the use of transparent orders rather than dark orders. Transparent orders should have priority over dark orders at the same price within a trading venue;

(c) regulators should have access to information about dark orders and trades;

(d) market users should have sufficient information to be able to understand the manner in which their orders are handled; and

(e) regulators should monitor the developments in dark liquidity to ensure it does not adversely affect the efficiency of the price formation process, and take appropriate action as needed.

Section B1: Trends in dark liquidity and internalisation

80 Our analysis identified the following trends in dark liquidity in Australia:

(a) there are multiple incentives to trade in the dark and the nature of dark liquidity is changing;

[4] Technical Committee of IOSCO, *Principles for dark liquidity* (IOSCOPD353), report, May 2011.

(b) although the proportion of dark liquidity remains steady, there is anecdotal evidence that the growth in automated trading and new high-frequency traders on lit exchange markets is masking a shift of fundamental investors away from lit exchange markets overall;

(c) there has been a structural change in dark liquidity with fewer block trades and significant growth in the number of smaller dark trades;

(d) we are starting to see evidence that dark liquidity is affecting market quality and price formation in some securities (i.e. wider bid–offer spreads and less depth in prices); and

(e) current tick sizes (i.e. the minimum price increment of a security) are constraining prices of some securities and driving trading in these securities to the dark.

81 These trends are discussed in more detail in this section. We anticipated many of these developments in REP 215. We expect the new 'price improvement rule' (that takes effect in May 2013) to slow the use of dark liquidity.

Incentives to trade in the dark

82 We are concerned that the short-term private incentives to trade in the dark (outlined in Table 3) may be starting to outweigh the public incentives to trade on the lit exchange markets.

Table 3: Incentives to trade in the dark

Catalyst	Incentive
Advances in technology	Advances in crossing system technology and smart order routers. The cost of technology has fallen and there are more off-the-shelf solutions. These developments enable systematic internalisation or matching of client orders.
Market participant benefits	Saving on exchange market fees and fees for clearing messages. The benefit of choosing which client flow to interact with.
Client incentives	Avoiding information leakage and avoiding interacting with high-frequency and algorithmic trading on lit exchange markets (crossing systems are perceived to be safer). In some instances, dark liquidity offers price improvement. In the September quarter 2012, 21% of turnover of below block size trades reported to market operators resulted in some element of price improvement.
Regulatory changes	The removal in 2009 of the requirement to appear in the market for 10 seconds before crossing a trade, together with the introduction of the 'at or within the spread' off-market trading type in 2011, provides more flexibility. Many market participants claim to use a crossing system to help them comply with best execution.

83 While, in the short term, it may seem everyone is better off by these developments, the actual result may be quite different. Most dark liquidity is priced by reference to prices on the exchange markets. As liquidity is shifting away from lit exchange markets, there is less demand (fewer lit orders), which can widen bid–offer spreads. This results in everyone receiving worse prices, even if they receive some price improvement: see evidence in paragraphs 100–119. This is a case of individual incentives conflicting with what would be a better price outcome for all.

Shift of fundamental investors into the dark

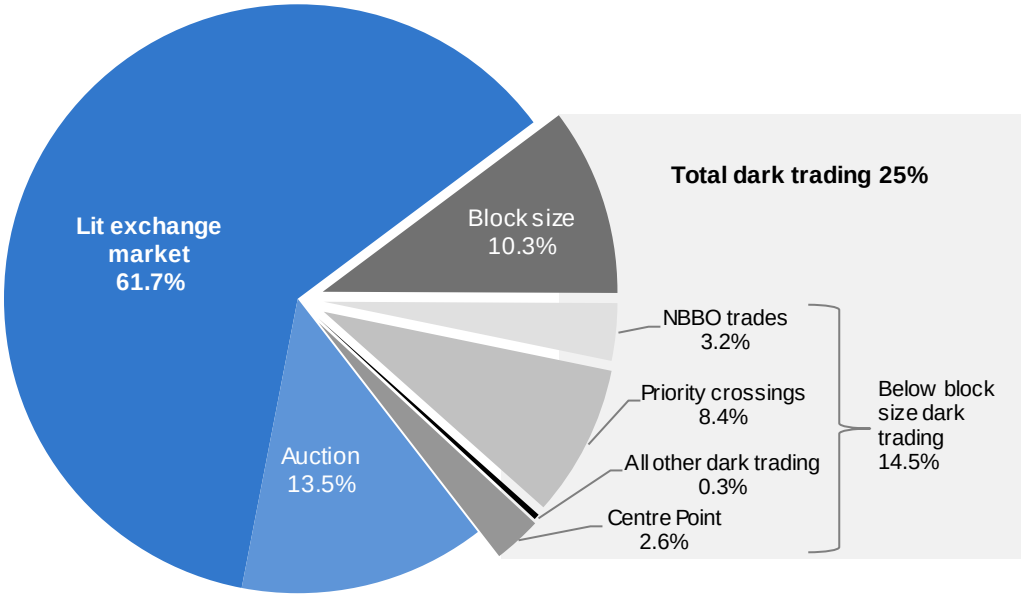
84 Dark liquidity as a proportion of total trading has remained reasonably constant in recent years at around 25–30%: see Figure 1 and Figure 2. However, we believe that this statistic masks an important underlying change in the way dark liquidity is being used and by whom.

(a) Anecdotal evidence suggests that there has been a shift of fundamental investors away from lit exchange markets into the dark. At the same time, there has been an increase in trading by entities deploying high-frequency trading strategies on lit exchange markets. As a result, the proportion of dark liquidity in terms of total trading has remained about the same (25–30%) but there have been changes in who is using dark liquidity. We believe fundamental investors are contributing less to pre-trade price formation on the lit exchange market than they used to.

(b) Fundamental investors are telling us that they are turning away from lit exchange markets in favour of dark venues for the perceived 'safety' from entities deploying high-frequency trading strategies. Some investors view high-frequency trading as predatory, unfair, and a barrier to efficient long-term investment: see paragraph 321. We believe that this is a significant contributor to the shift, together with the other incentives to trade in the dark that we outlined in Table 3.

(c) Analysis of the market participants that deal with the vast majority of trading by retail investors shows that there has been a significant increase in their use of dark liquidity in below block size. Comparing September 2010 to September 2012, below block size dark trades by these market participants rose from 4% to 11% of their total turnover. We can therefore infer that market participants are executing more retail orders in the dark than they used to. This is not surprising, given the growth in the number of crossing systems in the Australian market, including those used to execute orders of retail investors: see paragraphs 92–93.

Figure 1: Trade execution by type of trade as a proportion of value—September quarter 2012



Note: In this figure, 'block size' refers to trades executed under the pre-trade transparency exceptions in Rules 4.2.1 and 4.2.2 (Competition)—typically of $1 million or more.

Shift from block size to below block size

85 The original purpose of the introduction of dark order types was to facilitate large orders and to manage their market impact. We are seeing a decline in the use of block trades (trades executed under the pre-trade transparency exceptions in Rule 4.2.1 and Rule 4.2.2 (Competition)—typically of $1 million or more) and significant growth in the use of smaller dark trades: see Figure 2.[5] For example, Table 4 shows that the turnover of block size dark trades has declined from 14% in the September quarter 2010 to 10% in the September quarter 2012, and below block size dark trades have increased from 9% to 14% over the same period.

86 There has been a similar trend for the number and value of trades. This is consistent with the findings of research commissioned by the Financial Services Council.[6] This means that dark trading is being used for purposes other than protecting block trades. Therefore, we need to re-examine the regulatory framework.

87 In addition to this shift from block size to below block size, there is anecdotal evidence that fundamental investors are just trading less, given the current economic climate. Therefore, some of the growth in below block size trading has resulted from the shift of trading from lit exchange markets.

[5] This evolution is well documented. For example, the Financial Services Council noted this trend in its commissioned paper, *Changing technology in capital markets: A buy side evaluation of HFT and dark trading*, November 2012.
[6] David Walsh, Baseline Capital, *Changing technology in capital markets: A buy side evaluation of HFT and dark trading*, commissioned research for the Financial Services Council, November 2012, www.fsc.org.au/downloads/uploaded/Changing%20Technology%20in%20Capital%20Markets_2182.pdf.

Figure 2: Block size and below block size dark trades as proportion of total turnover—monthly averages to September 2012

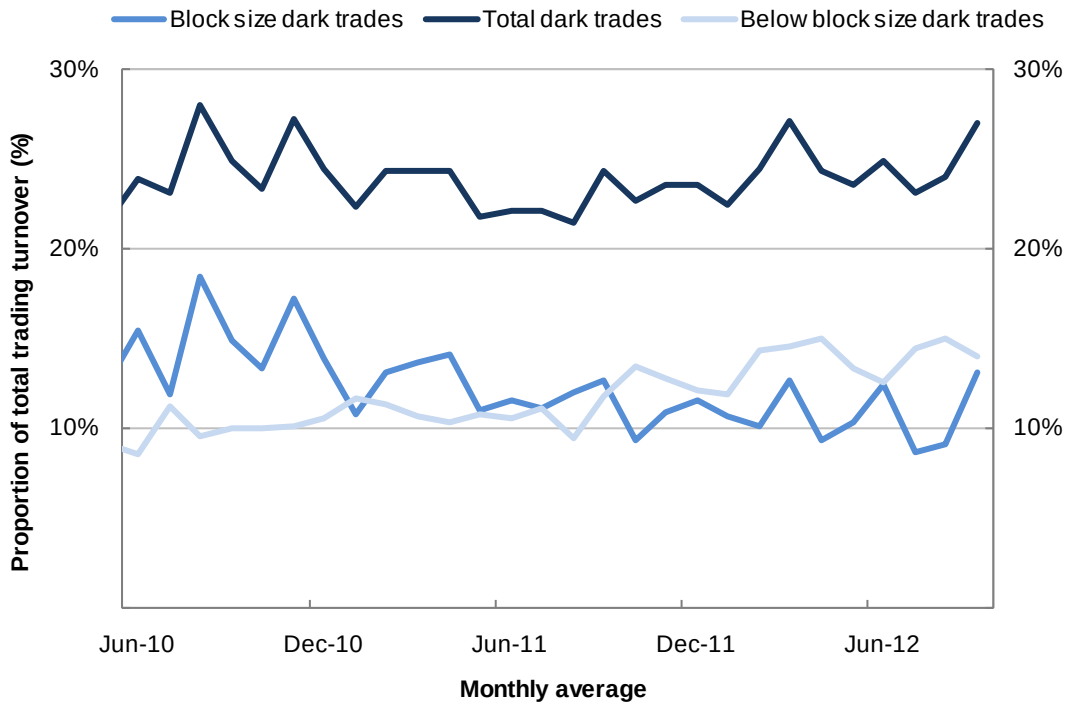


Table 4: Trends in block size and below block size dark trades—change from September quarter 2010 to September quarter 2012*

Block size dark trades	Below block size dark trades
Percentage of total turnover:	
Decreased from 14% to 10%: see Figure 2	Increased from 9% to 14%: see Figure 2
Number of trades:	
Decreased (by 69%) from 32,000 to 10,000: see Figure 3	Increased (by 388%) from 670,000 to 2.6 million: see Figure 3
Value of trades:	
Decreased (by 48%) from $17 billion to $8.9 billion. Note: Some of this is due to broader declines in turnover over this period.**	Increased (by 17%) from $10.6 billion to $12.4 billion

* All figures are monthly averages.

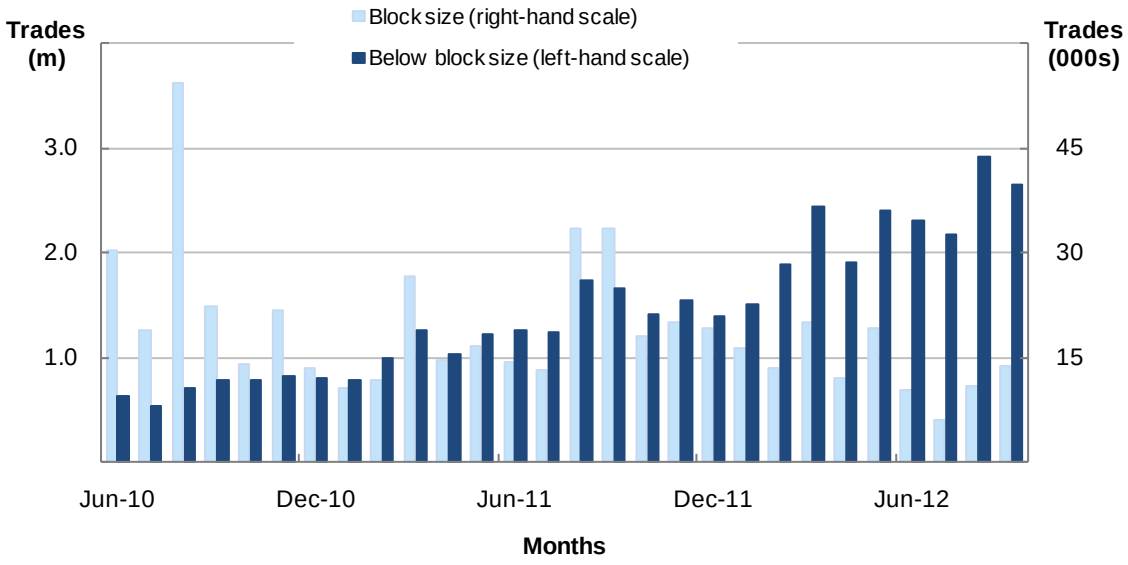
** Total market turnover fell from $5.2 billion per day in the September quarter 2010 to $4 billion per day in the September quarter 2012.

88 The median size of below block size dark trades has fallen from $750 to $400 between September 2010 and September 2012. It was as low as $300 in August 2012. This means that half of the trades in that month were smaller than $300. This low trade value is likely to be attributable to the growth in the use of algorithms to execute trades (see paragraph 301 in Section C), and

we expect it is also the result of excessive pinging (i.e. the use of very small orders to test if there is liquidity) in dark venues. This is inconsistent with the original purpose of dark liquidity for managing larger orders.

89 We do, however, expect there to be more block size dark trading when the new tiered block trade rule commences on 26 May 2013. This is because it will be possible to trade in smaller sizes (i.e. $200,000 for the majority of securities compared with $1 million today) at any price. From 26 May, trades smaller than block size will be required under the Market Integrity Rules to receive meaningful price improvement.

Figure 3: Number of dark trades at block size and below block size—June 2010 to September 2012



Growth in dark trading venues

90 The largest dark venue in the Australian market is ASX's Centre Point, with 2.6% of total market turnover ($130 million per day) in the September quarter 2012: see Figure 1. This compares with 0.2% in the September quarter 2010.

91 Chi-X does not have a dark venue, but it permits fully dark orders to interact with lit orders on its market. Hidden orders represented 0.15% of total market turnover, or 3.9% of total turnover, on Chi-X's market in the September quarter 2012.

92 Dark venues operated by market participants are known as crossing systems. They are any automated service provided by a market participant to its clients that matches or executes client orders away from lit exchange markets: see paragraphs 142–146 for more details.

93 Growth in crossing systems was relatively slow between 2005 (when the first crossing system was launched in Australia) and 2009. However, since 2009, the number of crossing systems has increased from five to 20. They are operated by 16 market participants, as shown in Table 5.

Table 5: List of crossing systems registered with ASIC

Operator of crossing system	Date of commencement
E*TRADE	February 2013
State One Stockbroking Ltd	November 2012
CLSA Pty Ltd	October 2012
UBS Investment Bank—Crossing System 2	August 2012
J.P. Morgan Securities Limited	August 2011
Deutsche Securities Australia Limited—Crossing System 2	June 2011
Commonwealth Securities Limited—Crossing System 2	May 2011
Commonwealth Securities Limited—Crossing System 1	May 2011
Instinet Australia Pty Limited	April 2011
Macquarie Securities (Australia) Limited	September 2010
Merrill Lynch Equities (Australia) Limited	August 2010
Deutsche Securities Australia Limited—Crossing System 1	June 2010
ITG Australia Limited	May 2010
Morgan Stanley Australia Limited	March 2010
Goldman Sachs & Partners Australia Pty Ltd	January 2010
Credit Suisse Equities (Australia) Limited—Crossing System 2	May 2009
Liquidnet Australia Pty Ltd	February 2008
Credit Suisse Equities (Australia) Limited—Crossing System 1	April 2006
Citigroup Global Markets Australia	February 2006
UBS Investment Bank—Crossing System 1	August 2005

94 Further:

(a) trading on crossing systems has increased from 2.6% of total market turnover in the September quarter 2011 to 4% in the September quarter 2012;

(b) the number of trades on crossing systems has also increased from 8.1% of total market trades in the September quarter 2011 to 10.7% in the September quarter 2012; and

(c) the average trade size of crossing system operators has fallen from $2,400 to $2,200 over the same period.

95 We believe the numbers in paragraph (a) understate the volume of trading that is occurring on crossing systems and we are working with market participants to improve the reporting of this data.[7]

96 This compares with the United States, where 'non-displayed venues' accounted for 13.06% of total equity trading turnover in September 2012.[8] We do not have the data for total dark trading in the United States in September 2012—however, it was 36.8% of total trading turnover in January 2013.[9]

97 There is considerable principal trading on crossing systems (i.e. trading by the crossing system operator). Eight crossing systems conducted principal trading in the September quarter 2012. Principal trading represented 38% of value traded on these crossing systems—that is, more than one dollar in every three traded by clients was against the operator of these crossing systems.

98 Centre Point and the crossing systems mostly offer trading in S&P/ASX 200 securities, although some offer trading in a wider variety of securities. There is one crossing system that trades in well over a thousand different securities.

99 The data also shows that liquidity is becoming more fragmented across different crossing systems. The average number of crossing systems receiving orders and/or trading per day has grown considerably between June 2011 and June 2012. All securities regardless of size have experienced an increase in the average number of crossing systems where they are active: Table 6.

Table 6: Average number of crossing systems trading in certain securities

Date	S&P/ASX 200	ASX 201–500	ASX 500+
June 2011	8.3	3.0	0.3
June 2012	11.6	5.1	1.0

[7] These numbers are based on data provided by crossing system operators to ASIC under Part 4.3 (Competition). We believe the numbers are understated because the total volume of below block size dark trading is 14% (see Table 4), and it is unlikely that manual trading accounts for more than twice the volume of automated trading. As noted in paragraphs 251–254, we have also identified errors in these reports, including under-reporting.
[8] Rosenblatt Securities Inc, *Trading talk: Let there be light*, October 2012.
[9] Rosenblatt Securities Inc, *Trading talk: Let there be light*, February 2013.

Evidence that dark liquidity is impairing market quality

100 Market quality is about the efficiency and fairness of the market. A number of recent studies have shown that dark liquidity can result in worse prices (i.e. wider bid–offer spreads) and less depth (i.e. less securities available). There is now empirical evidence based on the Australian market that dark liquidity is impairing the quality of the market for a number of securities.

Research

101 In the United States, Weaver (2011) found that internalisation of order flow was associated with an increase in bid–offer spreads and an increase in the price impact and volatility of trades on the lit exchange markets in the United States. Weaver estimated that, on average, a security listed on the New York Stock Exchange (NYSE) with 40% of its volume reported as dark (of all sizes) had an average spread that was $0.0128 wider than a similar security with no dark liquidity. This results in investors paying $3.9 million more per security per year.[10]

102 Research by the CFA Institute found that the tipping point where dark liquidity[11] starts to impair market quality in the United States varies by liquidity of a security (i.e. 13–23% of total volume for large-to-medium-size securities and 44–64% for smaller securities). The CFA Institute also noted that when most orders are filled away from lit exchange markets, investors could be inclined to withdraw displayed quotes because of the reduced likelihood of those orders being filled.[12]

103 In Australia, Comerton-Forde and Putnins (2012) reached similar conclusions, although at different thresholds. Their research suggests that the migration of order flow into the dark removes valuable information from the price formation process, and leads to increased adverse selection, larger bid–offer spreads and larger price impacts on ASX.[13] They found that dark liquidity was associated with a decline in the quality of the lit exchange market once dark trading below block size exceeded 10% of total dollar volume after controlling for other security characteristics. The changes in market quality are economically meaningful in magnitude.[14]

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[10] D Weaver, *Internalization and market quality in a fragmented market structure*, Rutgers Business School, Rutgers University working paper, 2 May 2011.
[11] The CFA Institute study separately considers internalisation and dark pools in the measurement of dark liquidity.
[12] www.cfapubs.org/doi/pdf/10.2469/ccb.v2012.n5.1
[13] Carole Comerton-Forde & Talis J Putnins, *Dark trading and price discovery*, 26 November 2012. Available at SSRN: http://ssrn.com/abstract=2183392 or http://dx.doi.org/10.2139/ssrn.2183392. The sample period of this study was 1 February 2008 to 30 October 2011.
[14] The paper reports that a large increase in below block size dark trading from 10% to 20% of dollar volume is estimated to increase the informational inefficiency measures by 10% to 15% of a standard deviation. A more modest increase in below block size dark trading from 10% to 12.5% of dollar volume is expected to increase the informational inefficiency measures by 2% to 4% of a standard deviation.

104 By contrast, they found some block trades executed away from the lit exchange market (up to approximately 15% of dollar volume) can be beneficial to aggregate price formation. Sixty-two of the 492 securities in the ASX All Ordinaries Index had more than 10% of their turnover in below block size trades.

Our analysis: Building on Comerton-Forde and Putnins' findings

105 We examined trading in the September quarters of 2011 and 2012. We focused on this period because of the accelerated growth in below block size dark trading after September 2011. We identified the number of securities where the median proportion of below block size dark trading exceeded 10% of total dollar volume.[15] This means that the level of below block size dark trading in these securities is above 10% on more than half of the trading days in the sample. For each security on each day, we calculated the proportion of below block size dark liquidity, ranked the days based on this proportion and then identified the median (middle) value for each security in each quarter.

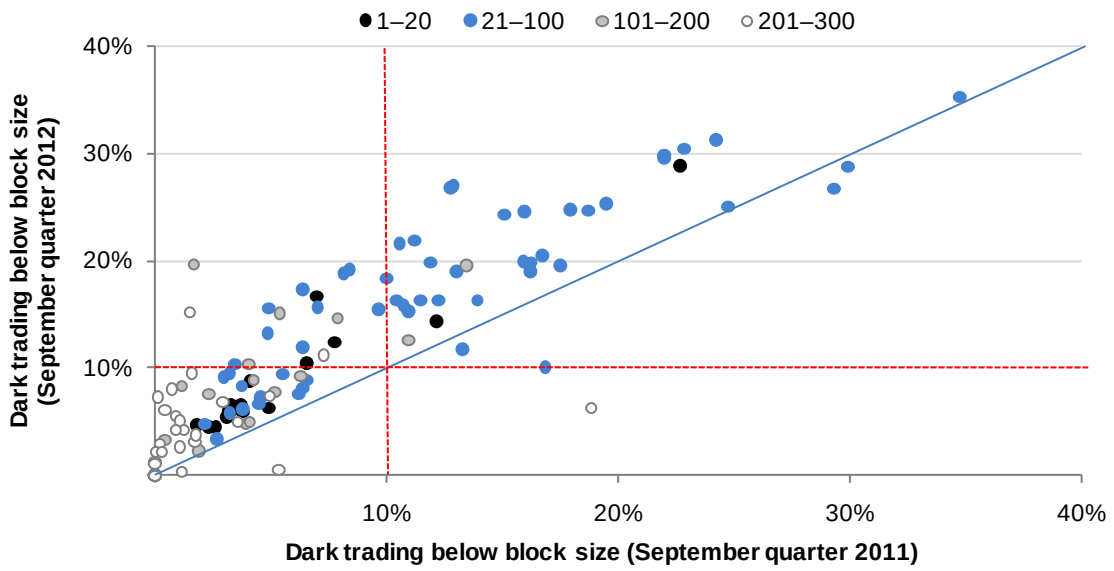
106 Figure 4 reports the median values for the most active 300 securities for each quarter. Data for 2011 is plotted against the horizontal axis and data for 2012 is plotted against the vertical axis. Securities above (to the left) of the diagonal line represent an increase in below block size dark liquidity from the September quarter of 2011 to the September quarter of 2012. Securities were also ranked and grouped according to total turnover for the September quarter 2012 (i.e. the most active 20 securities, ASX 21–100, ASX 101–200, ASX 201–300).

107 Of the top 300 securities, 85% experienced an increase in below block size dark liquidity in the September quarter 2012 compared with the September quarter 2011. This is shown by the thick band of securities above (and to the left) of the diagonal line in Figure 4.

108 Our analysis shows that, for the September quarter 2012, an additional 80 securities in the ASX All Ordinaries Index were above Comerton-Forde and Putnins' estimated 10% threshold for below block size dark liquidity: see the cluster of dots above the diagonal line and above 10% on the vertical axis in Figure 4.

[15] We analysed medians rather than averages because this shows that more than half of the trading days in the sample have levels of dark trading that are potentially harmful to price formation. In this context a median is more useful than an average value as an average may be caused by only a small number of trading days having very high levels of dark trading.

Figure 4: Median day of below block size dark trading turnover as a percentage of market turnover—September quarter 2011 and September quarter 2012



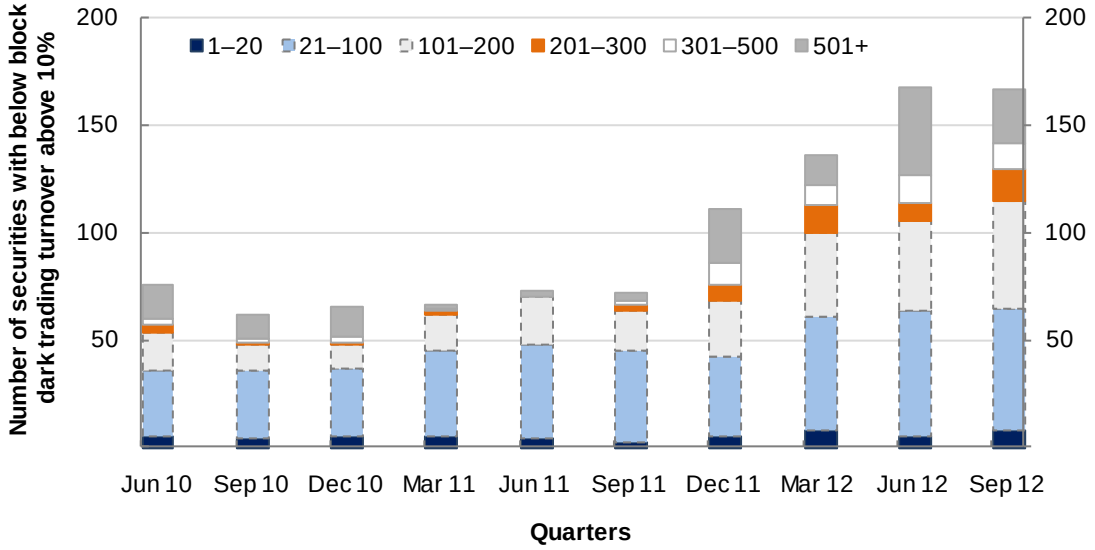
109 The growth in securities with a quarterly median day where total dollar volume was above the estimated 10% has been pronounced and has not been limited to the most active securities (see Figure 5):

(a) in the September quarter 2012, 28% (142) of the 500 largest securities by market turnover were above the estimated threshold, compared with 14% (69) in the September quarter 2011;

(b) the number of small securities (ASX 300+) with below block size dark liquidity exceeding 10% has also risen strongly from five to 37 between the September quarter 2011 and the September quarter 2012 (less than 2% of these securities); and

(c) the growth in below block size dark liquidity exceeding the 10% level, however, has been most rapid in the mid-tier securities (ASX 21–200). The number of securities in this group with below block size dark liquidity exceeding 10% has risen from 61 in the September quarter 2011 to 107 in the September quarter 2012, and now represents 60% of mid-tier securities.

Figure 5: Number of securities with the median day of below block size dark trading turnover above 10% of total turnover—to September quarter 2012



110 We examined the impact of these changes on spreads (Table 7) and depth (Table 8) by considering securities in four possible categories:

(a) those where dark trading below block size was below 10% in both quarters;

(b) those where dark trading below block size was below 10% in the September quarter 2011 but above 10% in the September quarter 2012;

(c) those where dark trading below block size exceeded 10% in both quarters; and

(d) those where dark trading below block size was above 10% in the September quarter 2011 but below 10% in the September quarter 2012.

111 This analysis does not control for market-wide factors that may influence spreads and depth. However, these factors will be likely to influence all securities—therefore, considering spreads and depth based on the level of dark trading below block size helps to gain insight into the correlation between dark trading and spreads and depth.

112 Securities with increased levels of below block size dark liquidity tended to exhibit increases in spreads. Comparing the September quarter 2011 with the September quarter 2012, spreads widened for the majority of securities that went from having less than 10% below block size dark liquidity in the first period to more than 10% in the second period (39 out of 63, or 62%), and for those securities having above 10% in both periods (49 out of 57, or 86%).

Table 7: Change in spread and the level of below block size dark liquidity in the S&P/ASX 300[16]

Below block size dark trading in September quarter	No. of securities	% securities increased spread	Change in spread (expressed as ratio of tick size)	Spread as ratio of tick size (Sept quarter 2011)
Below 10% in 2011, below 10% in 2012	163	37%	–0.022	1.308
Below 10% in 2011, above 10% in 2012	63	62%	0.027	1.066
Above 10% in 2011, above 10% in 2012	57	86%	0.025	1.018
Above 10% in 2011, below 10% in 2012	2	0%	–0.273	1.656

113 As shown in Table 7, there was a marked difference between the change in spread for securities with below block size dark liquidity in excess of 10% and the remainder of securities in the S&P/ASX 300:

(a) spreads predominantly narrowed for securities with less than 10% of below block size dark liquidity for both periods (63% of securities). The median change in spread was –0.022 minimum ticks or a reduction of 1.7% of the median spread in these securities; and

(b) spreads widened for securities above 10% in September 2012, whether below or above the 10% threshold in the prior period. This may reflect the increasing level of dark liquidity, even for those securities that were already beyond the 10% level of below block size dark liquidity in the September quarter 2011 (as shown in Figure 4). The median change in spread for these two groups (below 10% in 2011/above 10% in 2012 and above 10% in 2011/above 10% in 2012) was 0.027 and 0.025 minimum ticks, respectively (or both were 2.5% of the median spread).

114 There was a general decrease in market-wide depth.[17]

115 There appears to be little difference in the proportion of securities that had a decrease in depth and less than 10% below block size dark liquidity in both periods (85%), and securities that had an increase in below block size dark liquidity from below to above 10% (90%) or remaining above 10% in both periods (89%). However, securities that reported more than 10% below block size dark liquidity experienced approximately twice the decline in the median securities' depth when compared with securities that had less than 10% below block size dark liquidity.

116 While it is acknowledged that some of the decline in depth is likely to be driven by the decline in turnover on Australian markets over this period, the

[16] Spreads were examined through the quoted spread expressed as a ratio of the minimum tick size. This helped control for changes in a security's price and any movement between minimum tick size bands.
[17] Depth was examined through changes in the median day's average number of shares on the lit exchange market at the first five potential price steps either side of the midpoint price divided by the daily turnover.

difference in the size of the decline in depth, as shown in Table 8, suggests that a high level of below block size dark liquidity may be having a negative impact on depth on lit exchange markets.

Table 8: Change in depth and the level of below block size dark liquidity in the S&P/ASX 300

Below block size dark trading in September quarter	No. of securities	% securities decrease in depth	Change in depth (%)	Depth as % daily turnover (Sept quarter 2011)
Below 10% in 2011, below 10% in 2012	163	85%	–18.8%	18.7%
Below 10% in 2011, above 10% in 2012	63	90%	–40.1%	15.5%
Above 10% in 2011, above 10% in 2012	57	89%	–35.4%	16.6%
Above 10% in 2011, below 10% in 2012	2	50%	–25.3%	18.7%

117 We expect the proportion of dark turnover that is below block size to fall in response to the new market integrity rule on trade with price improvement: see paragraphs 120–122.

118 We also examined the fraction of dark trading in block size in the September quarter 2011 and the September quarter 2012. There were far fewer securities above the estimated 15% threshold for block size dark liquidity over the period. One security had a median day above the threshold in the three months to September 2012, although there was a slightly higher number of securities (12) above the threshold in the three-month period to September 2011. This is consistent with the overall decline in block size trades described in paragraphs 85–89.

119 We note, however, the proportion of turnover conducted in block size transactions is anticipated to increase with the introduction of the new lower block thresholds from 26 May 2013. At the same time, the block trade threshold, above which trades can be done at any price, will change from the current static $1 million to three tiers of $1 million (around 25 securities), $500,000 (around 30 securities) and $200,000 (all other securities) based on the liquidity of the security.

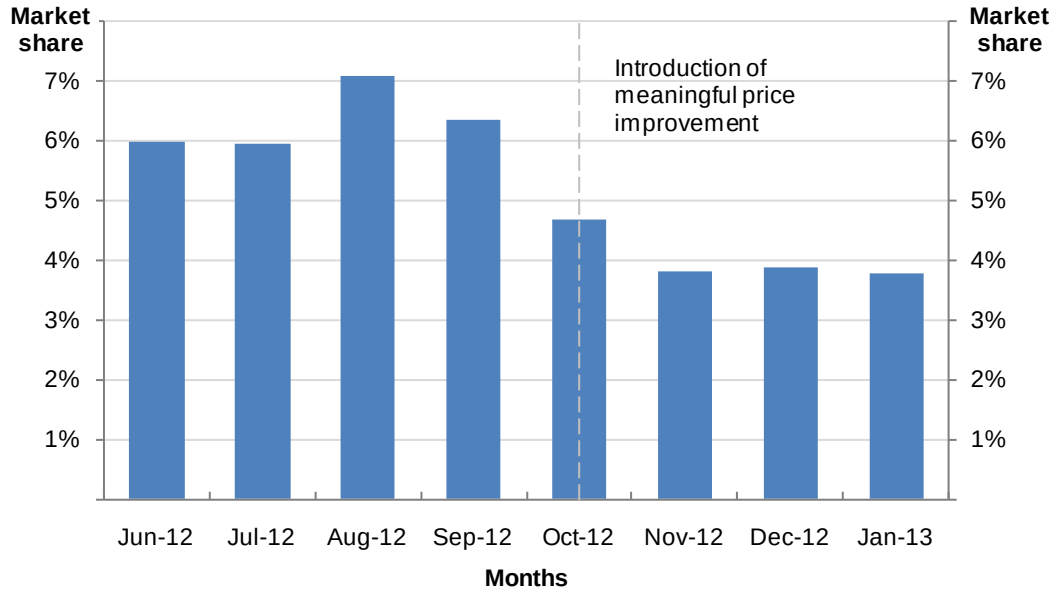
Expected impact of the new price improvement rule

120 Currently, dark orders can be filled before orders at the same price that have been waiting in the queue on a lit exchange market. This results in investors that display liquidity waiting longer for their orders to be executed, which exposes their orders to greater risk of non-execution and adverse price movements (i.e. adverse selection).

121 ASIC has made a new market integrity rule requiring dark trades to be executed with meaningful price improvement (i.e. at least one price step better than the best bid or offer or the midpoint on lit exchange markets). This rule takes effect on 26 May 2013. It will protect lit orders from being traded ahead of by dark trades at the same price.

122 This new rule is designed to encourage more trading to occur on lit exchange markets. Indeed, this has been the outcome in Canada, where a similar price improvement rule (for dark pools only) took effect in October 2012. The proportion of overall equity trading in Canada that took place in dark pools was around 40% lower in November 2012 (3.8%) after the new rule took effect, compared with September 2012 (6.4%)—the month prior to the commencement of the rule.

Figure 6: Dark pool market share and the introduction of meaningful price improvement in Canada



Source: Fidessa Fragulator

Regulatory response

123 While there is evidence that market quality has declined for a number of securities in the Australian market as dark liquidity has increased, the experience in Canada indicates that we can also expect that the price improvement rule will moderate this at least in the short-to-medium term. Nonetheless, we propose a safety net in CP 202 (proposal B1). We propose a trigger to implement a minimum dark order threshold to apply where there is evidence that dark liquidity has caused degradation in the market quality of a security or group of securities.

Tick sizes and dark liquidity

124 Tick sizes are the minimum price increment that a security can trade at both on-exchange and off-exchange markets. The regime in Australia has been broadly unchanged for many years, originally set by ASX and now embedded in ASIC's Market Integrity Rules: Part 6.4 (Competition):

(a) for securities priced ≥ $2, the tick size is $0.01;

(b) for securities priced between $0.10 and $2, the tick size is $0.005; and

(c) for securities priced < $0.10, the tick size is $0.001.

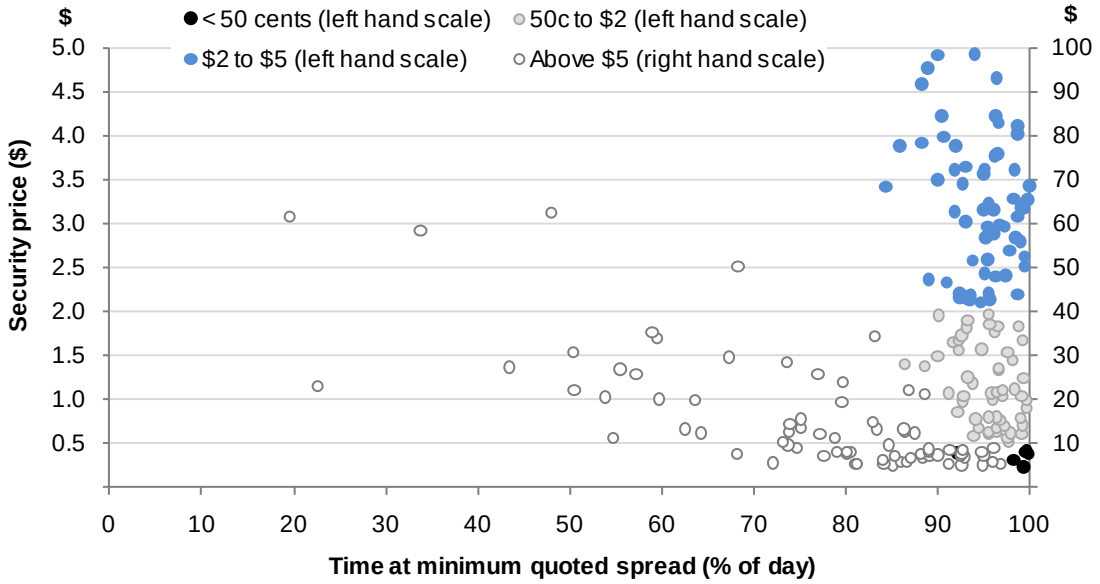
125 Tick sizes can influence the volume of dark trading. Generally, securities with a large tick size relative to their price are more attractive to trade in the dark. This is because there are greater cost savings from trading within a tick size in the dark (e.g. at a mid-tick). For example, as a proportion of the price of a security, a tick on a $2 security is 25 times that of a $50 security (i.e. 0.5% compared with 0.02%, respectively). This makes trading in the dark in a $2 security more attractive than a $50 security. It is also possible to be filled ahead of orders on lit exchange markets at the same price.

Tick-constrained securities

126 Some securities are 'tick constrained'. A security is tick constrained if its bid–offer spread is frequently equal to the minimum tick size. This typically means that there is considerable liquidity queuing at the minimum price on the lit exchange market. This can drive trading activity off lit exchange markets into the dark to avoid waiting in the queue.

127 Our analysis shows that securities in the S&P/ASX 200 priced below $5 (which the majority of securities are) were tick constrained for most of the day during the first half of 2012. Of these securities, 91% were tick constrained for more than 90% of the day: Figure 7. This compares with only 9% of securities priced below $5 outside the S&P/ASX 200. There is little evidence that tick constraint is an issue for securities priced at more than $5.

Figure 7: Percentage of day at minimum quoted spread and price of security



128 A similar pattern is observable when examining trading occurring in the dark (in sizes below block size). Of securities below $5 in the S&P/ASX 200, 85% trade at the minimum tick size for 90% of the day and report more than 10% of their turnover as dark liquidity below block size.

129 We also examined whether securities that were tick constrained experienced an increased proportion of trading in the dark. This was examined through a number of indicators, including the proportion of the day a security was tick constrained, the proportion of trades and value traded that offered price improvement, and whether effective spreads were lower than quoted spreads. We identified 25 securities that exhibited a strong relationship between tick constraint and indicators of increased trading in the dark. These securities are listed in Table 9.

Table 9: Top 25 'tick-constrained' securities in the S&P/ASX 200—January to June 2012

Security	Rank*	Security	Rank*	Security	Rank*
Dexus Property Group	1	Insurance Australia Group	10	BlueScope Steel	19
Telstra	2	Tatts Group	11	Spark Infrastructure	20
Commonwealth Property Office Fund	3	SP AusNet	12	Federation Centres	21
Westfield Retail Trust	4	Fairfax Media	13	Incitec Pivot	22
Mirvac Group	5	Goodman Fielder	14	Sundance Resources	23
Goodman Group	6	Sydney Airport	15	Sigma Pharmaceuticals	24

Security	Rank*	Security	Rank*	Security	Rank*
GPT Group	7	TABCORP Holdings	16	Aurizon Holdings	25
Investa Office Fund	8	CFS Retail Property Trust Group	17		
Stockland	9	ResMed Inc.	18		

* The rank order is based on the aggregate score against each of the indicators listed in paragraph 129.

Impact of reducing tick sizes

130 In other jurisdictions, where tick sizes have been reduced, spreads (and depth to a lesser extent) have declined. As a result, small traders who demand liquidity have faced lower transaction costs. Although large traders who demand liquidity also pay lower spreads, they may not be better off as the volume of liquidity available may not be adequate. Liquidity suppliers are also worse off as they earn lower spreads for the liquidity that they provide.[18]

131 If a tick size becomes too small, the cost of trading at one tick size smaller than other orders becomes insignificant, which can lead to more high-frequency trading.[19] This may discourage investors from placing limit orders if they can be easily stepped ahead of. It is important to balance these competing incentives.

Regulatory response

132 We seek feedback in CP 202 (issue D1) on two options for addressing this tick constraint issue:

(a) reducing the tick size from 1c to 0.5c for securities priced between $2 and $5; or

(b) for the 25 most tick-constrained securities, reducing their tick size to the next lowest tier in Part 6.4 (Competition).

Industry feedback about trends

133 We have received a range of feedback on trends during our inquiries, including concerns about:

[18] Charles M Jones and Marc L Lipson, 'Sixteenths: Direct evidence on institutional trading costs,' *Journal of Financial Economics* 59(2), 2001, pp. 253–278; Michael Goldstein & Kenneth Kavajecz, 'Eighths, sixteenths and market depth: Changes in tick size and liquidity provision on the NYSE', *Journal of Financial Economics*, 56, 2000, pp. 125–49.

[19] The French securities regulator found that high-frequency trading increased when tick sizes decreased. It showed that the proportion of volume traded and the number of orders sent by high-frequency traders increased (from 38% to 64%, and from 58% to 62%, respectively) when tick sizes decrease. See Autorité Des Marches Financiers, *Tick size: The 'Nouveau Régime'*, October 2012, www.finance-watch.org/wp-content/uploads/2013/01/Tick-Size-The-Nouveau-Regime-Compatibility-Mode.pdf.

(a) the ability for orders to be filled in the lit exchange market, trade sizes getting smaller, and less volume being available at the best bid and offer;

(b) the fragmentation of markets and trading venues making it more difficult to find liquidity. Some believe the market is more efficient, but investment is required to realise the ability to benefit from it;

(c) difficulties in finding legitimate large blocks. Fund managers are worried about information leakage; and

(d) as more trading shifts to the dark, the potential for the cost of maintaining lit exchange markets to be disproportionately borne by smaller market participants.

134 The proposals in CP 202 are designed to address these concerns.

Section B2: Dark trading venues

Australian exchange markets

135 Exchange market operators have been responding to the competitive market environment and developments in technology by innovating with new order types and dark trading offerings.

136 ASX's fully hidden dark venue, Centre Point, executes orders at the midpoint of the best bid and offer on ASX's TradeMatch. From May 2013, it will reference the national best bid and offer (NBBO) (i.e. across all markets).

137 In July 2012, ASX expanded the Centre Point offering, with a block and sweep order type. The block order type enables a market participant to nominate a minimum executable value of $50,000. The sweep order type has delivered a modest increase in fill rates in Centre Point. Market participants still mainly use their own order routers to route orders to Centre Point. Orders in Centre Point are accessible to all ASX participants and usage is transparent.

138 ASX has also announced plans for a new order type ('broker preferencing'), which will allow market participants to jump ahead of other orders in the queue when they have two matching orders at the midpoint price.

139 Chi-X has a number of fully dark order types that interact with lit orders on its market. These order types include a hidden limit order and hidden pegged order type, whose price is determined by reference to the NBBO. Until mid-2012, these order types were subject to a $20,000 minimum order size requirement. Since the removal of this requirement, there has been a significant increase in the use of these order types.

140 Both ASX's Centre Point and the hidden orders on Chi-X are subject to the normal regulation for an exchange market operator, including the requirement to have transparent operating rules and for the Minister to approve those rules, and orders and trades are subject to ASIC's real-time market surveillance.

Crossing systems in the Australian market

141 Market participants have been responding to developments in technology by innovating and investing in crossing system technology. On the whole, these developments are improving the efficiency of trading for these market participants and their clients. The benefits are noted in paragraph 74, as well as the risks. This section outlines how crossing systems operate in the Australian market, and:

(a) describes what crossing systems are;

(b) notes that they are becoming more 'market-like';

(c) discusses the transparency and disclosure about crossing systems;

(d) describes the types of order flow in crossing systems, including high-frequency trading;

(e) notes that wholesale investors are exerting more control over their orders, while retail investors have limited control;

(f) outlines the key aspects of the operation of crossing systems; and

(g) summarises the monitoring of activity that currently occurs on crossing systems.

What are crossing systems?

142 Crossing systems are any automated service provided by a market participant to its clients that matches or executes client orders away from lit exchange markets. They are not pre-trade transparent and are not accessible to a large part of the market.

143 They include systems that have resting orders (often referred to as a 'dark pool') and systems that check new orders for a match with the market participant's existing orders on an exchange market. We expect much of the latter to fall away when the new trade with price improvement rule commences in May 2013. This is because it will not be possible to trade in the dark at the same price as the price displayed on a lit exchange market.

144 Crossing systems can be:

(a) a block facility—for fund managers who wish to trade in large parcels (e.g. Liquidnet);

(b) agency operated—these match client orders with other market participant orders (e.g. ITG); and

(c) single market participant operated—these typically trade either client to client, or crossing system operator (or related body corporate) as principal to client.

145 Most crossing systems have characteristics of financial markets within the meaning of s767A(1) of the Corporations Act. These types of venues are regulated as markets in some other jurisdictions (e.g. as alternative trading systems in the United States and Canada). In Australia, the Government is reviewing the market licensing regime, including the appropriate licensing of 'dark pools': see paragraphs 51–55.

146 Crossing systems are growing in number. There are currently 20 crossing systems operated by 16 market participants, up from five in 2009: see paragraphs 90–95. The growing number of crossing systems gives investors access to a greater variety of services. However, it increases fragmentation (see paragraph 99) and makes it more difficult, and potentially more costly, to find liquidity.

Crossing systems becoming more 'market-like'

147 Crossing systems are becoming even more 'market-like'. Initially, access was mostly limited to institutional clients and internal trading desks. More recently, we have seen market participants executing more retail client orders in their crossing systems: see paragraph 84(c). Six crossing system operators execute retail client orders in their crossing systems. There are also high-frequency traders, market makers, other market participants and aggregators in crossing systems.

148 An aggregator provides links between crossing systems. They receive and transmit orders from and to other crossing systems, providing clients with access to more sources of liquidity. For example, in Figure 8, crossing system F receives an order for 5,000 shares. It routes the order through an aggregator and the order is partly filled on two crossing systems—C and D. Before an order is filled, it may pass through other crossing systems (in part or full) searching for liquidity. There are at least two aggregators operated by ITG and Instinet in the Australian market. At least five further crossing system operators are connected to these aggregator services and receive orders from them. There are also a number of crossing system operators that are considering direct bilateral connections between their systems (as illustrated between crossing systems A and B in Figure 8).

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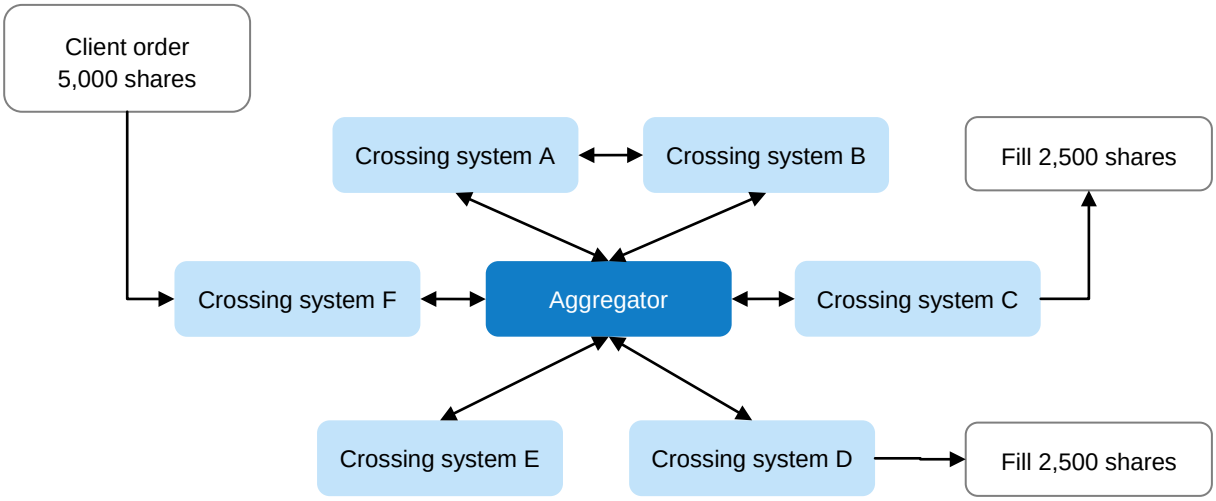
Figure 8: Examples of linkages between crossing systems



149 This means that many crossing systems are becoming multilateral and are no longer just a facility for matching their own client orders. It raises questions about what duty a crossing system operator owes, or should owe, to users of its facility and their clients. The obligation to take reasonable steps to obtain the best outcome for clients (i.e. best execution, Part 3.1 (Competition)) is a bilateral obligation and typically limited to direct clients.

150 Some industry feedback suggests that the use of aggregators may increase the risk of adverse selection and information leakage—that is, they may lead to a worse price outcome because some information about orders may be determined by others as orders pass through more venues. Furthermore, it was suggested that it is difficult for clients to control and monitor whether their instructions are being met (e.g. regarding the types of counterparties they wish to interact with) because they are one or more steps removed from the execution process. We note, however, that the two current aggregators indicated that they provide the ability for users to nominate how their orders are managed.

Transparency and disclosure about crossing systems

151 There is very little information available to the wider market (and to clients) about crossing systems, including access requirements, nature of liquidity and operation. The information that ASIC receives when a crossing system initially 'registers', and in the monthly aggregate reports (required under Part 4.3 (Competition)), is not made publicly available.

152 This means that end clients may be unaware of how their orders are being handled and executed, and listed companies may be unaware of how and where their securities are being traded.

153 There are concerns in overseas markets too about the lack of transparency about crossing systems. For instance, in the testimony before the US Senate Subcommittee Hearing on Computerized Trading, Tabb Group CEO Larry Tabb suggested that 'concrete examples of how these order types in crossing systems work, how fees/rebates are generated, where they show up in the book queue, how and when they route out to other venues and how these order types change under various market conditions' should be made public.

154 There also appears to be a deficiency in information provided by crossing system operators to their clients/users. During 2012, many fund managers issued questionnaires to the market participants that they use, to obtain information about their process, the operation of their crossing system, the nature of liquidity in the system, other parties that access the system and what functionality (if any) can be tailored to the user.

155 The lack of transparency and consistency in disclosure makes it difficult for users and potential users to identify sources of liquidity and assess execution options.

Regulatory response

156 To address this, in CP 202 (proposals C1–C4), we propose that crossing system operators:

(a) have transparent procedures about their operation (e.g. products, access criteria, order types, fees and monthly trading statistics); and

(b) make disclosures to users about execution risks, the operation of the crossing system and a user's obligations in relation to the crossing system. They should also disclose the venue on trade confirmations.

157 We also propose in CP 202 (proposal D2) to embed the existing practice of the full course-of-sales report (i.e. a record of all trades executed on an exchange market or reported to a market operator) being published three days after each transaction. This record currently includes the identity of the executing market participant, and we intend to add a requirement to identify the crossing system where the trade was matched.

Types of order flow in crossing systems (including high-frequency trading)

158 The nature of liquidity in a crossing system is important for some users. It has been suggested[20] that interaction with certain types of counterparties can affect execution quality, signal trading intentions and lead to adverse selection.

[20] For example: Credit Suisse Alpha Scorecard; and H Mittal, 'Are you playing in a toxic dark pool? A guide to information leakage', *Journal of Trading*, vol 3, Summer 2008, pp.18–20.

159 Generally, retail and institutional order flow is considered 'fundamental' or 'natural' order flow. In contrast, market making, trading by the market participant as principal and other proprietary trading are considered less desirable order flow as they may be more informed. There are examples where these traders may not trade for fundamental or valuation reasons, but trade instead based on price movements and market information gathered from other orders and trades in the market, and they may 'scalp', which involves selling almost immediately after a trade becomes profitable. This concerns some fundamental investors because it can give others an insight into their trading intentions: see paragraphs 378–380. Many fundamental investors are also concerned about the conflicts involved when a market participant trades with them as principal: see paragraphs 189–194.

160 We asked crossing system operators about the liquidity in their systems. All operators indicated that their main clients consisted of fund managers, hedge funds and other wholesale investors. As already noted, at least six crossing system operators execute retail client orders in their crossing systems. The majority indicated that they permit principal trading (or trading by associated entities) in the crossing system, although most indicated this activity was related to facilitation and/or hedging (e.g. options market making and statistical arbitrage). Facilitation is a service where the market participant or other trader acquires securities directly from its clients for its own inventory or promptly on-sells them.

161 Most crossing system operators have stated that they do not allow high-frequency trading in their crossing systems. Eight indicated they had at least one market maker/electronic liquidity provider, and at least three have proprietary desk trading: see paragraphs 189–194 on managing conflicts of interest. Our data analysis suggests that the majority do in fact have user accounts with high-frequency trading characteristics: see paragraphs 363–377. Therefore, there may have been selective or misleading disclosure to clients and to ASIC: see paragraphs 226–228.

162 Five crossing system operators provide users with the option not to interact with certain types of other users. Seven provide the option not to interact with principal order flow.

Regulatory response

163 To address our concerns, in CP 202 (proposals C1–C4) (see also paragraphs 156–157), we have proposed additional transparency and disclosure obligations for crossing system operators, including about the nature of liquidity in the crossing system.

Wholesale clients are exerting more control over order execution decisions, while retail clients have limited control

164 It used to be the case that clients accessed crossing systems through a market participant's execution algorithm rather than specifically accessing the crossing system. This is changing, and wholesale clients are beginning to exercise greater choice about where their orders are routed and how they are executed. In some cases, clients have established direct connections to a crossing system and route their orders directly to the system themselves (e.g. by controlling the algorithms they use themselves).

165 For orders that a crossing system operator has discretion over (i.e. they can determine when and how to execute the order), all but one crossing system operator routes client orders by default via its crossing system before routing it to a lit exchange market. This includes retail client orders.

166 All crossing system operators indicated that they allow clients to opt out of using the crossing system. They differed on whether this was possible on a trade-by-trade or batch basis. One crossing system operator allowed retail clients to opt out only by telephone, which attracts a substantially higher commission.

167 The best execution rules (Part 3.3 (Competition)) require market participants to disclose to clients the venues where their orders may be executed. However, the rules do not require disclosure on trade confirmations of the particular crossing system where the trade was executed. We are concerned that retail investors are not aware of how their orders are being executed and of the fact that they have a choice about this.

Regulatory response

168 We propose in CP 202 (proposal C6) that crossing system operators must provide clients with the ability to opt out of using the crossing system at no additional cost and with no additional operational or administrative requirements. We also propose (proposal C4) that the specific trading venue (exchange market or crossing system) is identified on trade confirmations, or in the case of wholesale clients, on other similar communications.

Operation of crossing systems

Order types

169 Crossing systems that allow resting liquidity (i.e. dark pools) usually offer various types of limit orders that have either a set price or can be pegged to market movements. A third of the crossing systems allow various types of aggressive orders such as market orders, sweep orders or limit orders. Other order types include fill-or-kill orders and immediate-or-cancel orders. One

crossing system scans users' order management systems, identifies possible matches and provides a negotiation facility.

Matching and price determination

170 Two-thirds of the crossing systems match orders on some form of price–time priority. Other matching logic includes time priority, size priority and prioritising client orders over principal orders.

171 Six crossing systems set their prices at the midpoint of the NBBO. Most others match orders at the midpoint of the orders entered into the crossing system, provided that this complies with the price limits of the pre-trade transparency exceptions: Part 4.2 (Competition). One operator matches aggressive and resting orders at the midpoint between the resting order's price and the next best limit price on the lit exchange markets. This operator does not permit retail orders to rest.

Controls for undesirable activity

172 The fund management community is concerned about information leakage (specifically about orders they have placed) in crossing systems.[21] To prevent resting liquidity in crossing systems from being pinged by small orders, some operators offer the option for clients to specify minimum execution sizes for their orders.

173 It appears that all crossing system operators have some sort of controls against 'gaming' and information leakage. The controls include allowing users to nominate minimum execution sizes; prohibiting the use of immediate-or-cancel orders, fill-or-kill orders and indications of interest; and randomising when order matching occurs.

Simultaneous display of orders on a lit exchange market

174 Seven crossing system operators simultaneously display on a lit exchange market at least some element of orders within the crossing system (known as 'shadowing'). While the element shown in the lit exchange market contributes to price formation, it also raises the risk of over-execution (e.g. buying or selling for the same order twice). Some crossing system operators have controls to manage this risk (e.g. waiting for confirmation that the lit order has been cancelled before matching it in the crossing system). However, these controls are not universal. This is discussed more in paragraph 250. Substantially more dark trades are cancelled than lit trades, and one possible explanation is over-execution as a result of shadowing.

[21] D Walsh, *Changing technology in capital markets: A buy side evaluation of HFT and dark trading*, commissioned research for the Financial Services Council, Baseline Capital, November 2012.

175 We anticipate that the introduction of the trade with price improvement rule in May 2013 will significantly limit the use of 'shadowing'. Trade with price improvement means that market participants will no longer be able to shadow at the same price.

Monitoring of activity on crossing systems

176 There appears to be a gap in monitoring of trading in crossing systems. ASIC does not receive or monitor orders in crossing systems and market participants are not explicitly required to monitor such trading.

177 All crossing system operators have at least some arrangements in place for monitoring and responding to undesirable conduct in their crossing system. However, they tend to monitor firm-wide activity and for commercial drivers such as system performance and execution quality, rather than for detection of misconduct. Most of the monitoring is performed on trades on a post-trade basis rather than orders in real time, with only one operator known to be implementing real-time surveillance of the crossing system.

178 The types of activity that may be going unnoticed include pinging, slowing the system through excessive order placement and engaging in inappropriate conduct on lit exchange markets to obtain an advantage in a crossing system, particularly for less liquid securities where spreads are wider or there are only one-sided prices. These activities may all be forms of market manipulation.

179 Since January 2013, market participants have been required to report suspicious activity when they become aware of such activity (Part 5.11 (ASX) and (Chi-X)). They must also consider the circumstances of an order in relation to misconduct, before submitting an order to the market (Rule 5.7.1 (ASX) and (Chi-X)). Some market participants may operate some level of monitoring in order to meet these requirements.

> Note: In this document, 'Rule 5.7.1 (ASX) and (Chi-X)', 'Part 5.11(ASX) and (Chi-X)' or 'Chapter 5 (ASX) and (Chi-X)' (for example) refer to a particular rule, part or chapter of the ASIC Market Integrity Rules (ASX) and the ASIC Market Integrity Rules (Chi-X).

180 This is in contrast to overseas jurisdictions, where alternative trading venues are typically required to have real-time monitoring arrangements in place to detect misconduct. For example, in Europe multilateral trading facilities are required to monitor conduct of market participants and compliance with the multilateral trading facility's rules. They are required to report to the regulator breaches of the operator's rules, disorderly trading conditions, and conduct that may involve market abuse.

181 In the United States and Canada, alternative trading systems are responsible for monitoring compliance with their rules. Broader market participant and market abuse monitoring is performed by industry regulatory bodies.

Regulatory response

182 In CP 202 (proposal C7), we propose that crossing system operators monitor orders and transactions in the crossing system, including for conduct that may involve market misconduct, and examine and report conduct to ASIC. We also propose (proposal C8) enhancements to the record-keeping obligations, which will facilitate this monitoring.

Systems and controls

183 Some crossing system operators are buying crossing system technology off-the-shelf without understanding the system. This is concerning because we expect all market participants to understand and be able to control their systems.

184 There is also some evidence that crossing systems may struggle during stressed market conditions. All crossing system operators have indicated that they have processes in place for managing market conditions that may result in system outages. However, there are some deficiencies in the ability of many to inform clients of the problem, route orders to other venues or operate a back-up system.

185 As crossing systems grow in number and prominence, and become more systemically important, it will be important that they have adequate technological resources and arrangements for ensuring continuity of operations. Alternative trading systems in the United States and Canada are required to have such arrangements.

186 We note that most crossing systems are subject to the automated order processing rules in Chapter 5 (ASX) and (Chi-X), which require market participants to have knowledge of their systems and of messages submitted by those systems. However, there is at least one crossing system operator that is not subject to these requirements, leaving a gap in the regulatory framework for such systems.

Regulatory response

187 We propose in CP 202 (proposal C9) that the system and control requirements that currently apply to automated order processing extend to all crossing systems. We also propose that crossing system operators must notify users and ASIC about system issues.

Section B3: Other aspects of off-market trading

188 In this section, we outline a number of other issues associated with off-market trading. We discuss:

(a) the conflicts of interest that may arise;

(b) internalisation and facilitation;

(c) payment for order flow;

(d) indications of interest; and

(e) settlement risk.

Conflicts of interest

189 A conflict of interest arises when the interests of a market participant diverge from those of its client. Conflicts may arise when a market participant is acting as agent for a client, but particularly when trading with clients against its own account (known as internalisation).

190 Conflicts of interest become more acute when there are information asymmetries between the market participant and the client. For example, when a market participant receives an order from a client, it obtains an informational advantage over other market participants and investors because it has private information about the client's trading intentions. The market participant must ensure that it does not use this information to its own advantage, or to the advantage of another client.

191 If these conflicts are not managed appropriately, there is a risk that the market participant (or other clients) could extract profits from clients placing comparatively uninformed orders in its off-market trading, called 'cream skimming'.

192 The obligation to manage conflicts of interests that might compromise a client's interests is set out in the Corporations Act for AFS licensees (including crossing system operators) to do all things necessary to ensure that the financial services covered by their AFS licence are provided efficiently, honestly and fairly. They are also required to have in place adequate arrangements for the management of conflicts of interest: s912A of the Corporations Act. Currently, these provisions do not have associated guidance specific to internalisation and the operation of crossing systems.

193 This is in contrast to the situation in the United States, Canada and the United Kingdom, which have comparatively more prescriptive regulations in place to mitigate the risks of conflicts of interest arising from securities dealing.

Regulatory response

194 See paragraphs 233–235 for examples of conflicts of interest we have seen in the Australian market. In CP 202 (proposal D3), we propose to enhance the conflicts of interest obligations for crossing system operators (e.g. protect client information when outsourcing services, market participants to give client orders priority when trading as principal).

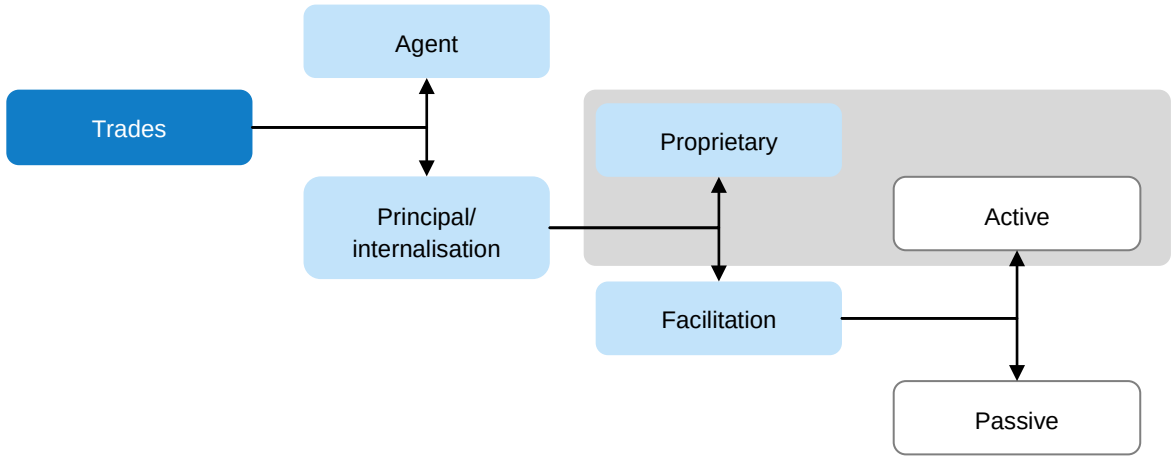
Internalisation and facilitation

195 It is common in the Australian market for many of the larger market participants to internalise their trading with clients. As indicated in Table 3, market participants are incentivised to internalise or match orders, including in their crossing systems, as it can reduce their transaction costs (through lower execution and reporting fees). These savings are a net benefit to the market participant because they are rarely, if ever, passed on to clients.

196 Over the period from 1 January to 30 June 2012, about 30% of total trading (by value) on crossing systems was trading by crossing system operators with clients against the operator's own account.[22]

197 Figure 9 provides a breakdown of the types of trading that is conducted by some market participants. For example, trades are generally separated into those where a market participant acts as agent for a client and those where the market participant trades with clients against its own account (known as 'internalisation'). Internalisation includes proprietary trading (i.e. when a market participant uses its own capital to actively trade for profit) and client facilitation. Facilitation can be passive (i.e. responding to a client's request to trade) or active (i.e. seeking out clients to trade against existing inventory). Active facilitation is at times difficult to distinguish from proprietary trading.

Figure 9: Types of trading conducted by some market participants



198 Statistics obtained from 13 of the largest market participants show that client facilitation makes up about 10–15% of total turnover for these market participants. Client facilitation is conducted by 10 of the 13 market participants, with nine engaged in active facilitation to some degree. One

[22] This figure would be higher if it included associated entities trading on their own account in the crossing system.

market participant advised that active facilitation could account for up to 50% of their total facilitation, by value.

199 Facilitation can provide advantages to the client such as liquidity and certainty of execution. Market participants that conduct facilitation typically take on some risk at the point of execution, but hedge their risk by taking an offsetting position in either the lit or dark markets depending on market conditions. For active facilitation, this risk is hedged before taking on the facilitation trade.

200 Market participants advised us that the primary motive of facilitation is to provide a service to the client and that it does not generally generate profits. However, facilitation provides other benefits to market participants—for example, reporting both legs of client facilitation can increase trading volumes and market share compared to agency-only business. Market share statistics do not distinguish between agency and facilitation volumes and may be used to promote other profit-making business areas, such as capital raisings.

201 Also, many market participants offset their facilitation positions into their own crossing systems and interact with other clients, raising conflicts of interest. Routing order flow to the crossing system will increase trading volumes and market share in the crossing system, which may in turn attract more liquidity. Over the period from 1 January 2012 to 30 June 2012, 13 market participants estimated that they unwound on average about 40% (by value) of total facilitation on the lit exchange markets, leaving about 60% to be unwound off market.

202 As a backdrop to these proposals, the 'Volcker rule' is expected to be implemented in the United States during 2013. This will affect the way in which deposit-taking institutions with operations in the United States, and their affiliates and subsidiaries operating in other jurisdictions (i.e. Australia), can conduct proprietary trading and may affect the way in which facilitation is carried out. We expect this to affect at least some of the larger market participants in the Australian market. However, the final rules are yet to be determined and their final impact is uncertain at this stage.

Regulatory response

203 See paragraph 194 for our response to issues with conflicts of interest.

Payment for order flow

204 Payment for order flow was introduced in the US equities market in the 1980s. It is an arrangement whereby a market participant or other trader receives a payment from another securities dealer, in exchange for sending its clients' order flow to them. These payments are designed to influence how and where securities dealers direct client orders for execution, and can

apply to all types of order flow. The effect of these payments is that the referring securities dealer receives some of the execution profits. The incentives can take various forms, including:

(a) direct cash payment, such as a direct payment per order or rebates for certain types of orders, or providing execution services that are below the cost of providing that service; and

(b) soft dollar incentives, such as technology offerings (trading software) or bundling services (where a market participant may provide other services, such as advice, research, data and analytical tools, in conjunction with trade execution), payment of a securities dealer's settlement fees, or volume discounts.

205 Securities dealers have a strong incentive to route orders to market participants that provide the best incentives. However, directing orders in return for some benefit represents a conflict of interest if a securities dealer places its own interests ahead of its clients' interests. It also compromises best execution because it may result in a client receiving a worse outcome: see paragraph 208.

Overseas regulation

Canada

206 In Canada, market participants are prohibited from making direct cash payments to each other. However, soft dollar incentives are allowed where the goods or services received are used to assist with investment and trading decisions on behalf of clients, and a 'good faith' determination that the client receives a reasonable benefit.

United States

207 Payment for order flow is very common and highly competitive in the United States. In the first quarter of 2012, up to US0.32 cents per 100 shares was being paid for order flow. Rosenblatt Securities states that order flow is strongly biased towards broker–dealers (the term used in the United States) that provide payments. Also, almost 100% of retail order flow is routed through dark venues before being routed to the lit exchange markets, with 65–75% of all retail order flow routed to wholesale broker–dealers that pay for order flow.[23] The US Securities and Exchange Commission regulates payment for order flow by requiring broker–dealers to disclose particular elements of the arrangement to clients on opening a new account, on trade confirmations, in quarterly reports, and on request by a client.

[23] From Rosenblatt Securities Inc, who was contracted by ASIC to provide research in 2012.

United Kingdom

208 Payment for order flow is becoming more common in the United Kingdom and the Financial Services Authority (FSA) has noted it as a serious concern.[24] The FSA has stated that '…it is difficult to see any advantage in the [payment for order flow] arrangements for the end client', inferring that it may actually result in the client receiving a worse overall outcome. For example, where payments are made to attract orders that would not otherwise be obtained, the client may receive a price that is disadvantageous, which 'is similar to the client being charged an extra commission although it is hidden in the form of a poorer price'.

209 The FSA also states that 'it is easy to see how such arrangements would give rise to a significant conflict of interest that, if not satisfactorily managed, could lead to client detriment through breaches of our conflicts of interest, inducements and best execution rules'.

210 Also, during consultation by the FSA, some market makers acknowledged that these payments resulted in worse prices and that clients had been disadvantaged as a result. Investment firms (the term used in the United Kingdom), on the other hand, stated that the payments they receive reflect the service they provide to market makers.

211 The FSA issued final guidance in May 2012, which places increased emphasis on an investment firm's obligation to monitor and review its arrangements for managing its conflicts of interest and ensuring it acts in the client's best interests.[25] This builds on existing rules on 'inducements', which aim to ensure that, where an incentive (such as payment for order flow) is used, a firm acts in the best interests of the clients; payments made and received are disclosed in a comprehensive, accurate and understandable way; and the incentive is designed to enhance the quality of the service to the client.

Payment for order flow in Australia

212 Although direct cash payments for order flow are not prominent in the Australian market, they are used to a limited extent. Some market participants' terms of business contain clauses that allow for this type of payment. Soft dollar incentives are much more prevalent in the Australian market and can take a variety of forms.

Regulatory response

213 In RG 223, we note that directing orders in return for some benefit does represent a conflict of interest. In CP 202 (proposal D4), we propose to build

[24] FSA, *Proposed guidance on the practice of 'Payment for order flow'*, October 2011.
[25] FSA, *Guidance on the practice of 'Payment for order flow'*, May 2012.

on this by expressly prohibiting direct cash payments and putting controls around soft dollar incentives. This is consistent with the Future of Financial Advice (FOFA) reforms.

Indications of interest

214 In general, an indication of interest (IOI) is a non-binding electronic expression of trading interest that may contain information such as the security name, capacity (agency or principal), volume and price instructions. An IOI is a mechanism to identify potential counterparties, typically seeking to execute large volumes on behalf of wholesale clients. IOIs have been used reasonably widely in Australia and in other jurisdictions, including the United States and the European Union. IOIs are not usually disseminated through an exchange market, but rather through a fund manager's or market participant's own systems to selected clients or by means of a third-party service provider.

215 Traditionally, the use of IOIs in Australia is more widespread outside of crossing systems. For example, platforms such as IRESS IOS+ and Bloomberg may allow IOIs from fund managers and market participants.

216 The use of IOIs in crossing systems in Australia appears to be limited, although at least one has IOIs. It is more commonplace in overseas markets to have IOIs in crossing systems.

217 IOIs are not formally regulated in Australia. There is a lack of transparency and consistency in the use of, and accessibility to, information contained in IOIs, which raises a number of potential regulatory concerns:

(a) selective disclosure and accessibility to IOIs is problematic, especially for less liquid securities, for which indications of some trading interests may be price sensitive;

(b) IOIs may give rise to conflicts of interest. For example, market participants that conduct principal and client trading may misrepresent the nature of the liquidity to attract liquidity (e.g. genuine natural client order flows versus proprietary interests), which in turn attracts more liquidity and boosts market share of trading volumes;

(c) IOIs may be misused to generate a misleading appearance of intention to trade; and

(d) platforms for IOIs generally lack appropriate licensing and regulation. Fund managers may be able to submit IOIs to the third-party platforms directly, circumventing market participants (and therefore the regulatory obligations that apply to market participants).

218 The use of IOIs may result in information leakage for clients with genuine trading intentions, which can result in a worse outcome for the client. For

example, recipients may trade ahead of the person issuing the IOI leading to an adverse price movement. Furthermore, they may not be backed by genuine client or principal liquidity, and instead aimed to gather information on trading interests through the responses received to the IOIs. This raises questions about whether the client's best interests are being served through the use of IOIs and whether clients should provide specific consent before communication of their trading intentions through an IOI.

Regulatory response

219 To determine what, if any, regulatory response is necessary, we have asked a number of questions in CP 202 (issue D5). We will then determine whether a further regulatory response is warranted.

Settlement risk

220 There are differences in settlement protections for on-market and off-market trades. Transactions that are matched on an exchange market are novated (i.e. the risk is transferred) to the clearing and settlement facility and scheduled for settlement (usually three days later). The individual on-market transactions are netted by the clearing and settlement facility the day after the transaction and only the residual non-netted amounts remain novated and protected against counterparty default. This means that settlement of the netted amounts is the responsibility of the market participant (and the respective clearing participant they use). There is a reliance on market participants to fulfil their clients' transactions, and for clients to fulfil their commitments to market participants.

221 For transactions that are crossed off market, there is no novation or scheduling for settlement. The market participant is responsible for ensuring the transaction is settled. Each underlying client to a transaction is not exposed to the default risk of the other underlying client(s). The clearing house has no role to play, so the capital position of the market participant is important. This means that if a client defaults, it is the market participant that must fill the order and not the underlying client on the other side of the transaction.

222 We found that market participants tend to have the same process for settling trades done off market (including via a crossing system) as for netted on-market trades. Most market participants have standard clauses in their terms of business outlining client responsibilities and the market participant's right to take any necessary steps to meet its settlement obligations. Market participants tend to manage their settlement risk through know-your-client assessments, setting of trading limits and imposing access restrictions.

Section B4: Conduct in off-market trading

223 We have looked closely at activity occurring off market. For the most part, market participants appear to be complying with the obligations in the Market Integrity Rules related to off-market trading and dealing with clients. However, we have identified some issues. This section summarises some of these issues. They relate to:

(a) disclosures made to clients and to ASIC about crossing systems;

(b) preferential order types in crossing systems;

(c) conflicts of interest with off-market trading;

(d) charging commission for principal trading;

(e) crossing systems matching at invalid prices;

(f) leakage of information about client orders;

(g) representations about the regulation of crossing systems;

(h) trades relying on the 'at or within the spread' exception;

(i) cancellation of off-market trades; and

(j) crossing system report errors.

224 We are already seeing changes in market participant behaviour as a result of our inquiries. We continue to work with the relevant market participants on these issues. Some matters have been referred for further investigation to our Enforcement teams.

225 We encourage market participants to examine these issues closely in the context of their own business and to take the necessary steps to rectify these and any similar issues. We remind market participants of their obligations to self-report material breaches under s912D of the Corporations Act.

Disclosure to clients

226 We are concerned about statements we have seen made to clients and to ASIC in relation to the nature of the liquidity in a crossing system or in relation to orders that can interact with other orders in a crossing system:

(a) Many crossing system operators have described their crossing system(s) to fund manager clients and to us as providing 'natural liquidity' or as having no high-frequency trading. Yet there are cases where there appears to be active facilitation, proprietary trading or high-frequency trading interacting with client orders. Some crossing system operators allow, or have previously allowed, access to their crossing systems by clients that the industry widely considers to be high-frequency traders while maintaining there is no high-frequency trading in their crossing system.

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(b) Many crossing system operators are not disclosing where there is a market maker operating within their crossing system (or outside the crossing system but that interacts with orders after they have passed through the crossing system and before they reach the lit exchange market). For three market participants, at least, the market maker is the crossing system operator trading on its own behalf or that of a related body corporate.

227 There have been failures in disclosure on trade confirmations. Market participants dealing with retail clients are required to disclose on each trade confirmation when they have:

(a) dealt as principal for a trade. This includes a related body corporate of the market participant (Rule 3.2.3 (ASX) and (Chi-X)) and s1017F of the Corporations Act as modified by reg 7.9.63B(4)); or

(b) crossed a trade (Rule 3.4.1(3)(g) (ASX) and (Chi-X)).

228 The types of failures we have seen include failure to make any disclosure at all, as well as inadequate disclosures that are general, ambiguous and not specific to the trade. This is an important disclosure for retail investors enabling them to assess a market participant's potential conflicts of interest and the manner in which their orders are executed. We are investigating instances of non-compliance.

Regulatory response

229 See paragraphs 156–157 for our response to issues with transparency and disclosure about crossing systems.

International case study: Pipeline

In October 2011 the US Securities Exchange Commission charged Pipeline Trading Systems LLC US$1 million for making false and misleading statements. Pipeline described the liquidity in its system as 'natural liquidity', even though an associated entity filled the majority of client orders. Further, the associated entity sought to predict the trading intentions of Pipeline's customers and trade elsewhere in the same direction as clients before filling their orders in Pipeline's system. Pipeline also represented that all users were treated equally but it provided its associated entity with a different fee structure and other advantages, including access to information about the operations of the crossing system and to data connections that made it easier to track activity in the system.

Preferential order types

230 It appears that one or more crossing system operators may be offering specific order types to an exclusive subset of their clients and advising these clients how to benefit from these order types (based on the nature of other

liquidity in the crossing system)—for example, advising these exclusive clients on how to capture more of the spread from other clients' aggressive market orders. These order types include orders pegged to market movements.

231 We consider this behaviour to be at odds with a market participant's obligation to provide financial services efficiently, honestly and fairly: s912A(1)(a) of the Corporations Act.

Regulatory response

232 To address these concerns, and to build on the existing obligations in s912A(1)(a) of the Corporations Act, we have proposed in CP 202 (proposal C5) that crossing system operators must not unfairly discriminate between users.

Conflicts of interest

233 We have concerns with how some market participants are managing their conflicts of interest, particularly when they are also conducting principal trading.

234 There are some instances where other parts of a market participant's business may be gaining an insight into the orders in a crossing system and therefore an advantage over other users. For example, in some instances:

(a) staff have visibility of some or all orders in a crossing system, beyond those they are managing themselves;

(b) other business areas are receiving information sooner than the rest of the market or more granular information; and

(c) there appears to be insufficient physical separation between functions (e.g. between proprietary or facilitation desks and persons overseeing the crossing system(s)).

235 We consider that market participants could improve the following:

(a) physical, electronic and entity segregation of agency, client facilitation and proprietary trading;

(b) restricting the visibility of confidential order information in the crossing system to an 'as needs basis';

(c) disclosure of potential conflicts and providing clients with the option not to interact with principal orders;

(d) internal policies on managing conflicts of interest, including staff trading, information barriers, the allocation of aggregated trades and trading desk mandates (which stipulate what types of trading can be undertaken for particular desks); and

(e) policies on client order priority, such as giving client orders time priority over all principal orders, and not interposing principal trades between otherwise crossable client orders.

Regulatory response

236 See paragraph 194 for our response to issues with conflicts of interest.

Charging commission for principal trading

237 There appear to be instances where retail clients have been charged commission where a market participant has traded with them as principal.

Regulatory response

238 We remind market participants of their obligations under Rule 3.2.4 (ASX) and (Chi-X) that they are not permitted to charge commission in these circumstances. We propose to amend Rule 3.2.4 (ASX) and (Chi-X) to clarify, for the avoidance of doubt, that 'principal' in this context is to apply to trading on a market participant's own behalf, which includes trading for a related body corporate (except where a market participant is dealing as a trustee of a trust in which the market participant has no direct or indirect interest).

Crossing systems matching at invalid prices

239 Rule 4.2.3 (Competition) 'trade at or within the spread' (as amended to 'trade with price improvement' from 26 May 2013) states that the exception to pre-trade transparency only applies to off-market trading where a transaction is entered into at a price that is a valid price step (i.e. tick size) or at the midpoint of the NBBO.

240 A number of crossing systems appear to be matching orders at prices other than a valid tick size or the midpoint. The crossing system operator is then reporting the transaction as two or more transactions to achieve the desired crossing price (e.g. reporting one at a lower price step and the other at a higher price step).

241 We consider that Rule 4.2.3 (Competition) prohibits a crossing system operator from allowing orders to enter its crossing system, or for the crossing system to match orders, at a price other than a valid tick size or the midpoint. It is also the case for other off-market trading that occurs outside of a crossing system that orders must not match at a price other than a valid tick size or the midpoint. This does not preclude a market participant from allocating an average price (e.g. volume weighted average price) to a client at the end of the day.

Information leakage

242 Some market participants have made representations that they have controls in place to limit information leakage from their crossing systems. This responds to concerns by many fund managers that information about their trading intentions may become apparent to others.

243 However, we are seeing many examples where some users of crossing systems trade in a crossing system and then immediately offload the same volume of the security into a lit exchange market. These users exhibit high-frequency trading characteristics (as described in paragraphs 23–27). The entry of these trades into the lit exchange market can occur through the same market participant that operates the crossing system or through another market participant. This activity may provide a 'signal' to the market that a fundamental investor is on either the buy-side or sell-side and potentially that there is an ongoing intention to trade. There are some cases where, overall, clients would actually have received a better outcome had they traded on a lit exchange market.

ASIC expectations

244 Market participants that claim that their crossing system provides a safe harbour from high-frequency trading, or that they are a venue for 'natural liquidity' or to minimise information leakage, may need to consider monitoring for information leakage to the lit exchange market. They should also consider what this means for delivering best execution to the clients that are on the opposite side of this activity.

International case study: eBX LLC

In October 2012, the US Securities and Exchange Commission charged crossing system operator eBX LLC US$800,000 for failing to protect the confidential trading information of its users and failing to disclose to users that it allowed an outside firm to use their confidential trading information. eBX allowed a technology firm to use the orders in the crossing system to inform its own order routing business. eBX had insufficient safeguards and procedures to protect users' confidential trading information.

Representations about crossing system regulation

245 Representations have been made to clients and others about the regulation of crossing systems. Crossing systems are not currently licensed as markets and they are not subject to the same regulation as an Australian market licensee. Hence, it is not appropriate to make representations that give the impression of market-like regulation. For example, compliance with the automated order processing rules (Part 5.6 (ASX) and (Chi-X)) or crossing system reporting (Part 4.3 (Competition)) is not the same as regulation as a market. Clients

may perceive such representations as the crossing system being regulated as a market.

'At or within the spread' (also known as NBBO) trades

246 Market participants often rely on Rule 4.2.3 (Competition) to trade off market. It currently requires trades to be done:

(a) at a price equal to the best available bid or offer across all lit exchange markets (known as the NBBO); or

(b) within the best bid and offer by one price step (tick size) or at the midpoint of the best bid and offer.

247 These trades must be reported to a market operator immediately.

248 While the vast majority of market participants appear to have complied with this obligation, there have been some issues, including:

(a) market participants reporting trades at prices other than valid tick sizes or valid midpoints (e.g. $4.9899); and

(b) market participants reporting trades at prices that are outside the NBBO at the time they are received by a market operator. In some cases, this is a result of market participants being slow to report (we found some instances of trades reported over 30 seconds late).

249 To assess the extent of slow reporting, we compared the prices of all NBBO trades against the price at the time the trade was received and the recent best prices. Allowing 100 milliseconds for latency, over the first four months of 2012 there were 800 instances of trade prices outside the NBBO. Over the three-month period from July to September 2012:

(a) there were 14,381 instances;

(b) four market participants were responsible for 97% of instances; and

(c) a few market participants reported trades with prices outside the NBBO more than 1.5% of the time.

Disproportionate cancellation of off-market trades

250 The proportion of cancellations for off-market trades is significantly higher than those occurring on the lit exchange markets. Some market participants are cancelling between three and six times more off-market trades. Given that the mechanics of off-market orders are fully within the control of the market participants, it is surprising that such a large component of these orders result in cancelled trades. This may indicate that there is a difference in the quality or standard applied to trades by crossing system operators or that these cancellations may be symptomatic of insufficient controls: see also paragraphs 174–175.

Crossing system reporting errors

251 A crossing system operator is required under Part 4.3 (Competition) to lodge an initial report with ASIC describing the nature of its crossing system(s), including access to the system (e.g. criteria for determining persons eligible to use the system and whether the crossing system transmits orders to other crossing systems), and how transactions are executed. They are then required on a monthly basis to report any changes to the initial report as well as aggregate statistics on the activity in their crossing system(s).

252 A number of crossing system operators have failed to notify us of changes to their crossing system(s). For example, where:

(a) new types of users access the crossing system(s);

(b) the crossing system operator starts receiving or transmitting orders to another crossing system through an aggregator or a direct connection. Market participants also need to consider whether such connections constitute a linkage of computer facilities for the purpose of Rule 5.2.1 (ASX) and (Chi-X); and

(c) the trade execution and reporting process has changed as a result of switching between ASX priority crossings and NBBO crossings.

253 There have been errors in the aggregate reports, including under-reporting and misrepresenting principal trading.

ASIC's expectations

254 We remind market participants that when there are changes to crossing systems or the reporting processes that may result in a change to any of the factors in Rule 4.3.1(1) (Competition), market participants should consider the ramifications for their reporting obligations.

C High-frequency trading and related issues

Key points

We analysed all trading on Australian equity markets over a nine-month period in 2012 to determine the nature, extent and impact of high-frequency trading.

We found that many of the attributes associated with high-frequency trading, such as high order-to-trade ratios and short resting times, are also found in other algorithmic trading, such as execution algorithms used by the buy-side.

We found that high-frequency trading in Australia is dominated by a small group of trading entities, with the 20 largest high-frequency trading entities accounting for approximately 80% of all high-frequency trading turnover (or 22% of total equity market turnover).

Through our analysis and market surveillance work, we have found some problematic behaviours and continued instances of market disorder. These are more strongly associated with algorithmic trading, generally, than exclusively with high-frequency trading.

We have taken steps to address these issues with the trading entities involved. Outcomes include changed behaviour, reprogramming or disabling of trading algorithms and generally heightened governance across the industry.

Purpose

255 This section outlines the high-frequency trading taskforce's findings. It:

(a) discusses the characteristics and presence of high-frequency and automated trading in the Australian equity market (paragraphs 265–319);

(b) addresses the common negative perceptions about high-frequency traders and their conduct (paragraphs 320–401); and

(c) considers two issues that are associated with, though not exclusive to, high-frequency trading (paragraphs 402–415).

Context

256 High-frequency trading is best defined as trading that correlates strongly to a set of specific attributes: see paragraphs 23–27. Some of the attributes of high-frequency trading are also seen in trading by others who are not generally thought of as high-frequency traders, and observations and

complaints about high-frequency trading and traders often relate to a trading attribute that is shared by many market traders.

257 As a result, we saw a need to objectively analyse the role and impact of high-frequency trading on Australian markets and to test the validity of public perceptions and industry complaints about high-frequency trading and high-frequency traders.

258 On that basis, we can better determine whether any regulatory responses are required and, if so, how they should be framed.

Our approach

259 To determine the nature, scale and impact of high-frequency trading on Australian equity markets, we conducted an analysis of trading on equity markets over the nine-month period from January to September 2012 with additional statistical analysis undertaken on data for the period from May to July. Our findings and conclusions are presented in *Section C1: Analysis of high-frequency trading in Australian equity markets*.

260 Section C1 also presents our findings on the trading entities engaged in high-frequency trading, based on the same nine-month survey period.

261 We also used the information available from our trading analysis and ongoing market surveillance work to examine common perceptions and industry complaints about high-frequency trading and traders: *Section C2: Perceptions of high-frequency trading—Our analysis*.

262 We discuss and analyse each of these, drawing on findings from our study, where applicable, as well as on ASIC's market surveillance and enforcement work. Where appropriate, we also make reference to overseas research and findings.

263 Issues that require a regulatory response are identified and discussed, and our proposed regulatory response is set out in the accompanying CP 202.

264 *Section C3: Related issues* outlines ASIC's position on two issues that are associated with, though not exclusive to, high-frequency trading: market making, and proprietary trading firms who access the Australian markets directly as participants.

Section C1: Analysis of high-frequency trading in Australian equity markets

265 To determine the nature and extent of high-frequency trading in Australia, we analysed trading data for Australian equity markets over the period from 1 January to 30 September 2012.

266 Unless specifically noted, the analysis is based on trading of equity securities within the S&P/ASX 200. The S&P/ASX 200 was chosen because it represents 95% of total equity turnover, and includes the most liquid securities.

267 Our analysis is based on trading across lit exchange markets and dark trading venues in equity market products and does not cover trading in other asset classes, such as futures.

268 Some researchers have relied on exchanges to identify high-frequency trading within their data[26]—others have analysed order book behaviour to infer its existence and measure its effect.[27]

269 ASIC's approach has been to group trading messages into well-defined sets, based on the broker reference code and account, supplemented by other market intelligence. For the purpose of this study, these groupings are referred to as 'traders'.

270 Concurrently, we identified a number of measures that could be consistently and objectively measured and that relate strongly to the characteristic attributes of high-frequency trading: see paragraphs 23–26.

271 The measures selected were:

(a) order-to-trade ratios;

(b) percentage of turnover traded within the day;

(c) total turnover per day;

(d) the number of fast messages;

(e) holding times; and

(f) at-best ratios.

272 The metrics used and the rationale for selecting these metrics is set out in the appendix.

273 We collated the data on each of these metrics for all traders for each trading day.

274 For each day's trading data, we filtered out the outliers and scored all traders based on their performance against these metrics. From this index the highest-scoring 15% of traders were designated as 'high-frequency traders' for that trading day. We did not analyse traders' trading strategies in order to designate them as high-frequency traders for the purpose of our analysis. This designation was based purely on the trader's score against all the chosen metrics. The process is described in detail in the appendix.

[26] J Brogaard, T Hendershott and R Riordan, *High frequency trading and price discovery*, working paper, 30 July 2012.
[27] J Hasbrouck and G Saar, *Low-latency trading*, working paper, December 2012.

Our findings—High-frequency trading

275 We analysed the trading behaviour of the high-frequency traders against that of other traders on the market, using each of the measures listed in paragraph 271.

Order-to-trade ratios

276 An order-to-trade ratio is generally described as the number of times orders submitted into an order book are amended or cancelled relative to the execution of a trade.

277 High order-to-trade ratios mean that there are large numbers of trade messages being generated, increasing the already large amounts of data that market participants, market operators and ASIC need to store and manage for order records, best execution analysis, surveillance and compliance purposes. The costs of processing and storing the increased amount of data, and ensuring that systems have the necessary capacity, can increase trading costs for all traders.

278 Our analysis confirms that high-frequency traders do, on average, operate with higher order-to-trade ratios. However, this ratio fell substantially in February 2012 and trended downwards over the rest of the period analysed. The initial fall in order-to-trade ratios for high-frequency traders coincides with the implementation of Treasury's cost recovery program which, for market participants, commenced on 1 January 2012.

Table 10: Order-to-trade ratios

	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	June 2012	July 2012	Aug 2012	Sept 2012
High-frequency traders	32.1	15.1	17.0	17.8	19.1	17.0	13.7	10.9	13.7
All other traders	5.2	5.4	4.4	4.6	4.6	4.6	4.5	3.9	4.1

Note: Our analysis is based on data from our surveillance systems. These systems capture dark orders quoted on ASX's Centre Point and Chi-X 'hidden orders', but do not capture orders on crossing systems. As a result, where traders sought liquidity on crossing systems, their actual order-to-trade ratios will be higher than our data indicates.

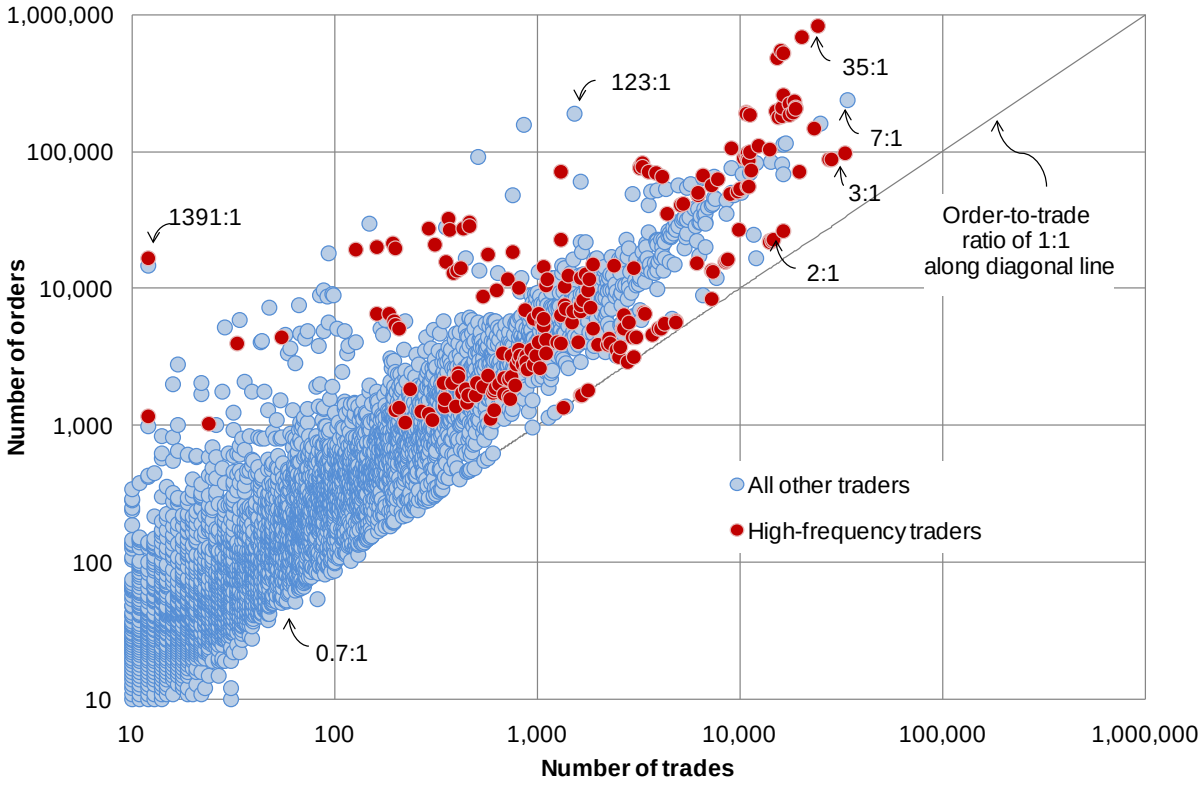
279 Order-to-trade ratios will vary across securities and market operators based on the liquidity and natural order flow. For example, order-to-trade ratios on Chi-X are approximately 80% higher than on ASX.

280 We analysed order-to-trade ratios over a three-month period, from May to July 2012.

281 Figure 10 provides a detailed view of trading during one week of that period. It illustrates, as a scatter plot, the ratios of orders to trades for both high-frequency traders and all other traders across a large number of securities.

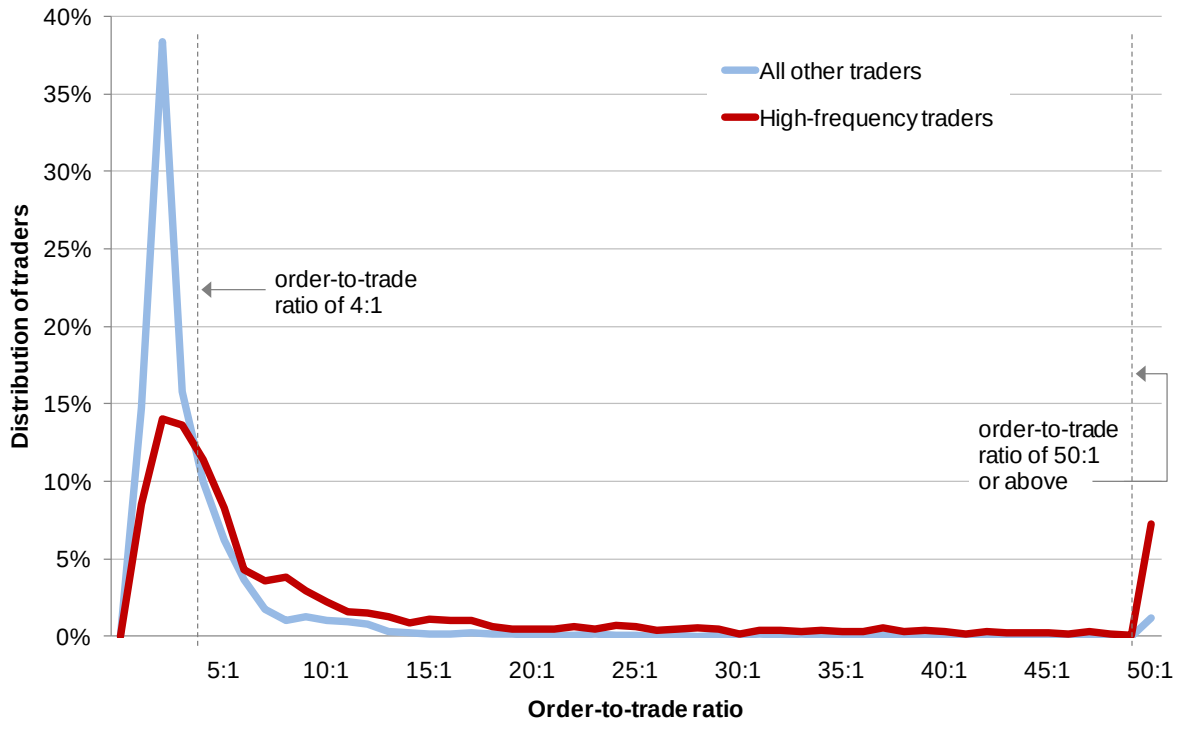
282 Ratios are calculated by dividing the number of orders by the number of trades, so that a constant order-to-trade ratio will run in a diagonal line across the chart.

Figure 10: Order-to-trade ratios, by account—2 to 6 July 2012



283 Figure 11 shows the distribution of order-to-trade ratios for high-frequency traders and other traders over the entire three-month period.

Figure 11: Order-to-trade ratios, by distribution of traders—May to July 2012



284 The high-frequency traders tended to have higher volumes of orders and trades than other traders, but the pattern of distribution for order-to-trade ratios is similar for both high-frequency traders and all other traders. Most traders, whether high-frequency traders or not, had order-to-trade ratios below 4:1.[28]

285 However, a small number of traders do operate with large order-to-trade ratios. Clusters of traders appear in the range of 200:1 to 100:1. Occasionally, some traders will operate with ratios in excess of 1,000:1. As displayed in Figure 11, approximately 7% of all high-frequency traders, and 1% of all other traders, operated with an order-to-trade ratio in excess of 50:1.

286 High order-to-trade ratios in liquid securities suggest inefficient or ambit pricing (pricing away from the current market price). The excessive amendment of orders has the potential to undermine investor confidence in the market, because investors may question the credibility of quoted liquidity. The 7% of high-frequency traders with order-to-trade ratios above 50:1 contributed to less than 1% of market turnover.

287 We have seen that the order-to-trade ratios of high-frequency traders have lowered. We have recently focused on working with market participants whose own algorithms, or their client's algorithms, are exhibiting high ratios. These market participants have responded positively by reprogramming or decommissioning the identified algorithms.

Overseas comparisons

288 There is limited data available on order-to-trade ratios on exchange markets overseas, but what data there is indicates that the ratios on Australian markets are relatively low. For example, the average order-to-trade ratio on Canada's main exchange market, the Toronto Stock Exchange, was more than 50:1 at the start of 2011, having increased from a little over 10:1 in 2005.[29]

Percentage of turnover traded within the day

289 The attribute that most clearly characterises high-frequency trading and differentiates it from other trading is the percentage of turnover bought and then sold, or sold and then bought, within each trading day. High-frequency traders tend to close out a high proportion of trading intraday, so their overnight positions are relatively small. This metric distinguishes high-

[28] Order-to-trade ratios of below 1:1 were observed. In these cases, trade reports arising from crossings or dark pools contributed to the trade count. A small number of the traders with order-to-trade ratios of below 1:1 were high-frequency traders.
[29] W Barker and A Pomeranets, *The growth of high-frequency trading: Implications for financial stability*, Bank of Canada, 30 June 2011, www.bankofcanada.ca/2012/01/fsr-article/the-growth-of-high-frequency-trading/.

frequency trading from the more widespread execution algorithms which trade in only one direction during a day.

290 Our analysis indicates that approximately 65% of all high-frequency trading is closed out within the day and that, at most, 35% is held overnight.

291 Our analysis did not capture any hedging undertaken by external accounts or other trading in derivative securities, so it is likely that our estimate of 35% of positions being held overnight is an overestimate. However, these statistics do give an indication of the level of pure intraday trading.

Total turnover per day

292 Table 11 shows that, in the nine-month period analysed, the traders we designated as high-frequency traders accounted for 27% of total turnover in S&P/ASX 200 securities. These traders accounted for a slightly higher proportion of total trades (32%) and a much larger proportion of total orders (46%), consistent with the finding that high-frequency traders generally have higher order-to-trade ratios.

293 Combined with our finding that approximately 65% of high-frequency trading is traded on a purely intraday basis, this means that *at least* 18%[30] of all equity market turnover in S&P/ASX 200 securities is traded on a purely intraday basis.

Table 11: Relative share of trading—May to July 2012

Indicator	High-frequency traders	All other traders
Percentage of traders	< 0.1%	> 99.9%
Percentage of total turnover by value	27%	73%
Percentage of total trades	32%	68%
Percentage of total orders (new, amended and deleted)	46%	54%

294 A very small number of traders accounted for most of the high-frequency trading turnover, and a substantial proportion of total trading turnover. The 10 largest high-frequency traders were responsible for approximately 60% of all high-frequency trading turnover (or 16% of total market turnover). The top 20 accounted for approximately 80% of all high-frequency trading turnover (or 22% of total market turnover).

295 By contrast, the bottom 66% of high-frequency traders accounted, collectively, for only 1% of all high-frequency trading turnover.

[30] This figure represents 65% of the 27% of total market turnover attributable to high-frequency traders.

296 Traders other than high-frequency traders accounted for 54% of all orders. This is consistent with our other findings that show market participants' own algorithms exhibit attributes similar to those of high-frequency traders.

Overseas comparisons

297 The relative share of high-frequency trading in Australia remains modest compared with some other major markets.

298 Tabb Group estimates that in the United States high-frequency trading increased from around 21% of turnover (by volume) in 2005 to 61% in 2009—however, its share has since declined to just over 50% in 2012.

299 Tabb Group estimates that in Europe high-frequency trading has experienced similar growth in market share (by value), although from the lower base of 1% in 2005, to 38% in 2010. In 2012 high-frequency trading represented approximately 36% of European turnover—a similar decline to that experienced in the United States between 2010 and 2012.

Number of fast messages

300 Algorithmic programs are now used widely by market participants and buy-side clients to execute trades on and off market.

301 ASIC estimates that at least 99.6% of all trading messages submitted to market over the nine-month period in 2012 were sourced from an automated order processing program. Some of this would be direct electronic access flow (clients sending individual orders through a market participant's automated order processing system), but most of the trading messages would have originated from the algorithmic programs used by market participants and buy-side clients.

302 For our analysis we choose an 'event window' of 100 milliseconds—that is, we analysed responses that occurred within a 100 millisecond period. We chose 100 milliseconds because it is too short a timeframe for a manual response but it is a timeframe that algorithms commonly trade within. Our analysis, therefore, compares the performance of algorithms used by high-frequency traders and those used by other traders.

> Note: An 'event' is either when an existing order is amended or cancelled in the order book within 100 milliseconds from the previous action on that order, or when a better priced order is posted following a break in the market.

303 As Table 12 indicates, other traders are almost as fast as high-frequency traders. In fact, other traders have a higher tendency to amend orders within a shorter period than high-frequency traders.

Table 12: Average speed of order additions, amendments and deletions (within a 100 millisecond event window)—May to July 2012

	Average speed		Contribution to number of orders	
Order type	High-frequency traders	All other traders	High-frequency traders	All other traders
Enter order	32 ms*	40 ms	61%	39%
Amend order	23 ms	9 ms	60%	40%
Delete order	27 ms	31 ms	59%	41%

* 'ms' = milliseconds

304 The frequency with which orders are amended and deleted within the market reflects more than the speed of individual algorithms. Algorithmic programs do require speed in order to quickly price and manage execution risk. However, if orders are amended frequently within very short periods, then there may be an issue with the stability of the underlying algorithm. The finding that the average speed of order amendments by traders other than high-frequency traders is just nine milliseconds highlights the fact that these are issues associated with algorithmic trading and the quality of the algorithms used, rather than issues specific to high-frequency trading.

Holding time

305 Holding time is the period of time a trader holds a position.

306 The value-weighted average holding period of securities traded by high-frequency traders, during the nine-month period analysed, was approximately 42 minutes. However, the holding times for individual securities and traders varied greatly, reflecting the range of strategies, signals and risk tolerances used by high-frequency traders.

307 Only 1.2% of high-frequency traders held positions for an average of two minutes or less, 18% for less than 10 minutes, and 51% for less than 30 minutes.

308 Our analysis indicates that, in general, high-frequency traders do not trade (i.e. open and close a position) within sub-second intervals. Only 0.1% of high-frequency traders had an average holding time of one second or less.

309 This finding indicates that high-frequency traders in Australia are not engaged in any significant amount of cross-market arbitrage, because such trading necessarily involves sub-second interval trading. In CP 145 we noted an expectation that arbitrage trading would emerge between lit exchanges. While there may be greater scope for such arbitrage trading on overseas markets, the amount of such trading in Australia has, to date, been relatively small. We note that this may yet increase, in line with international developments.

At-best ratio

310 The at-best ratio is the number of orders that are placed at the best price (and priced at market) divided by the total number of orders.

311 Our analysis showed that 88% of orders from high-frequency traders during the nine-month period were at the existing best market price, compared to 83% of orders from all other traders.

312 The higher ratio indicates that high-frequency traders tend to price and manage orders closer to market than other traders.

313 We included the at-best ratio in order to screen out 'ambit traders' (traders who place orders away from the best price). Also, we felt that a preference for orders priced and managed around market would align with IOSCO's principle of 'sophisticated tools'. Removal of the at-best ratio from the 'bundle' of measures used to score and rank high-frequency trading had minimal effect on the resultant rankings.

Our findings—High-frequency traders

314 ASIC identified 550 separate traders whose trading we designated as high-frequency trading during the nine-month period in 2012.

315 We analysed this group of traders by type.[31] The results of this analysis are presented in Table 13.

Table 13: High-frequency traders, by type—May to July 2012

Trader type	Percentage of high-frequency trading turnover	Percentage of total trading turnover
Proprietary trading desk within a market participant (e.g. investment banks)	33%	9%
Foreign bank trading as a client	32%	9%
Hedge fund—client or market participant that only trades as principal	23%	6%
Direct electronic access client of a market participant	12%	3%

* We were unable to determine conclusively the identity of some clients who accessed the market through an existing participant. Accordingly, we placed them in this 'direct electronic access' group. They may be hedge funds, market makers or users of some other type of high-frequency strategy.

316 Analysing the behaviour of individual traders, we surmised that most high-frequency traders were engaged in a mixture of 'statistical arbitrage' and liquidity provision strategies. The largest high-frequency traders were based offshore.

[31] Our analysis was based on intelligence from communications with market participants and intelligence received during past surveillance inquiries.

317 As previously noted (in paragraph 294), our analysis also found that a small number of traders accounted for most of the high-frequency trading. In many cases, a number of traders were linked to the same underlying entity. In some cases, ASIC was able to link multiple traders back to the same individual operating within an entity.

318 As part of our surveillance activities, ASIC has acquired considerable intelligence on traders operating within the Australian market. Many of these entities were expected to, and did, appear as high-frequency trading entities within our working definition of high-frequency trading. In particular, most of the top 20 high-frequency trading entities, who collectively accounted for 80% of all high-frequency trading turnover and 22% of total market turnover, were known to ASIC as being active high-frequency traders in the Australian market.[32]

319 In general, high-frequency traders tended to concentrate their business on a single market (e.g. predominantly Chi-X or predominantly ASX). The exception was principal trading desks of investment banks, with traders executing simultaneously across multiple markets. At least 45% of all high-frequency trading turnover was sourced by offshore traders (although these traders did tend to operate within the co-location facilities offered by the operators).

Section C2: Perceptions of high-frequency trading—Our analysis

320 As noted in Section A, high-frequency trading and traders are the focus of much media commentary and public concern, and ASIC has received a variety of complaints from investors on the conduct and presence of high-frequency traders.

321 Investors have cited predatory behaviour, fleeting orders (inaccessibility of liquidity) and exacerbation of volatility, and have raised issues of fairness associated with high-frequency traders' use of co-location facilities and fast data feeds, and the cost to other market users of the increased data storage and monitoring costs associated with high-frequency trading activity.

322 This section presents our findings on these areas of concern.

Impact on market

323 There is a significant amount of academic and industry analysis which has examined the effect of high-frequency trading on the efficiency of the market (not just in equities). Most of this analysis has taken place on overseas markets where high-frequency trading is more prevalent and has been established for a longer period of time.

[32] At the time of completion of the report, we sought consent to name high-frequency traders in this report, however as we were unable to provide them with an advance copy of the report in which their names would be listed, a large majority declined to be identified.

324 For the most part, this research has found that high-frequency traders[33] (and the broader algorithmic trading classification[34]) improve market quality through increasing price efficiency and market liquidity, while dampening the effects of volatility.

325 Our analysis does not allow for an explicit determination of the effect of high-frequency trading on price formation. Set out below are our key findings in relation to the impact of high-frequency trading on Australian markets.

Contribution to the order book

326 There was a notable difference in high-frequency traders' contribution to the order book by security: Table 14. This difference is broadly in line with high-frequency traders' activity in the different security groups. The proportion of depth from high-frequency traders at best prices is also consistent with their contribution to depth around best prices. This suggests that high-frequency traders are active through the order book. There is little evidence that high-frequency traders' behaviour in the order book is materially different from that of other traders.

327 We have examined high-frequency traders' provision of liquidity measuring both:

(a) the average proportion of volume at the best bid and the best offer provided by high-frequency traders ('high-frequency trading depth at best prices'); and

(b) the average proportion of volume at the best bid, the best offer and the volume at the two minimum tick price steps either side of the best bid and the best offer ('high-frequency trading depth around best prices').

Table 14: Contribution by high-frequency traders to order book depth—January to September 2012

	S&P/ASX 200	ASX 201–300	ASX 301+
High-frequency traders' contribution to depth at best prices	20%	5%	0.5%
High-frequency traders' contribution to depth around best prices (within three price steps of best price)	25%	4%	0.4%

[33] J Brogaard, T Hendershott and R Riordan, *High frequency trading and price discovery*, working paper, 30 July 2012; AJ Menkveld, *High frequency trading and the new-market makers*, working paper, 2012; J Brogaard, *High frequency trading and its impact on market quality*, working paper, 22 November 2010; J Hasbrouck and G Saar, *Low-latency trading*, working paper, 2 October 2010.

[34] T Hendershott and R Riordan, *Algorithmic trading and information*, working paper, August 2009; T Hendershott, CM Jones and AJ Menkveld, 'Does algorithmic trading improve liquidity?', *Journal of Finance*, vol 66, pp. 1–33; T Hendershott and R Riordan, 'Algorithmic trading and the market for liquidity' (11 April 2012), *Journal of Financial and Quantitative Analysis*, forthcoming.

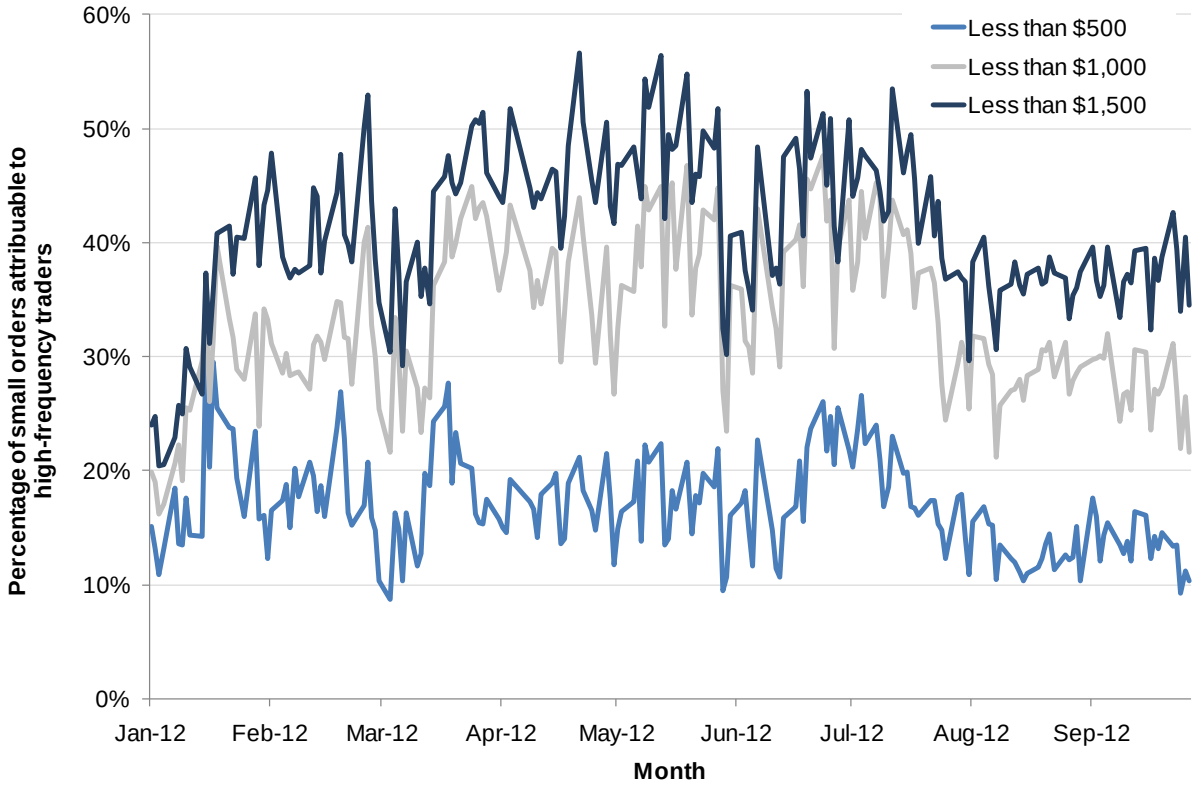
Small orders

328 Investors and listed companies have expressed concerns that high-frequency traders use multitudes of small transactions to create market volatility.[35] Market commentary has often correlated moves in share prices with the presence of small orders transacted over the day.

329 As part of our analysis, we profiled trading in small lots (less than $500 in value) within the market and found that during the period from January to September 2012 an average of only 17% of all orders of less than $500 in value were generated by high-frequency traders, with the remaining 83% of such orders being generated by other traders.

330 Figure 12 shows the percentage of trades of less than $500 in value generated by high-frequency traders (bottom line on graph) and provides, for the purposes of comparison, the percentage of slightly larger orders generated by high-frequency traders.

Figure 12: Percentage of small orders attributable to high-frequency traders



331 The majority of small orders are submitted by traders other than high-frequency traders and are likely to be sourced from market participants' algorithms. These algorithms are typically used by fund managers to minimise execution costs.

[35] C Latimer, 'Alarms sounded over high frequency trading', *Mining Australia*, 25 January 2013, www.miningaustralia.com.au/news/alarms-sounded-over-high-frequency-trading/.

332 We have contacted market participants whose algorithms are generating a large number of small orders. They have generally responded positively and are reviewing the settings for these algorithms.

Fleeting orders

333 An order may be described as 'fleeting' if it fails to rest, within a market, for a meaningful period of time. This liquidity, although posted, is effectively inaccessible because investors are unable to trade purposefully against it.

334 The widespread belief that high-frequency traders are responsible for the vast majority of fleeting orders is not supported by our analysis.

335 Table 15 compares untraded order resting periods for high-frequency and all other trading. Approximately 80% of all high-frequency traders' orders, and 78% of all other orders, rest in the market for less than one minute. Of all high-frequency traders' orders, 28% rested for less than 0.5 seconds. Of all other orders, 16% rested for less than 0.5 seconds.

336 In relative terms, the orders generated by high-frequency traders do move faster than those of the other traders—however, their tendency to immediately amend following submission is much lower: see Table 12 above. This suggests a greater degree of stability in the way in which high-frequency traders' orders are managed. It is possible that the algorithms used by high-frequency traders are more sophisticated than those used by other traders.

337 The number of orders submitted by other traders is marginally greater than those submitted by the high-frequency traders: see Table 11. In absolute terms, both classes of traders tend to remove the same number of orders from the market order book within a three-minute timeframe.

Table 15: Orders removed from the market before trading—cumulative percentage removed within a specified time period—May to July 2012

Time (seconds)	High-frequency traders (%)	Other traders (%)
0.5	28	16
1	35	23
10	60	49
30	73	67
60	81	78
3,600	(approx) 100	(approx) 100

338 Table 15 indicates that fleeting orders are a feature of algorithmic trading, generally, and that other traders are responsible for a substantial proportion of these orders.

Small and fleeting orders

339 A smaller proportion of submitted orders are both small and fleeting. ASIC estimates that approximately 3.6% of all untraded orders were for less than $500 and rested within the market for less than 500 milliseconds; and up to 12.2% of all untraded orders were for less than $2,000 and rested within the market for less than 2,000 milliseconds (or two seconds).

Table 16: Percentages of untraded orders over a range of values and resting times—July to September 2012

	< $500	< $1,000	< $1,500	< $2,000
< 500 ms*	3.6%	4.9%	5.9%	7.0%
< 1,000 ms	4.4%	6.0%	7.3%	8.7%
< 1,500 ms	5.8%	7.9%	9.5%	11.1%
< 2,000 ms	6.3%	8.7%	10.5%	12.2%

* 'ms' = milliseconds

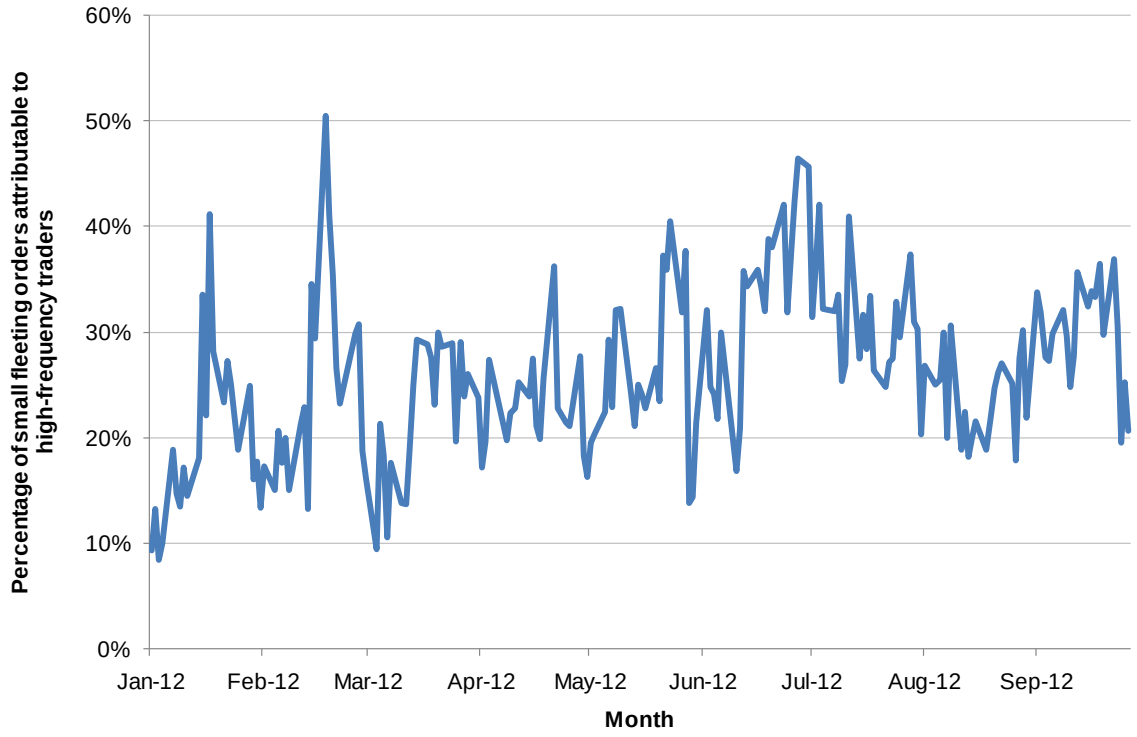
340 A small proportion of these fleeting orders may arise from crossings on ASX's market. ASX's priority crossing rules require that these crossings appear in the market at the relevant price before the crossing is executed. These crossings typically appear with a volume of one share. ASX has announced that priority crossings will cease in May 2013.

341 Small fleeting orders contribute to market noise. They do not add to market liquidity and are potentially misleading when posted at new price levels. Our study suggests that only 24% of all orders for less than $500, and which have rested for less than 500 milliseconds within the market, are attributable to high-frequency traders. The majority of these small fleeting orders arise from other traders (76%) and are likely to be sourced from market participants' algorithms.

342 Orders with resting times of 500 milliseconds or less must be in general managed algorithmically, because the timeframes are too short for manual trading. Of the 76% of small and fleeting orders that are not attributable to high-frequency traders, almost half arise from two market participants that undertake a high volume of buy-side trading.

343 Figure 13 charts, on a daily basis, the percentage of small fleeting orders that may be attributed to high-frequency traders.

Figure 13: Percentage of small fleeting orders attributable to high-frequency traders



Note: In this figure, 'small fleeting orders' refers to orders valued at less than $500 and resting within the market for less than 500 milliseconds.

Active and passive trading

344 High-frequency traders do not have a single strategy. It is therefore difficult to hypothesise whether high-frequency traders are primarily passive traders (liquidity sellers) or whether they trade actively (liquidity buyers). Passive high-frequency traders, primarily deploying market-making strategies, tend to attract significant attention and therefore it is common to think that all high-frequency traders are liquidity providers.

345 High-frequency traders trade slightly more passively than actively (46% of their dollar turnover is passive compared to 40% of dollar turnover being active).[36] The preference to trade passively was highest in the securities between ASX 21 and 200. High-frequency trading in the S&P/ASX 20 was relatively equally split between active and passive participation. High-frequency traders traded more actively than passively in illiquid securities (i.e. securities that are outside the S&P/ASX 200).

346 High-frequency traders alter their trading preference in different states of market volatility. When volatility was highest (August 2011) high-frequency traders traded more actively than they did in a period of low volatility

[36] The remaining orders are either executed in the auction process or conducted as crossings by participants.

(August 2012). Active trading was preferred over passive trading in the most volatile periods. This is further discussed in paragraphs 352–353.

Response to volatility

347 There is a concern that high-frequency traders exacerbate volatility and do not add to price formation—that is, they do not add to the setting of the fundamental price of securities.

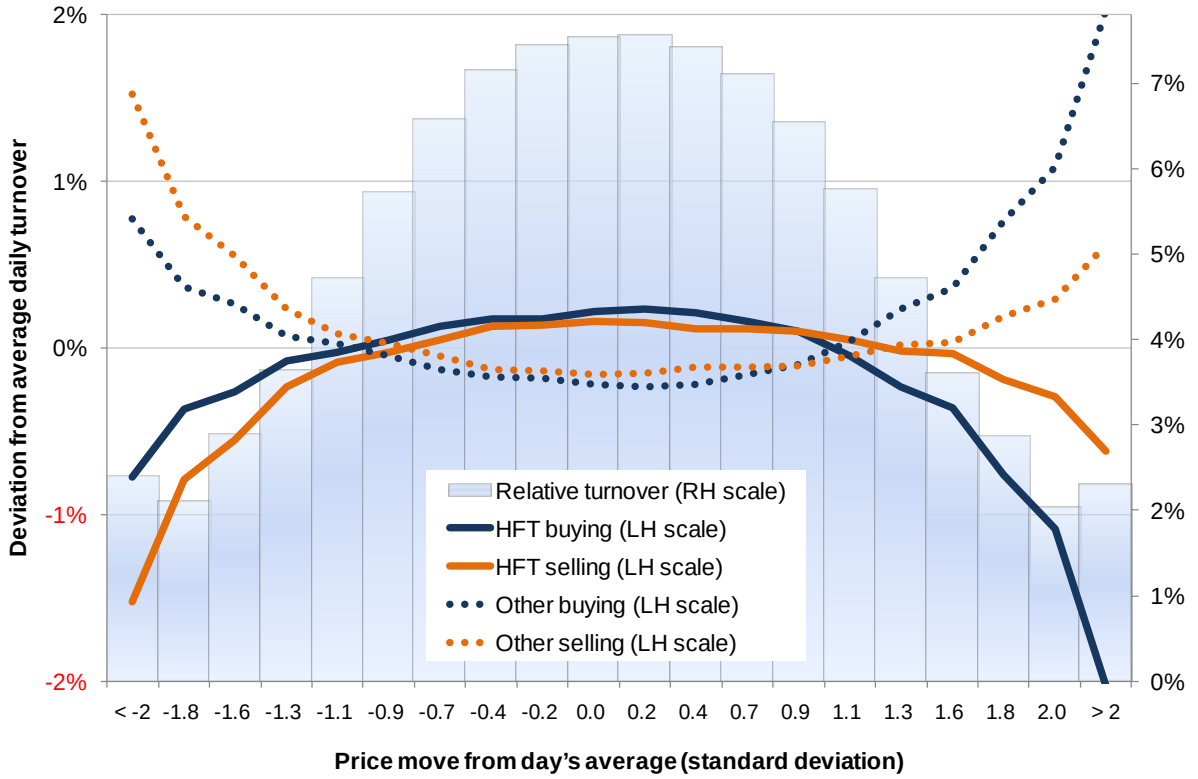
348 There are also concerns that high-frequency traders withdraw from the market during periods of high volatility, resulting in less liquidity in the market.

349 To assess the validity of these concerns, we examined the responses of high-frequency traders to volatility during the period from January to September 2012, and compared responses between periods of high and low volatility in 2011 and 2012. We also considered the response of high-frequency traders on overseas markets to episodes of extreme volatility, notably the 'flash crash' of May 2010.

Response to normal volatility

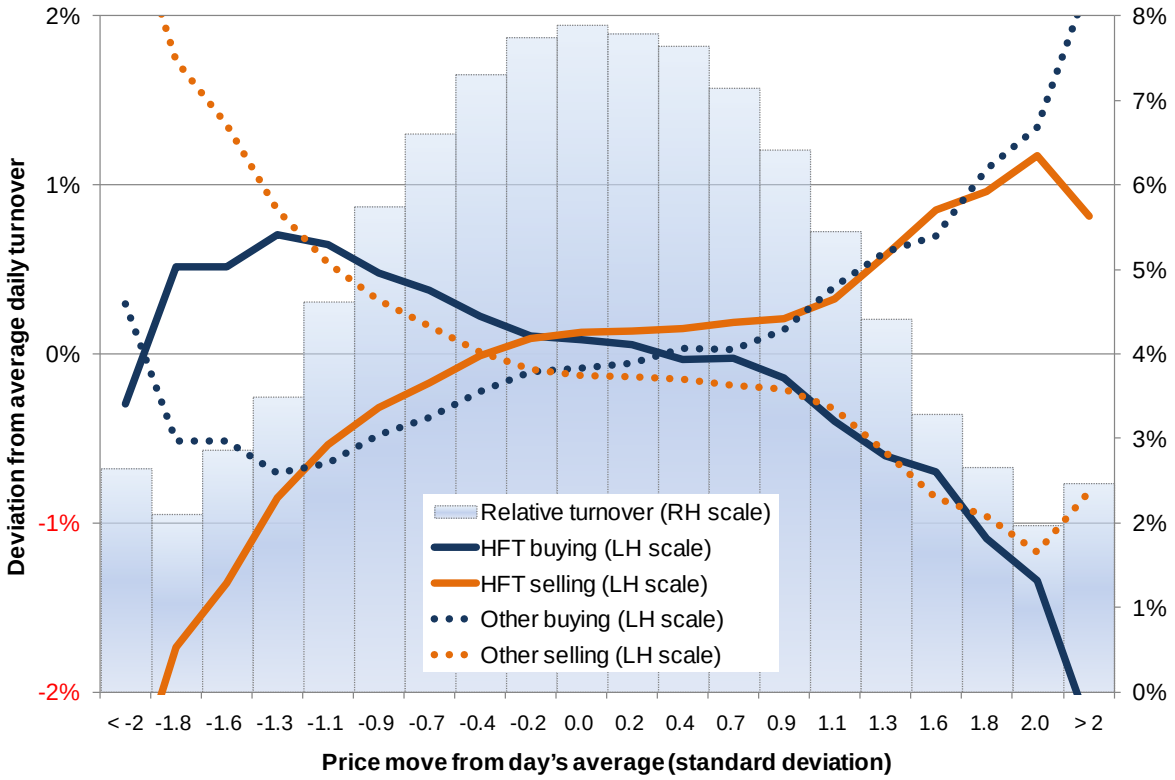
350 As we have noted in earlier sections, high-frequency trading is concentrated in the most liquid securities, the S&P/ASX 200. We analysed the behaviour of high-frequency traders in the period from January to September 2012 in the most liquid portion (S&P/ASX 50) and the least liquid portion (ASX 150–200) to observe any difference in high-frequency traders' behaviour to changing prices. In the S&P/ASX 50, high-frequency traders tended to buy and sell more than average when prices were around the daily average—that is, they traded more than average when turnover was highest, and they reduced their participation in the market as prices diverged from the daily average: Figure 14.

Figure 14: Trading profiles of top 50 securities (S&P/ASX 50)—January to September 2012



351 The behaviour of high-frequency traders was quite different in the less liquid ASX 150–200 sector. When prices fell below the daily average, high-frequency traders increased participation, buying more than average and selling less (Figure 15). This relationship held until prices fell by around 1.8–2 standard deviations from the average price. At this point, high-frequency traders participated less than average in the market. Similarly, high-frequency traders tended to participate by selling more than average, and buying less than average, as the price rose above the daily average.

Figure 15: Trading profiles, ASX 150–200—January to September 2012



Response to high volatility—Australia

352 We compared the behaviour of high-frequency traders in Australia during periods of high volatility and relatively low volatility.[37] We assessed what proportion of depth around the midpoint price (within three tick sizes) was attributable to high-frequency traders and how this changed in periods of high and low volatility. Assessing changes in the proportion of depth from high-frequency traders helps control for the expected decline in total market depth, which is generally experienced in volatile conditions. Specifically, we examined periods of high and low volatility as represented by the S&P/ASX 200 VIX Index (32% in August 2011 and 16% in August 2012) and periods with similar, moderate volatility (20% in June 2011 and 21% in June 2012).

353 High-frequency traders displayed negligible change in their contribution to depth in the S&P/ASX 200 securities given different states of volatility. Between June 2011 and August 2011 the Australian VIX Index (a measure of expected volatility) increased substantially from 20% to 32%. During this period, high-frequency traders' contribution to depth around best prices fell only marginally, from 45% to 44%. Over the same period in 2012, with relatively stable volatility, high-frequency traders' contribution to depth

[37] Volatility has been measured using the S&P/ASX 200 VIX index. This is an end-of-day index that reflects the market's expected volatility in the Australian benchmark equity index.

around best prices remained constant at 26%, which indicates that seasonality did not play a role. High-frequency traders became more active traders in volatile markets, increasing their contribution to total turnover by around 25%. However, this was primarily attributable to an increase in aggressive trading.

Response to extreme volatility—the overseas experience

354 Although, in our analysis, high-frequency traders reduced their provision of liquidity no more than other traders did during periods of high volatility, their response to extreme volatility may be quite different. It is possible that, if Australia had an event similar to the extreme volatility experienced in the United States with the 'flash crash' of 6 May 2010, high-frequency traders may withdraw substantially from the market.

355 The 6 May flash crash, where major equity indices in both the futures and securities markets, each already down over 4% from their prior-day close, suddenly fell a further 5–6% in a matter of minutes before rebounding almost as quickly—was triggered by a poorly programmed algorithm selling a large order in the E-mini S&P contract. The interaction of this algorithm and other automated strategies (both high-frequency traders and fundamental investors) exacerbated volatility, which led to market makers reducing their provision of liquidity or widening their bid and offer quotes. As a result, liquidity evaporated and this exacerbated market volatility, leading to market disorder.

356 This event, and other instances in overseas markets of extreme volatility, has highlighted potential risks with the increased adoption of algorithms by high-frequency traders and fundamental investors. A substantial concern is that the growing reliance of automated liquidity provision may result in disorderly markets when volatility rises.

357 ASIC has recently developed new Market Integrity Rules to supplement the existing rules for automated trading, and these will be introduced and take effect over the next 14 months: see paragraphs 59–62, and CP 179 and CP 184. These new rules are designed to strengthen the regulatory regime and further mitigate against market disorder. The new rules will:

(a) enhance market operators' controls for extreme price movements, including automated trading pauses and extension to the ASX SPI 200 Future; and

(b) enhance market participant filters and controls for automated trading, including a 'kill switch' to immediately shut down problematic algorithms.

358 We will also provide additional guidance on testing of systems, filters and controls, including the ability to manage highly automated trading and stress testing of order flow.

Interaction between high-frequency traders and other investors

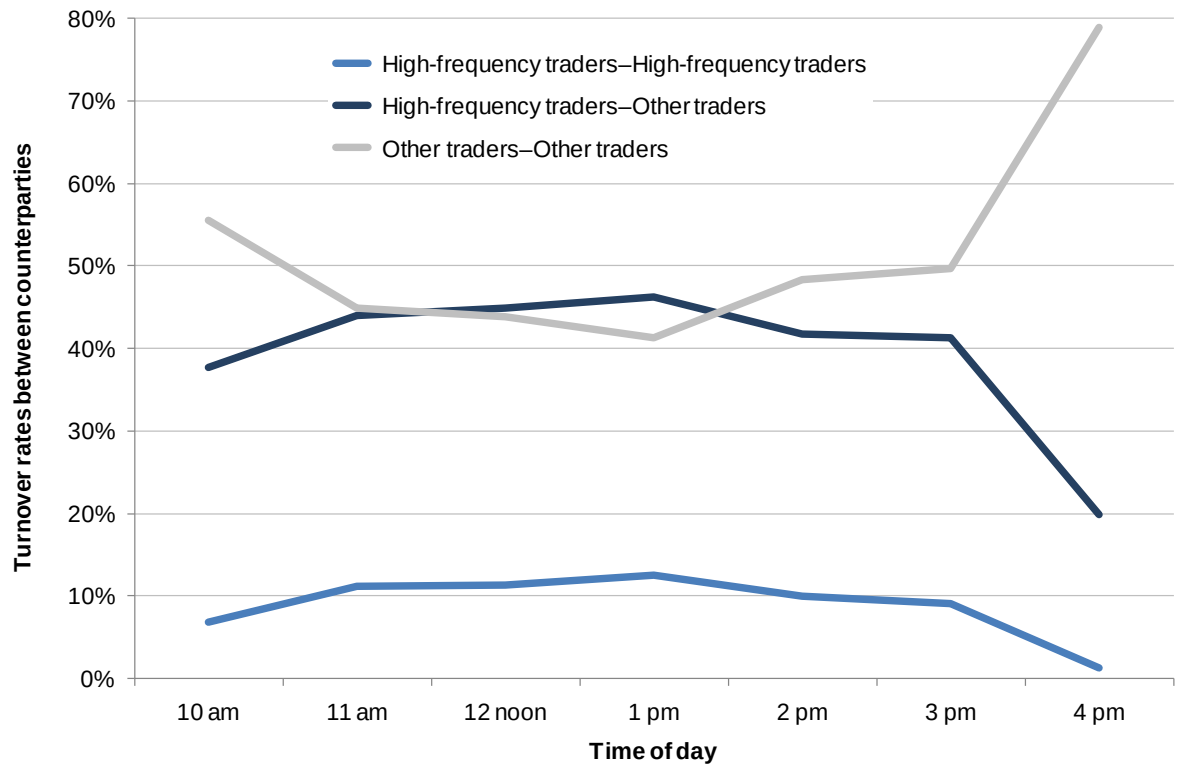
359 Investors have expressed concern to ASIC that they are trading against high-frequency traders, and that information leakage is creating poorer execution outcomes.

360 Participation in exchange liquidity is conducted on a non-discriminatory basis. Counterparties cannot be filtered on the basis of any attribute. Exchange order books are completely anonymous; neither investors nor market participants are aware of whom they may be trading with.

361 Our analysis confirms that a large proportion of trades within the lit exchange market are conducted with high-frequency traders. Across the market, 39% of all trades occur between a high-frequency trader and other trader, 52% between two other traders and 9% between two high-frequency traders.

362 The probability that an investor will interact with a high-frequency trader changes over the day. Participation by high-frequency traders is highest at midday as market turnover ebbs. On average, high-frequency trader participation is low in the opening auction and highest at midday, as market turnover ebbs, then falls by more than 50% in the afternoon session's closing auction. The probability that a trade will involve a high-frequency trader is lowest on the market close.

Figure 16: Flows between high-frequency traders and other traders—May to July 2012



High-frequency trading in crossing systems

363 There is a general perception that trading in the dark offers a safe harbour from high-frequency trading. We understand that this is increasingly a factor for fundamental investors in their venue selection. As discussed in paragraph 161, most crossing system operators purport to not permit high-frequency traders in their crossing systems. However, our analysis indicates that high-frequency traders are active in a number of these crossing systems.

364 High-frequency traders are currently far more active in lit venues than dark venues. This reflects a range of factors such as preferred trading strategies (e.g. liquidity provision) and the fact that they are better able to manage risk with lit orders. However, we are seeing accounts previously identified in the lit exchange market with high-frequency trading attributes trading in the dark. We expect this is because dark venues offer an additional source of liquidity and may give a higher probability of executing against order flow of fundamental investors.

365 We found that high-frequency traders were trading more in the dark than we had anticipated, although still substantially less than other traders (i.e. 5% of high-frequency trading turnover compared with 16% of other trading turnover): see Table 17. A similar concentration is evident when examining the number of trades (dark trades of 5% for high-frequency traders, compared with 14% for other traders).

Table 17: Trading by high-frequency traders and other traders in lit and dark venues—May to July 2012

Trader type	Number of lit trades	Number of dark trades	Turnover in lit venues	Turnover in dark venues
High-frequency traders	95%	5%	95%	5%
Other traders	86%	14%	84%	16%

366 Access to dark liquidity by high-frequency traders is concentrated through a small number of market participants. 80% of dark trading by high-frequency traders is done through seven participants.

Unfair access

367 As previously noted, algorithmic programs are now used widely by market participants and buy-side clients to execute trades on and off market.

368 We estimate that at least 99.6% of all trading messages submitted to market over the nine-month period in 2012 were sourced from an automated order processing program, and our analysis found that other traders had average order speeds comparable to, and in some cases faster than, high-frequency traders: see Table 12.

369 Algorithmic programs do require speed in order to correctly price and manage execution risk. As a result, traders whose trading strategies rely on speed have sought to minimise the delay, or 'latency', in transmitting and receiving trading messages.

370 'Co-location', where traders' processing systems are located in the same site as a market operator's execution (trading) engine, is the preferred way to minimise latency, and in Australia co-location services are currently provided by the ASX liquidity centre and Equinix data centre.

371 Truncated message protocols (available through the ASX's ITCH and OUCH services) are also useful to traders reliant on speed, as they provide data feeds with reduced package size and hence faster transmission.

372 We have received submissions that these services unfairly advantage the traders who use them, at the expense of other traders.

ASIC's view

373 The need for low latency market access is not crucial to all investors. However, the ability for some participants to receive information from, and send messages to, a market operator as fast as practicable has been critical to the success of their trading and business models.

374 We do not regard the fact that market participants can co-locate to obtain a speed advantage as inherently unfair. Speed of access to the market has always been contestable, from the days of physical proximity on the floor, when an open outcry system operated. We recognise that not all market operators choose to operate at the co-location site with the lowest latency, but for those who do, our concern is to ensure that the facilities for doing so are made available to them on a fair basis and on transparent terms.

375 Our assessment is that access to these services is fair. Market operators offer economically reasonable and transparent pricing, inclusive of ongoing fee costs, that is publicly available and access to these services is available on a non-discriminatory basis. Network connections within co-location facilities are precisely measured, and all participants within the facility receive their data feed with exactly the same latency as any other participant running the same options.

376 The fastest connections are available to, and used by, market participants executing algorithms on behalf of clients as well as to high-frequency traders.

377 The use of technology to receive, process and instruct is only available after the market operator has publicised prices so that these are available to the wider market. In Australia, no specific investor or participant category has access to data before the broader market. While the technological advances

discussed allow faster reaction times, for the removal, replacement and introduction of orders across markets, this is done based only on public and non-privileged information.

Predatory trading

378 There are a number of predatory trading strategies that are often attributed to high-frequency trading. Concerned investors have cited:

(a) *layering*: the creation of large numbers of orders, often at various price points, to create a false impression of demand or supply. These orders are then deleted, or moved, as they move closer to trading;

(b) *quote stuffing*: a strategy to impede the processing of markets, or participant processes, by overloading an order book with trading messages;

(c) *latency arbitrage*: a strategy that detects the submission of individual orders and steps ahead of it by using superior speed;

(d) *liquidity detection*: a strategy that determines the direction of fundamental investor demand and 'front runs' its execution to create higher execution costs for market users; and

(e) *momentum ignition*: a strategy that drives prices artificially over range.

379 These strategies are heavily dependent on technology and speed. Because high-frequency trading uses both, high-frequency traders are often suspected of developing and using such strategies.

380 These strategies constitute market abuse under existing Market Integrity Rules, and ASIC investigates all instances where such strategies are suspected to be in use, and takes enforcement action if appropriate.

Layering

381 Our surveillance systems routinely examine the market for patterns of layering. Examples, when found, are referred to ASIC's Enforcement teams for further investigation. A number of high-frequency traders do manage large order books, although this number has decreased over calendar 2012 in line with falling order-to-trade ratios. While a correlation does exist between high-frequency trading and stratified orders, ASIC has found no direct relationship between high-frequency trading and abusive layering.

382 However, an instance of potential market abuse using layering by a high-frequency trader was identified as part of our analysis of trading in 2012. This is currently being investigated by our Enforcement teams.

Quote stuffing

383 Potential risks to the systems of market participants do exist from abusive messaging. ASIC has noted a number of latency issues with some automated order processing systems responsible for managing large numbers of trading messages. In general, however, the source of excessive load has been internal rather than external.

384 ASIC regularly engages with market participants running active automated order processing systems. In general, ASIC has found that patterns of excessive messaging, where identified, are attributable to dysfunctional algorithms rather than any intentional strategy of creating systemic load.

385 In terms of market operators, ASIC has no concerns at this stage that systemic levels of quote stuffing would compromise the current processing capacity of the Australian equity markets. ASX 24's upgrade in October 2010 has insulated the futures platform from any similar risk. We recognise that while the market operator can manage large volumes, even excessive, message flow, it is not necessarily true for individual market participants. Accordingly, we would not want to see this practice become prevalent on the basis of available capacity at market operator level.

Latency arbitrage

386 With the advent of market competition, market participants' trading systems have evolved to handle multiple operator venues. Many have introduced a new type of process, known as a 'smart order router (SOR)'. SORs allow market participants to monitor disparate markets, source offered liquidity and route orders across venues automatically, in line with individual 'best execution' guidelines.

387 Over the course of 2012, ASIC received many complaints from market participants about the 'unevenness of the playing field'. Australian media have picked up on this theme.[38] Many have felt that high-frequency traders were monitoring markets simultaneously and arbitraging 'latency differentials' by trading ahead of submitted orders.

388 Our analysis has confirmed that many high-frequency traders operate at substantially faster speeds than many other traders. However, we also found that many other traders are also engaged in very fast trading, sometimes at average speeds higher than the high-frequency traders. Reaction times by many market participants (both traders and agency) using algorithmic platforms have fallen into the range of milliseconds

[38] A Kohler, 'Trade parasites feeding at the heart of the ASX', *The Drum*, 11 April 2012, www.abc.net.au/news/2012-04-11/kohler-high-frequency-trade-parasites-at-heart-of-asx/3943052.

389 However, market operators are required to provide market data on a fair, transparent and non-discriminatory basis. No trader is capable of detecting any submitted market message before acceptance by that operator. Many of the complaints about latency received and reviewed by ASIC appear to arise from the complainants' misunderstanding of participant SORs.

390 Many market participants will find that the routing options and time taken by their SORs to break, and route, orders between operators is considerably longer than the reaction times of many highly automated traders. If this happens they may find that when an order reaches market A and, before the related order reaches market B, another system has generated an order for market B possibly in response to the order on market A. Market participants need to take this factor into account when programming decision logic for their SORs.

Liquidity detection

391 Many investors have expressed concern that, despite market anonymity, their interactions with high-frequency traders divulge information about their trade. Their concern is that high-frequency trading is interposing 'toxic' liquidity between natural buyers and sellers, and thereby increasing execution costs for fundamental investors.[39]

392 Our analysis of high-frequency liquidity has detected some examples of potentially predatory activity. The specific strategies examined by ASIC ran, predominantly, during the market's auction phase where large pools of liquidity settle to trade at indeterminate prices. The traders, in these instances, have, in some cases responded positively to our intervention by modifying their algorithms, ceasing all trading in the market and in other cases they have been referred to Enforcement for investigation.

393 In any case, we have seen behavioural change by traders which has had a marked effect on market quality. ASIC believes that the volatility of the pre-open market has declined by approximately 40% due to modification to algorithms or exit from the market.

Momentum ignition

394 There is concern that some high-frequency traders enact a strategy of creating a price move by provoking other investors to aggressively trade in response to a pricing signal, thereby creating an opportunity to take a profit from a position opened prior to a market move.

395 Our analysis of complaints from investors and participants concerning rapid or unusual price movements in individual securities identified that although

[39] S Washington, 'Global trends could see ASX turn toxic', *The Sydney Morning Herald*, 22 February 2011, www.smh.com.au/business/global-trends-could-see-asx-turn-toxic-20110221-1b2in.html.

high-frequency trading accounts were present, there was no evidence of strategies being employed to create or exacerbate price moves and accordingly to open or unwind positions at a favourable price.

International response to manipulative trading activity

396 The IOSCO report *Regulatory issues raised by the impact of technological changes on market integrity and efficiency* [40] and the US Securities Exchange Commission's *Concept release on equity market structure*[41] specifically identified four trading strategies which may have an abusive and manipulative purpose. These trading strategies may be facilitated by high-frequency trading and algorithmic trading more generally and include momentum ignition or layering, quote stuffing, spoofing and abusive liquidity detection.

397 There appears to be widespread international recognition that the existing definition for market abuse is sufficiently broad to encompass abuse occasioned by high-frequency trading.

398 IOSCO, in its final report, recommended that, where appropriate, market authorities should take action, which may include issuing guidance to market participants on what is and is not considered acceptable market practice in order to facilitate the identification and analysis of novel forms and variations of market abuse.[42]

399 In other jurisdictions—for example, in the United Kingdom, United States, Germany, Canada, Hong Kong and Singapore—existing legislation and rules broadly prohibit market abuse and manipulation. In addition to existing legislation and rules prohibiting forms of market manipulation, most overseas regulators are also in various stages of assessing the impact of algorithmic trading (including high-frequency trading) and introducing new requirements and proposed rules and guidance with specific application to the regulation of algorithmic trading.

400 To ensure a consistent approach in monitoring and enforcement of high-frequency trading and other algorithmic trading, it is appropriate to provide guidance to the market about which activities may constitute market abuse.

ASIC's position

401 In circumstances where high-frequency trading strategies are undermining the efficiency and the integrity of the market, ASIC remains committed to

[40] Technical Committee of IOSCO, *Regulatory issues raised by the impact of technological changes on market integrity and efficiency* (IOSCOPD361), report, October 2011.
[41] Securities Exchange Commission (US), *Concept release on equity market structure*: www.sec.gov/rules/concept/2010/34-61358.pdf.
[42] IOSCO, *Regulatory issues raised by the impact of technological changes on market integrity and efficiency* (IOSCOPD361), report, October 2010.

taking enforcement action under the Market Integrity Rules and the Corporations Act. Over the past year, ASIC has identified instances of abusive and dysfunctional trading by some high-frequency traders. This has primarily involved foreign high-frequency traders and large-scale wash trading, with this conduct presently the subject of enforcement action. ASIC expects market participants to be in a position to identify and address the use of abusive or dysfunctional high-frequency trading strategies by having appropriate filters and adequate organisational and technical capabilities.

Section C3: Related issues

402 In this section we consider two issues that are associated with, though not exclusive to, high-frequency trading.

403 High-frequency traders employ a variety of trading strategies, including statistical or index arbitrage, hedge fund trading and liquidity provision (market making). High-frequency traders generally execute trades on their own, or their firm's, behalf, and using their own capital (known as 'proprietary trading').

Market making and maker–taker pricing

404 There is a tradition in some markets for 'market makers' to provide liquidity when it is generally absent or weak, and to manage short-term imbalances in supply and demand.

405 Market makers are typically regarded as market participants that continuously post passive limit orders on both sides of the order book hoping to make a profit on the bid–offer spread. It is common practice overseas for market makers to be formally registered with the relevant exchange market operator to perform this function, and to be subject to specific obligations and entitlement to specific benefits.

406 Market makers can play a pivotal role in assisting new markets to become viable by providing liquidity. They can also play a role in established markets by providing liquidity for less liquid securities.

407 Formal (registered) market makers have not traditionally formed part of the Australian cash equity market. However, with the increasingly low-latency trading environment in Australia and the introduction of competition in exchange markets, electronic liquidity providers—a form of principal trader that is usually not formally registered as a market maker—have become more prevalent.

408 Exchange market operators can provide incentives to attract liquidity (market makers and electronic liquidity providers) to their market. 'Maker–

taker' pricing—which rewards the making of prices—has become common place in some overseas markets, and it has more recently emerged in Australia.

409 There are examples overseas (e.g. BATS in the United States) where maker–taker pricing models involve the exchange market operator providing a rebate (i.e. payment) for price makers, while price takers pay a fee. There are variations of the pricing model. In Australia, Chi-X has a maker–taker pricing model which does not involve it paying a rebate. Instead, the Chi-X maker–taker model involves price makers paying a lower fee to Chi-X than price takers. ASX also introduced a similar model for its competitive market, PureMatch.

410 There have been concerns in Australia and overseas about the impact on market quality and market integrity of maker–taker pricing and other incentive-based pricing models. IOSCO's Committee on Secondary Markets is assessing the impact of trading fee models on trading behaviour. It is considering the potential for fee models involving rebates to exacerbate the risk of conflicts of interest. Trading fee models can create best execution conflicts for market participants' order routing decisions. Rebates can also create inefficiencies in pricing of securities because prices do not factor in rebates and fees. They can also distort trading behaviour where trading decisions are influenced by fee incentives. We note that there are differences in the evidence about the extent of these impacts.[43]

411 We have previously stated (e.g. in Report 237 *Response to submissions on Consultation Paper 145 Australian equity market structure: Proposals* (REP 237) and CP 168) that we would be concerned if pricing incentives influence behaviour in a way that is not in the best interests of clients and wider market integrity. We believe there is sufficient evidence to conclude that maker–taker models, *where the market operator pays a rebate*, do not promote market quality or market integrity.

Proprietary trading firms accessing markets as participants

412 In recent years, the number of proprietary trading firms entering Australian markets has increased at a greater rate than firms executing trades for clients. These proprietary trading firms often employ algorithmic trading strategies which can result in the proprietary trading firm generating large numbers of trading messages (new orders, amendments and trades).

[43] For example, L Cardella, J Hao and I Kalcheva, *Competition in make-take fees in the U.S. equity market*, working paper, 19 September 2012; J-E Colliard, and T Foucault, 'Trading fees and efficiency in limit order markets', *Review of Financial Studies*, Society of Financial Studies, 2012; andR Riordan and A Park, *Maker-taker and high frequency trading* (EIA12), Foresight Project, UK Government Office for Science, 14 February 2012.

413 Where these firms directly access the market as licensed market participants, they are required to demonstrate prudent risk management to the extent that they must have appropriate filters and limits in place.[44]

414 Many of these participants employ high-frequency trading strategies and may at any time have large potential market exposures via orders which they may not only not be able to fund, but which may cause disorder where the market is volatile, or where an attempt is made to close out an unintended position.

415 Accordingly, ASIC intends to do more work to ensure that there is appropriate and effective management of clearing and market-related risks throughout the clearing and settlement system. This must include real-time monitoring and control by clearing participants of pre and post-trade exposure of their clients, in a highly automated environment where algorithms can quickly create disorderly market events.

[44] In November 2012, ASIC released Consultation Paper 195 *Proposed amendments to ASIC market integrity rules: ASX 24 and FEX markets* (CP 195), in which we proposed amendments to the ASIC Market Integrity Rules (ASX 24 Market) 2010 to address this issue.

Appendix: High-frequency trading study methodology

416 To identify and analyse high-frequency trading on Australian equity markets, we scored traders, for each day of trading over a nine-month period, from 1 January to 30 September 2012, on six measures that relate to the characteristic attributes of high-frequency trading: see paragraphs 23–27.

417 Table 18 outlines the rationale for selecting each of these measures, and the specific metrics used for each measure.

Table 18: Measures used to identify high-frequency trading

Measure	Metric used	Rationale for measure
Order-to-trade ratio	The number of orders submitted to market (new orders, amendments and deletions) divided by the number of trades executed	High-frequency trading typically involves placing multiple orders for short periods over various price levels. High order-to-trade ratios suggest automation, agility, and lower risk tolerance.[45] High-frequency traders tend to have a high order-to-trade ratio.
Percentage of turnover traded within a day	One minus the residual position divided by total turnover in each security	This metric captures the extent to which intraday positions are liquidated before the close. High-frequency traders tend to close out a high proportion of trading intraday, so their overnight positions are relatively small. This metric distinguishes high-frequency traders from execution algorithms which mainly trade in only one direction during a day.
Total turnover per day	Total dollar value bought plus the total dollar value sold	High-frequency trading is typically a low-margin strategy, which means traders need to be active in the market in order to be profitable. High-frequency traders tend to have high turnover.
Number of fast messages	Absolute number of messages successfully submitted within a 40 millisecond window from a defined event[46]	High-frequency trading tends to be fast and so will have large message counts within a 40 millisecond time period. There is no single method that high-frequency traders use to manage order-books—some tend to delete and send new orders, others submit a rolling sequence of amendments.
Holding time	Volume weighted time that a position is held	High-frequency trading typically involves trading in and out of positions multiple times over a single day. Frequent, shallow and changing positions are a key element of this trading style. High-frequency traders tend to have low holding times.

[45] Note that in this model the number of trades is restricted by trade identification. An order that trades many times (e.g. an offer may be hit by five different bids before being exhausted) is counted only once. This more accurately captures large active orders which trade through multiple passive orders resting in the order book.
[46] An event is either (1) when an existing order is amended or cancelled in the order book within 40 milliseconds from the previous action on that order, or (2) when a better-priced order is posted following a break in the market.

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Measure	Metric used	Rationale for measure
At-best ratio	Number of orders placed at best price plus the number of orders priced at market divided by the total number of submitted orders	This metric measures the extent to which orders are managed at the best price level. High-frequency traders contribute actively to pricing in securities, so many orders are managed at, or close to, market. Active high-frequency traders tend to have high at-best ratios.

418 To remove 'outliers' that could skew results, and because we wanted to focus on traders that have a significant influence on the market, we excluded very small and infrequent traders from our analysis. We determined that any trader that had less than 1,000 orders or less than $1,000 total turnover or an average holding time of more than three hours would be excluded from our analysis of that day's trading. Around 300 to 400 traders were filtered out on this basis for each day.

419 Data on each identified metric listed in Table 18 was collated for each trader. Distributions were built around each metric and divided into statistical quartiles. Each trader was scored on its relative position within the distribution. A value in the top quartile (most high-frequency trading-like) was assigned four points, a value in the third quartile (less high-frequency trading-like) was assigned three points, and so on. Summing all scores for each trader gave a high-frequency trading index for that trader for that day. Scores ranged from 24 (most high-frequency trading-like) to six (least high-frequency trading like).

420 For each trading day, traders were ranked by score and the highest 15% (around 45 to 70 separate traders) classified and designated as the 'high-frequency traders' for that day.

421 This percentage was chosen because high-frequency trading is dominated by a small group of traders. The 10 largest high-frequency traders are responsible for approximately 60% of all high-frequency trading turnover (representing 16% of total equity market turnover) and the largest 20 high-frequency traders are responsible for approximately 80% of high-frequency trading turnover (22% of total equity market turnover). The bottom 66% of high-frequency traders account, collectively, for only 1% of high-frequency trading.

422 Setting the cut-off point at 15% ensured that our analysis focused on the traders that best met the attributes of high-frequency trading and gave us a sample of between 45 and 70 high-frequency traders for each day. Because the scoring and ranking of each trader was based purely on observable and measurable trading behaviour on that day, the actual composition of the sample group was different for each day, although the major high-frequency traders were consistently present.

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Key terms

Term	Meaning in this document
AFS licence	An Australian financial services licence under s913B of the Corporations Act that authorises a person who carries on a financial services business to provide financial services Note: This is a definition contained in s761A of the Corporations Act.
AFS licensee	A person who holds an AFS licence under s913B of the Corporations Act Note: This is a definition contained in s761A of the Corporations Act.
agency	Where a market participant acts on behalf of a client
aggregator	An aggregator provides links between crossing systems. It receives and transmits orders from and to other crossing systems, providing clients with access to more sources of liquidity
aggressive order	An order that is priced so that it is immediately executable (i.e. priced to buy at or above the current offer, or to sell at or below the current bid). An example of an aggressive order is a market order
algorithmic program	Automated strategies using programmable logic/system-generated orders (rather than human-generated orders) based on a set of predetermined parameters, logic rules and conditions. These include algorithmic trading, automated order generation, high-frequency trading and automated market making
algorithmic trading	Electronic trading activity where specific execution outcomes are delivered by predetermined parameters, logic rules and conditions
arbitrage	The process of seeking to capture pricing inefficiencies between related products or markets
ASIC	Australian Securities and Investments Commission
ASIC Market Integrity Rules (ASX)	ASIC Market Integrity Rules (ASX Market) 2010—rules made by ASIC under s798G of the Corporations Act for trading on ASX
ASIC Market Integrity Rules (ASX 24)	ASIC Market Integrity Rules (ASX 24 Market) 2010—rules made by ASIC under s798G of the Corporations Act for trading on ASX 24
ASIC Market Integrity Rules (Chi-X)	ASIC Market Integrity Rules (Chi-X Australia Market) 2011—rules made by ASIC under s798G of the Corporations Act for trading on Chi-X

Term	Meaning in this document
ASIC Market Integrity Rules (Competition)	ASIC Market Integrity Rules (Competition in Exchange Markets) 2011—rules made by ASIC under s798G of the Corporations Act that are common to markets dealing in equity market products and Commonwealth Government Securities depository interests quoted on ASX
ASX	ASX Limited or the exchange market operated by ASX Limited
ASX 24	The exchange market formerly known as Sydney Futures Exchange (SFE), operated by Australian Securities Exchange Limited
ASX Operating Rules	ASX Limited's operating rules, which replace the pre-existing ASX Market Rules
ASX SPI 200 Future	The ASX 24 futures contract over the S&P/ASX 200 Index
at-best ratio	The number of orders that are placed at the best price (and priced at market) divided by the total number of orders
Australian market licence	Australian market licence under s795B of the Corporations Act that authorises a person to operate a financial market
automated order processing	The process by which orders are registered in a market participant's system, which connects it to a market. Client or principal orders are submitted to an order book without being manually keyed in by an individual (referred to in the rules as a DTR). It is through automated order processing systems that algorithmic programs access our markets
below block size dark trades	Trades executed during normal trading hours that are not pre-trade transparent and that are not block size trades
best available bid and offer	See 'NBBO'
best execution	A requirement under Chapter 3 (Competition) for a market participant to achieve the best outcome for its client
bid–offer spread	The difference between the best bid and the best offer (also known as 'bid–ask spread')
block size trade	Trades that rely on the exception to the pre-trade transparency obligations in Rules 4.2.1 and 4.2.2 (Competition)

Term	Meaning in this document
buy-side	Advising institutions typically concerned with buying, rather than selling, assets or products. Private equity funds, mutual funds, unit trusts, hedge funds, pension funds and proprietary trading desks are the most common types of buy-side entities
Centre Point	An ASX-operated, dark execution venue that references the midpoint of the bid–offer spread on ASX's CLOB
Chapter 5 (ASX) and (Chi-X) (for example)	A chapter of the ASIC Market Integrity Rules (ASX) and ASIC Market Integrity Rules (Chi-X) (in this example numbered 5)
Chi-X	Chi-X Australia Pty Limited or the exchange market operated by Chi-X
CLOB (central limit order book)	A central system of limit orders, operated by a market operator, where bids and offers are typically matched on price–time priority
co-location	Facility offered by a market operator whereby market participants (and possibly clients of market participants) are able to place their trading processing servers within the same physical location as the market operator's processing servers to minimise latency
competition	Competition between licensed exchange markets
Corporations Act	*Corporations Act 2001*, including regulations made for the purposes of that Act
course-of-sales report	A record of all trades executed on an exchange market or reported to the market operator
crossing	A type of transaction where the market participant is the same for both the buyer and seller. The market participant may be acting on behalf of the buying client and the selling client, or acting on behalf of the client on one side of the transaction and as principal on the other side of the transaction
crossing system	An automated service provided by a market participant to its clients that matches or executes client orders with orders of the market participant (i.e. against the participant's own account) or with other users with orders in the system. These orders are not matched on a pre-trade transparent order book
crossing system operator	Market participant that operates a crossing system
dark liquidity/trading	Orders that are not pre-trade transparent (i.e. not known to the rest of the market before they match): see paragraph 22

Term	Meaning in this document
dark pools/venues	Electronically accessible pools of liquidity that are not pre-trade transparent, including crossing systems and dark venues operated by exchange market operators
depth	Volume of orders on an order book available to be traded
direct electronic access	Electronic access to markets via the electronic infrastructure of a market participant. The process by which an order is submitted by a client, agent or participant representative directly into a market participant's automated order processing system. Direct electronic access enables a client to access a market without being a direct market participant and without being directly bound by the operating rules of the market they are accessing
DTR (designated trading representative)	Representative of a market participant that has been authorised by the participant to submit trading messages to the execution venue on behalf of the participant
electronic liquidity provider	Typically, high-frequency traders or algorithmic traders who attempt to profit by providing continuous two-sided quotes for liquid securities on an unofficial basis to capture the bid–offer spread of a product
equity market products	Shares, interests in managed investment schemes, rights to acquire shares or interests in managed investment schemes under a rights issue, and CHESS depository interests admitted to quotation on ASX
exchange market	A financial market operated by a licensed market operator (under Pt 7.2 of the Corporations Act)
facilitation trade	Where a market participant acquires securities directly from its client and holds the securities briefly as principal for prompt resale
execution venue	A facility, service or location on or through which transactions in equity market products and Commonwealth Government Securities depository interests are executed and includes: • each individual order book maintained by a market operator; • a crossing system; and • a market participant executing a client order against its own inventory otherwise than on or through an order book or crossing system. This includes an order book and other matching mechanisms
financial market	As defined in s767A of the Corporations Act, a facility through which offers to acquire or dispose of financial products are regularly made or accepted

Term	Meaning in this document
financial product	Generally, a facility through which, or through the acquisition of which, a person does one or more of the following: • makes a financial investment (see s763B); • manages financial risk (see s763C); and • makes non-cash payments (see s763D) Note: See Div 3 of Pt 7.1 of the Corporations Act for the exact definition.
fleeting orders	Orders that fail to rest within a market for a meaningful period of time. This liquidity, although posted, is effectively inaccessible because investors are unable to trade purposefully against it
fragmentation	The spread of trading and liquidity across multiple execution venues
front running	The practice of transacting on one's own behalf because of, and in front of, a client order
fundamental investor	A person who buys or sells a security based on an assessment of the intrinsic value of the security (sometimes referred to as 'long-term investors')
high-frequency trader	Term used in this report to refer to a specific sub-group of traders within our analysis of equity market trading for the period from 1 January to 30 September 2012: see paragraphs 265–274, 416–420.
high-frequency trading	There is no internationally agreed, formal definition of high-frequency trading. For the purposes of this report, we have used the description provided by IOSCO: see paragraphs 23–26 for more detail
high-frequency trading entities	Term used in this report to refer to the small group of trading entities that dominate high-frequency trading in Australia, both in volume and value of trades: see paragraphs 28, 317–318
holding time	The period of time a trader holds a position
institutional investor	Advising institutions typically concerned with buying, rather than selling, assets or products. The most common types of institutional investors include private equity funds, mutual funds, unit trusts, hedge funds, pension funds and proprietary trading desks
internalisation	Where a client order is transacted against a market participant's own account
IOI (indication of interest)	A non-binding, electronic expression of trading interest that may contain information such as the security name, capacity (agency or principal), volume and price instructions to identify potential counterparties
IOSCO	International Organization of Securities Commissions

Term	Meaning in this document
latency	An expression of how much time it takes for data to get from one point to another
layering	The creation of large numbers of orders, often at various price points, to create a false impression of demand or supply. These orders are then deleted, or moved, as they move closer to trading
limit order	An order for a specified quantity of a security at a specified price or better
liquidity	Volume of orders
liquidity provider	An entity that places orders, often on both sides of the market, for significant proportions of the trading day, with the aim of profiting from the bid–offer spread
listed companies	Companies that are listed on an exchange market
lit exchange market	An exchange market where orders are displayed on the order book of a market operated by a market licensee and the orders are therefore pre-trade transparent
maker–taker pricing	A fee model, offered by exchange markets, that rewards market participants that make prices by paying a rebate or charging a lower fee than for price takers, Maker–taker pricing is common in overseas markets.
market impact	The effect on the formation of price, volume and market depth created by order flow or trading activity. This includes the associated cost incurred when the execution price differs from the target price, or when the liquidity required by the execution is different from the liquidity available
Market Integrity Rules	Rules made by ASIC, under s798G of the Corporations Act, for trading on domestic licensed markets
market licence	An Australian market licence
market licensee	Holder of an Australian market licence
market maker	An entity that provides liquidity to a market when it is generally absent or weak, and manages short-term buy and sell imbalances in customer orders by taking the other side of transactions. Market makers often take on this role in return for fee rebates or other incentives
market manipulation	As defined in Pt 7.10 of the Corporations Act
market operator	An operator of a licensed market: see paragraph 29
market order	An order matched at the best price currently available
market participant	A participant of a licensed market: see paragraph 30

Term	Meaning in this document
market users	Investors who acquire or dispose of financial products in a financial market, including an OTC market. Investors may be participants dealing for themselves or, where participants act as intermediaries, the clients of the participants
minimum size threshold	The minimum volume required before a trade can be executed in the dark
NBBO (national best bid and offer)	The highest bid (best buying price) and the lowest offer (best selling price) for a product that is available across all pre-trade transparent order books at the time of the transaction
off-market trading/transactions	Transactions that take place away from a CLOB and that are not pre-trade transparent. This is often referred to as 'dark liquidity' or 'upstairs trading'. It includes bilateral OTC transactions and transactions resulting from a market participant matching client orders or matching a client order against the participant's own account as principal
on-market trading/transactions	Trading that occurs on the CLOB of an exchange market, and that is generally accessible to others
operating rules	As defined in s761A of the Corporations Act
order book	An electronic list of buy orders and sell orders, maintained by or on behalf of a market operator, on which those orders are matched with other orders in the same list
order-to-trade ratio	The number of times orders submitted into an order book are amended or cancelled relative to the execution of a trade
OTC	Over the counter
Part 5.6 (Competition) (for example)	A part of the ASIC Market Integrity Rules (Competition) (in this example numbered 5.6)
Part 5.11 (ASX) and (Chi-X) (for example)	A part of the ASIC Market Integrity Rules (ASX) and ASIC Market Integrity Rules (Chi-X) (in this example numbered 5.11)
payment for order flow	An arrangement whereby a market participant, securities dealer or fund manager receives a payment from another market participant in exchange for sending its clients' order flow to them
pegged order	A specified quantity of a product set to track the best bid or offer on the primary market
pinging	The practice of using the placement of very small orders to test if there is liquidity
post-trade transparency	Information on executed transactions made publicly available after transactions occur

Term	Meaning in this document
pre-trade transparency	Information on bids and offers being made publicly available before transactions occur (i.e. displayed liquidity)
price formation	The process of determining the price of a security through the interaction of buyers and sellers
price improvement	From 26 May 2013, amended Rule 4.2.3 (Competition) takes effect. It provides an exception to the pre-trade transparency obligations where the dark trade provides price improvement of one tick size or the midpoint between the best available bid and best available offer
price step	See 'tick size'
price–time priority	A method for determining how orders are prioritised for execution. Orders are first ranked according to their price; orders of the same price are then ranked depending on when they were entered
principal trader	A market participant that can only trade on behalf of itself. 'Principal trader' is the term used in the Market Integrity Rules
priority crossing	A type of crossing on ASX's CLOB that is transacted with time priority
quote stuffing	A strategy to impede the processing of markets, or participant processes, by overloading an order book with trading messages
REP 215	An ASIC report (in this example numbered 215)
retail client	Has the meaning given in s761G and 761GA of the Corporations Act
retail investor	A retail client as defined in s761G of the Corporations Act
RG 241 (for example)	An ASIC regulatory guide (in this example numbered 241)
Rule 4.2.3 (Competition) (for example)	A rule of the ASIC Market Integrity Rules (Competition) (in this example numbered 4.2.3)
Rule 5.7.1 (ASX) and (Chi-X) (for example)	A rule of the ASIC Market Integrity Rules (ASX) and ASIC Market Integrity Rules (Chi-X) (in this example numbered 5.7.1)
S&P/ASX 20	The index known as the S&P/ASX 20
S&P/ASX 200	The index known as the S&P/ASX 200
S&P/ASX 300	The index known as the S&P/ASX 300
S&P/ASX 50	The index known as the S&P/ASX 50

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Term	Meaning in this document
s912 (for example)	A section of the Corporations Act (in this example numbered 912), unless otherwise specified
securities dealer	An entity that is an AFS licensee but is not in itself a market participant and that accesses the market on behalf of its clients through a market participant
sell-side	Firms that sell investment services to the buy-side, or corporate entities, including broking–dealing, investment banking, advisory functions and investment research
settlement	The exchange of payment and delivery for purchased securities
settlement risk	The risk of counterparty default
soft dollar incentives	The provision of a benefit to another party that does not involve a cash payment—for example, technology or bundled services (such as advice, research, data and analytical tools, in conjunction with trade execution)
SOR (smart order router)	An automated process of scanning various execution venues to determine which venue will deliver the best outcome on the basis of predetermined parameters
spoofing	The entry of large volumes of orders at best bid or offer price, which are then deleted within seconds of entry
spread	The difference between the best bid and offer prices
tick constrained	A security is tick constrained if its bid–offer spread is frequently equal to the minimum tick size
tick size	The minimum increment by which the price for an equity market product or Commonwealth Government Securities depository interest may increase or decrease
trade confirmation	A legal document provided to clients which sets out the terms of an executed transaction
trading messages	Messages submitted in relation to trading functions, such as orders, amendment or cancellation of orders, and the reporting or cancellation of market transactions
trading pause	A period during which the responsible market operator must prevent orders from being matched or executed on its market, but during which bids and offers may be displayed, entered, amended and cancelled

Related information

Headnotes

algorithmic trading, below block size dark trade, block trade, conflict of interest, crossing system, crossing system operator, dark liquidity, disclosure, facilitation, fundamental investor, high-frequency trading, internalisation, IOSCO, latency arbitrage, principles for dark liquidity, lit exchange market, market integrity, market operator, market participant, market quality, price improvement rule, principal trader, tick size

Regulatory guides

RG 223 *Guidance on ASIC market integrity rules for competition in exchange markets*

RG 241 *Electronic trading*

Legislation

Corporations Act

Consultation papers and reports

CP 145 *Australian equity market structure: Proposals*

CP 168 *Australian equity market structure: Further proposals*

CP 179 *Australian market structure: Draft market integrity rules and guidance*

CP 184 *Australian market structure: Draft market integrity rules and guidance on automated trading*

CP 195 *Proposed amendments to ASIC market integrity rules: ASX 24 and FEX markets*

REP 215 *Australian equity market structure*

REP 237 *Response to submissions on Consultation Paper 145 Australian equity market structure: Proposals*

Market integrity rules

ASIC Market Integrity Rules (ASX 24)

ASIC Market Integrity Rules (ASX)

ASIC Market Integrity Rules (Chi-X)

ASIC Market Integrity Rules (Competition)

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