



The legal tortoise and the high frequency trading hare: The challenge for regulators

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A little over a year after the US stock market 'flash crash' of 6 May, this article explores some of the legal and management issues and post-mortem regulatory initiatives to promote financial product innovation while at the same time limiting the potential disruption and harms caused by share high frequency trading (HFT) and algorithms gone mad. More generally, the article addresses the continuing challenge of law, including company law, to cope with challenges created by new technology.

1 Introduction

Discussions about the future of company law must include the general topic of the impact of technology on the corporate world and our financial system and the challenges this poses for regulators. While the use of technology, for example to facilitate shareholder meetings and facilitate share trading, can be beneficial, these same technology advances have the potential also to cause significant harm. One example of this is the case of HFT. Using as a case example, the US stock market 'flash crash' of 6 May, this article explores some of the legal issues and post-mortem regulatory initiatives to limit the potential disruption and harms caused by high frequency trading (HFT). Specifically, the main objectives of this article are to:

- define high frequency and algorithmic trading and explain briefly the techniques used by HFT;
- identify some of the advantages of HFT that have led to its rapid growth and increasing share of the market;
- articulate some of the concerns that have been raised about HFT, concerns that were heightened by the US 'flash crash' of 6 May 2010;
- summarise the planned regulatory response to HFT planned by regulators in the United States, Australia and the European Union; and
- identify further research and development that is required.

More generally, the article addresses the continuing challenge of law, including company law, to cope with problems created by new technology.

2 Nature of HFT and financial algorithms

2.1 Definition of HFT and algorithmic trading

High speed or frequency trading (HFT) is a form of trading that uses high speed, top-end computers that are programmed to execute share trades in

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milliseconds on electronic order books and are thereby able to hold or unload new equity positions within a sub-second.¹ Generally, high frequency traders (HFTs) use their own capital as opposed to acting on behalf of clients. HFTs move in and out of positions throughout the day, exploiting very small margins and millions of small transactions based on perceived trading patterns or prices that seem out of equilibrium.²

HFT works in combination with algorithmic trading, often called black-box trading, which relies on pre-determined, formulated complex mathematical equations (algorithms) fed into programs designed to enter orders when the conditions of the formula are met.³ So, while all HFT is algorithmic, only a small subset of algorithmic trading involves HFT. High frequency black box trading ranges from simple models that amount to a directional trend spotting formula to highly complex statistical arbitrage models (stat-arbs) that exploit price anomalies in correlated securities.⁴

Over the past decade there has been a rapid growth of electronic trading used especially by hedge-funds as part of their investment strategy. Black-box firms have grown rapidly and have been among the best performing and represent a significant share of market activity on all major stock markets (eg, Wall Street, Tokyo, Shanghai). At the same time, as seen in the 6 May ‘flash crash’, high frequency trading and other contextual factors led to a highly unstable market that lost and gained almost a trillion dollars in value in a matter of minutes, thus considerably shaking consumer confidence and confirming fears that many have long held about the nature of HFT. The secrecy of the black-box community and ability of HFTs to exploit regulatory gaps across a network of highly fragmented markets are just two of the many issues that have been raised by this new method of share trading.

2.2 Who engages in HFT?

A number of entities engage in HFT, including:

- Proprietary trading firms, usually small, staffed with people with strong mathematic/science expertise (QUANTS) and trading with the firm’s own capital, deploying cutting edge computers and software expertise.
- Electronic market makers that provide two way quotes on a wide range of instruments.
- Quantitative hedge funds that use strategies based purely on mathematical models. This is one of the fastest growing groups of high frequency traders.

1 See generally, P Wilmott, *Frequently Asked Questions in Quantitative Finance*, John Wiley & Sons, West Sussex, 2009.

2 Committee of European Securities Regulators, ‘Micro-structural issues of the European Equity Markets’, 1 April 2010, Ref: CESR/10-142, Paris, France, at <www.cesr.eu> (accessed 3 July 2011).

3 See S Patterson, *The Quants: How a New Breed of Math Whizzes Conquered Wall Street and Nearly Destroyed It*, Crown Books, New York, 2010; I Aldridge, *High Frequency Trading*, John Wiley & Sons, Hoboken, New Jersey, 2010.

4 Aldridge, above n 3.

- Proprietary trading desks of a multi-service broker-dealer or inside investment banks like Goldman Sacs.⁵

2.3 Business models used

In general HFTs make money in two primary ways. They offer bids in such a way so as to make tiny amounts of money from per share liquidity rebates provided by the exchanges.⁶ Alternatively, they make tiny per share long or short profits. These tiny margins from incremental asset gains/losses and rebates, are made possible by the extremely large volume of trade. Volume can be on the order of millions of shares traded almost immediately. Also, high levels of leverage are required to amplify those margins; 10x to 30x leverage is not uncommon.⁷ HFTs see themselves as not managing high levels of risk because the norm is that they finish flat each day, ie, they don't carry positions overnight. Although individual amounts are small, HFTs collectively execute millions of shares a day, making it an extremely substantial and profitable business.⁸

2.4 Specific strategies deployed by HFTs⁹

High frequency traders utilise a range of tools that in turn involve several strategies that, as explained below, leverage off of computer speed, low-latency first mover advantage, ability to deal in huge volume trading, acuity in sensing market movements, and capacity to act within short timeframes.¹⁰ A summary of the major strategies deployed by HFT's are as follows:

Co-location

In addition to the advantage gained by their extraordinary speed of computers and sophisticated programming in generating, routing and executing orders,¹¹ HFTs further enhance their competitive advantage by the use of co-location services and individual data feeds offered by exchanges and others to minimise network and other types of latencies.¹²

5 Aldridge, above n 3, p 3. Some of the largest HFT include: Millennium, Worldquant, Renaissance Technologies, and DE Shaw.

6 A Cartea and J Penalva, 'Where is the Value in High Frequency Trading?', 25 November 2010, at <http://www.cftc.gov/ucm/groups/public/@swaps/documents/dfsubmission/tac/presentation030111_acjp.pdf> (accessed 3 July 2011).

7 See generally, M Durbin, *All About High Frequency Trading*, McGraw-Hill, New York, 2010.

8 Aldridge above n 3, p 3.

9 See generally, E P Chan, *Quantitative Trading: How to Build Your Own Algorithmic Trading Business*, John Wiley & Sons: Hoboken, NJ, 2009.

10 See generally, E Perez, *The Speed Traders: An Insider's Look at the New High-Frequency Trading Phenomenon That is Transforming the Investing World*, McGraw-Hill, New York, 2011.

11 I Aldridge, 'What is High Frequency Trading, After All', 8 July 2010, at Huffington Post, <http://www.huffingtonpost.com/irene-aldrige/what-is-high-frequency-tr_b_639203.html> (accessed 3 July 2011).

12 HFTs have servers on the same floor as the stock exchange. Reducing latency by even a few milliseconds can provide a significant advantage.

Market making

Automatic Market Makers (AMMs) test the market to see who is trading and automatically respond in a way favourable to the HFT. They place, and rapidly edit, limit orders just outside the bid/ask spread of stocks in order to arbitrage these disparities. Thanks to high speed computing they are able to do these edits and adjustments many times per millisecond.¹³

Statistical arbitrage

Many traders are familiar with convergence trades, where two securities deviate from their historical pattern and as the deviation corrects itself, money can be made by shorting the one that is likely to come down and going long on the one that's likely to revert up. Statistical arbitrage is the same, except they do it with four or more variables, at the speed of light.¹⁴

Low-latency trading

Provides bids/asks to their own algorithmic trading platforms much faster than anyone else. This is a type of first-mover advantage, where milliseconds matter.¹⁵

Liquidity detection

Computers used by HFTs are programmed to sniff out the potential for large blocks coming behind small trades. By pinging immediate fill or cancel orders (often in dark pool trading exchanges that most people don't have access to), they can identify when a big seller, say a pension fund, is making a move. Then they can immediately buy up all offered shares of that security and resell those shares at a higher price than would have been available. This raises issues of fairness and equal access discussed below.¹⁶

Flash orders

An exchange flashes an order to the servers co-located with it for a half second before sending it to the wider market. This arguably gives co-located traders an unfair advantage over everyone else. Not every exchange allows flash orders and, as discussed below, the Securities and Exchange Commission (SEC) has recently banned them. HFTs have superior access to data streams provided by exchanges. Because of this, they can act accordingly, milliseconds before anyone else which is all the time they need. This is a much contested area because it violates the principle of equal market access to all of the same information.¹⁷

Liquidity rebates

As mentioned above, another HFT strategy is the collection of rebates that exchanges offer to liquidity providers. HFTs will outbid investors before immediately selling the shares to the investor at the slightly higher purchase

¹³ See generally, Aldridge, above n 3.

¹⁴ Ibid.

¹⁵ Ibid, p 3.

¹⁶ R Narang, *Inside the Black Box: The Simple Truth About Quantitative Trading*, John Wiley and Sons, New Jersey, 2009, pp xi-xii.

¹⁷ Ibid.

price and collect a rebate of one-quarter of a cent on both trades.¹⁸ Again, given the millions of volumes of HFT shares, this adds up to a substantial business gain.¹⁹

3 Context and growth of HFT

3.1 Context of HFT

HFT is made possible by advances in computing, network communication and mathematics. The emergence in the late 1990s of electronic trading venues known as ‘electronic communications networks’ (ECNs) made it possible for more individual investors to trade after-hours.²⁰ In theory, any investor who makes arrangements to access an electronic communications networks can trade in the after-hours marketplace. To participate in the after-hours trading sessions, you must be a customer of a brokerage firm that either has an ECN of its own or access to one or more ECNs. ECNs include Island,²¹ Archipelago²² and Instinet²³ amongst others.²⁴

A second factor leading to the growth of HFT is advances in quantitative finance. This involves using quantitative techniques and mathematical models to understand and develop strategies used to engineer profits or reduce exposure to risks in the financial system of the world.²⁵

A third factor is the trend for some brokers to allow hedge funds and other HFTs to have direct access to the market without going through the pre-trade and compliance checks that would normally attend Direct Market Access (DMA) which is routed through a broker’s compliance and risk checks. This unfettered access is called ‘naked access’ and can lead to significant risk

18 ‘Rise of the machines: High-frequency Trading’, *The Economist*, 1 August 2009.

19 Maker rebates encourage volume for the sake of volume. This has generated high volume among the top 100 stocks, giving the illusion of a deep, liquid market. A good percentage of this volume is from firms engaged in rebate arbitrage, however. Rebate arbitrage is highly complex, involving the arbitraging of numerous trading destinations, each with separate incentives and rates, such that participating in that game has little economic relevance and congruence with trading and investing in general. The successful playing of this game does not require buying low and selling higher, or vice versa. One of the criteria that many investment managers use when evaluating which securities to purchase is average daily volume (ADV). HFT ‘hot potato’ volume is skewing the statistics and could be distorting a key piece of information upon which many investors rely.

20 See M Bellafore, *One Good Trade: Inside the Highly Competitive World of Proprietary Trading*, John Wiley & Sons: Hoboken, NJ, 2010.

21 See B Biais, C Bisi and C Spatt, ‘Imperfect competition in financial markets: ISLAND vs NASDAQ’, 26 November 2003, at <<http://wpweb2.tepper.cmu.edu/spatt/island.pdf>> (accessed 3 July 2011).

22 See <http://en.wikipedia.org/wiki/NYSE_Arca> (accessed 3 July 2011).

23 See <<http://www.instinet.com/index.jsp>>. Instinet has been a leader in share trading innovation. For example, in 2007 it created Chi-X Europe, the first and largest European multilateral trading facility, which is now owned by a consortium of financial institutions.

24 See, M Sincere, *Understanding Stocks*, McGraw-Hill, NY, 2005, pp 64–5.

25 At <http://www.quantprinciple.com/invest/index.php/docs/intro_quant_principles/> (accessed 3 July 2011).

issues. The SEC is presently reassessing whether such access should be eliminated or significantly revised.²⁶

A fourth factor is the emergence of alternative and potentially related markets. In the 1990s the SEC passed reforms to gain further market efficiencies by allowing competition to the stock exchange by alternative trading systems. This marked the birth of electronic networks and quantitative financial professionals.²⁷ The existence of alternative markets made it possible for events to spill over into other markets, making it difficult for regulators in any one market to control events while at the same time making them potentially impacted by those events. Alternative Trading Systems (ATS) play an important role in public markets by allowing alternative means of accessing liquidity. Examples of ATS include:

- Electronic Communication Networks.
- Call markets — an auction market where orders are grouped until they reach a certain amount, and then executed together at a predetermined time.
- Matching systems.
- Crossing networks.
- Dark pools.²⁸

A fifth factor in the growth of HFT is the large number of trades involved, their inter-connectedness, and difficulty of monitoring activity among markets which have become increasingly international and interdependent with capital flows able to be moved electronically in a flash to other spots around the globe.²⁹ In addition to the advantages of scale and speed offered to investors by HFT, they have also reduced trading fees.³⁰

26 I Schmerken, 'The Naked Truth', 1 September 2009, *Wall Street & Technology*, Cover Story, p 30.

27 E Brown, 'Computerized Front-Running', *CounterPunch*, at <<http://www.counterpunch.org/brown04232010.html>>, 23 April 2010 (accessed 3 July 2011).

28 Rule 300(a) of the SEC's Regulation ATS provides the following legal definition of an 'alternative trading system':

Any organization, association, person, group of persons, or system:

- That constitutes, maintains, or provides a market place or facilities for bringing together purchasers and sellers of securities or for otherwise performing with respect to securities the functions commonly performed by a stock exchange within the meaning of Rule 3b-16 of this chapter; and
- That does not:
 1. Set rules governing the conduct of subscribers other than the conduct of such subscribers' trading on such organization, association, person, group of persons, or system; or
 2. Discipline subscribers other than by exclusion from trading.

See generally, E F Greene et al, *US Regulation of the International Securities and Derivatives Markets*, 9th ed, Aspen Publishers, Wolters-Kluwer, Aspen, 2006.

29 The difficulty of finding the necessary liquidity to match big-block orders forces traditional exchanges to slice and dice an order of 100,000 shares into smaller chunks of a few hundred shares each that are then executed at a range of different price points.

30 T Hendershott, C M Jones and A J Menkveld, 'Does Algorithmic Trading Improve Liquidity?' (2010) *Jnl of Finance*, at <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1100635> (accessed 3 July 2011).

3.2 Growth and extent of HFT

According to the Tabb Group, high frequency trading now accounts for 73% of daily equity volume in the United States resulting in \$21 billion profits last year.³¹

HFT is one of the most significant market structure developments in recent years. Estimates of HFT volume in the equity markets vary widely, though they often are 50% of total volume or higher. By any measure, HFT is a dominant component of the current market structure and is likely to affect nearly all aspects of its performance. As noted by SEC Chairman Mary Schapiro:

The financial crisis reminded us just how large, complex and critical to our economy the securities markets have become. Over the last 20 years, the dollar value of the average daily trading volume in stocks, exchange-traded options, and security futures has grown by over 25 times, reaching approximately \$245 billion a day.³²

Although the term 'high frequency trading' implies a large volume of trades, some of the concerns that have been raised about particular strategies used by proprietary firms do not necessarily involve a large number of trades. Indeed, any particular proprietary firm may simultaneously be employing many different strategies, some of which generate a large number of trades and some that do not. Conceivably, some of these strategies — for example, if they dampen short-term volatility or promote efficient pricing by narrowing spreads — may benefit market quality and long-term investors and others could be harmful.³³ The nature of some of these harms is discussed below.

4 US 'flash crash' of 6 May 2010³⁴

On 6 May 2010, the Dow Jones Industrial average dropped over 1000 points in a matter of minutes, only to recover those losses almost as quickly. It was the second largest point swing in history and largest intra-day swing. This dramatic event prompted an investigation of causes that led to such unusual volatility in the market. Quoting from the SEC/CFTC report on the 'flash crash':

The combined selling pressure from the Sell Algorithm, HFTs and other traders drove the price of the E-Mini down approximately 3% in just 4 minutes from the beginning of 2:41 pm through the end of 2:44 pm. During this same time cross-market arbitrageurs who did buy the E-Mini, simultaneously sold equivalent

31 K Heires, 'High Noon for High Frequency: Profits are now measured in microseconds. Will regulators tell traders: Not so fast?', *Securities Technology Monitor*, 3 August 2009, at <http://www.securitiestechologymonitor.com/issues/19_101/-23768-1.html?zkPrintable=true> (accessed 3 July 2011).

32 M Schapiro, Chairman of the Securities Exchange Commission, Testimony before the Committee on House Financial Services Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises, 20 July 2010.

33 See, eg, J Spicer and H Lash, 'Who's Afraid of High-Frequency Trading?', <www.Reuters.com>, 2 December 2009; S Patterson and G Rogow, 'What's Behind High-Frequency Trading', *Wall Street Journal*, 1 August 2009.

34 US SEC and the CFTC, 30 September 2010, at <<http://www.sec.gov/news/studies/2010/marketevents-report.pdf>> (accessed 3 July 2011).

amounts in the equities markets, driving the price of SPY [an exchange-traded which represents the S&P 500 index] also down approximately 3%.

Still lacking sufficient demand from fundamental buyers or cross-market arbitrageurs, HFTs began to quickly buy and then resell contracts to each other — generating a ‘hot-potato’ volume effect as the same positions were rapidly passed back and forth. Between 2:45:13 and 2:45:27, HFTs traded over 27,000 contracts, which accounted for about 49% of the total trading volume, while buying only about 200 additional contracts net.

A stock market anomaly, the major market indexes dropped by over 9% (including a roughly 7% decline in a roughly 15 minute span at approximately 2:45 pm eastern time) on 6 May 2010 before a partial rebound. Temporarily, \$1 trillion in market value disappeared. While stock markets do crash, immediate rebounds are unprecedented. The stocks of eight major companies in the S&P 500 fell to 1 cent per share for a short time, including Accenture, CenterPoint Energy and Exelon; while other stocks, including Southeby’s, Apple and Hewlett-Packard increased in value to over \$100,000 in price. Procter & Gamble in particular dropped nearly 37% before rebounding, within minutes, back to near its original levels.³⁵

After almost 6 months of investigation, a joint report by the SEC and the Commodity Futures Trading Commission (CFTC) identified the spark that set off the ‘flash crash’ as the single sale of \$4.1 Billion in futures contracts by Wadell & Reed Financial, a mutual fund in Overland Park Kansas. This action eliminated a large number of buyers from the market because HFTs, were also aggressively selling. The report found that ‘HFTs began to quickly buy and then resell contracts to each other — generating a “hot-potato” volume effect as the same positions were passed rapidly back and forth’.³⁶ While the SEC/CFTC saw HFT as part of the problem, there was also evidence that they assisted to correct the situation, pointing to the fact that their actions were also responsible for the market righting itself in a matter of minutes.³⁷

In its investigation the SEC/CFTC listed as additional factors causing the crash: a number of outdated and inconsistent rules governing trading across a wide number of markets as well as speculation. Ruled out by the report were criminal behaviour and terrorist activity.³⁸

Notwithstanding the report, some analysts have suggested that market manipulation was behind the flash crash. Rose, for example, suggests that it was deliberately induced by targeting orders at the NYSE which produced

35 The shares of more than 25% of all Exchange Traded funds experienced temporary declines of more than 50%.

36 G Bowley, ‘Lone \$4.1 Billion Sale Led to “flash crash” in May’, 1 October 2010, *New York Times*, at <http://www.nytimes.com/2010/10/02/business/02flash.html?_r=2&scp=1&sq=flash+crash&st=nyt> (accessed 3 July 2011).

37 M Corkery, ‘High Frequency Traders Saved the Day’, 13 September 2010, *Wall Street Journal*, at <http://blogs.wsj.com/deals/2010/09/13/jim-simons-on-flash-crash-high-frequency-traders-saved-the-day/?goback=.gde_86999_member_29971040> (accessed 3 July 2011); contra K Scannell, ‘Report: Algorithm Set Off “Flash Crash” Amid Stressed Market’, 1 October 2010, *The Wall Street Journal*, at <<http://online.wsj.com/article/SB10001424052748703859204575525973854203534.html>> (accessed 3 July 2011).

38 Z Goldfarb, ‘SEC Launches Inquiry into Market ‘Flash Crash’’, *Washington Post*, 21 May 2010, at <<http://www.washingtonpost.com/wp-dyn/content/article/2010/05/20/AR2010052005086.html>> (accessed 3 July 2011).

latency.³⁹ Others make the point that HFT depends upon highly volatile, unstable and difficult to regulate markets. It is argued that this is why some traders have moved to markets for currencies and stock futures, where volatility remains strong. There are also suggestions that it is having a similar effect on volatility in these new markets. For example, 16 March 2011 the US dollar fell 5% against the Japanese yen within a span of minutes. In February of that year sugar prices plummeted 6% within a single second.⁴⁰

Finally, still other commentators have argued that the 'flash crash' was an inevitable panic reaction in the market — events which happen from time to time and which no regulatory reform will be able to prevent.⁴¹

5 Regulatory reform

5.1 Advantages of HFT

HFT and algorithmic trading are here to stay and the technology genie will not be put back into the bottle. This is a reflection that computers have largely replaced humans when it comes to short-term trading, just as it has other areas of human activity. Just as farming has increasingly been taken over by large corporate firms, so too share trading is increasingly dominated by big 'technology have' players such as HFTs that possess the capital, technology, people talent and systems to thrive in this new environment. The growth of HFT has also arguably added liquidity to the market,⁴² facilitated trading and resulted in the creation of new financial instruments that are well suited to managing various risks that occur in a globalised and inter-connected set of markets.⁴³ It is also good for the market in that the 24/7 analysis and blinding speed make the market more efficient and responsive.⁴⁴

5.2 Concerns about HFT

In relation to HFT, some would echo the words of Aldous Huxley who observed, '[t]echnological progress has merely provided us with more efficient means for going backwards'. The major concerns about HFT can be summarised in the following points:

39 C Rose, 'The Flash Crash of May 2010: Accident or Market Manipulation' (2011) 9(1) *Jnl of Business & Economics Research* 85.

40 C Cui and T Lauricella, 'Mini "Crashes" Hit Commodity Trade' *Wall Street Journal*, Eastern Edition, 5 May 2011, Vol 257, Issue 104, pp C1–C2.

41 See Perez, above n 10.

42 There have been few studies regarding the impact of HFT on market liquidity. A recent study by Hendershott et al, above n 30, concluded that HFT did add to market liquidity.

43 B Urstadt, 'Trading Shares in Milliseconds', (Jan/Feb 2010) *Technology Review*, at <<http://www.technologyreview.com/computing/24167/>> (accessed 3 July 2011); C Duhigg, 'Stock Traders Find Speed Pays, in Milliseconds', 23 July 2009, *New York Times*, At <<http://www.nytimes.com/2009/07/24/business/24trading.html>> (accessed 3 July 2011).

44 Aldridge, above n 3, p 3. Aldridge cites an analogy by Richard Olsen who compares HFT to blood in the body that flows through the system twice a day, clearing up infections. Another analogy is how the body can make small adjustments instantaneously to enable the body to restore balance.

1 Too much speed and complexity, too many fragmented markets, too little transparency

The speed with which HFT takes place is part of the problem. In terms of regulatory framework, to use an automobile analogy — little regulation is required when a small number of early model cars with primitive engines were moving at speeds of around 10–20 mph. However, as the number of cars and the speed at which they travelled increased, a regulatory framework, police, traffic lights, automobile insurance and other features became necessary. Unfortunately, these infrastructure components often lagged behind the rapid growth in automobiles. The modern share market environment is at that chaotic point when the growth has appeared and made obvious the fact that regulation and other changes were required to cope with the reality:⁴⁵

In a world of 50 market venues, with structural latency issues being targeted by an entire industry of high-frequency traders, millions of trades reaping millions of dollars can take place before retail investors and the regulators who protect their interests can comprehend what happened. We need to ask if regulators are looking through the wrong end of a telescope when they should be using a microscope.⁴⁶

This imbalance between rapid growth through technology advances and a trading framework unable to cope with the change is seen in the 104 page SEC/CFTC report which concluded that the liquidity crisis that occurred on 6 May 2010 was exacerbated by HFTs quickly offsetting their positions between futures and stocks, and by the overall crush of sell-at-any-price orders.⁴⁷

Exchanges in other countries, Australia being one, have seized on the role that ‘market fragmentation’ played in dispersing and sapping that liquidity — that is, the availability of bids and offers. Stocks trade on 50 some venues in the United States, where the market is more fragmented than in Europe. As noted by Rainer Riese, managing director of Deutsche Boerse’s cash equities section: ‘There is a balance between market integrity and complexity, and the US market, lately, seems very complex to us.’⁴⁸

A related concern is regulatory arbitrage across markets in different countries. Fortunately, the 6 May ‘flash crash’ occurred at a time of the day when the EU markets were closed thus preventing the contagion from spreading globally.⁴⁹

45 R S Karmel, ‘Competition versus Fragmentation in Fast Equity Markets’, (2010) 243 *New York LJ* 3.

46 T Durden, ‘Senator Kaufman: ‘The Market is Currently Heavily Fragmented and Dominated by High-Frequency Traders’, *Zero Hedge*, 14 September 2009, at <<http://www.zerohedge.com/article/senator-kaufman-market-currently-heavily-fragmented-and-dominated-high-frequency-traders>> (accessed 3 July 2011).

47 US SEC and the CFTC, 30 September 2010, ‘Findings Regarding the Market Events of 6 May 2010’, at <<http://www.sec.gov/news/studies/2010/marketevents-report.pdf>> (accessed 3 July 2011).

48 J Spicer, ‘Special report: Globally, the flash crash is no flash in the pan’, 15 October 2010, *Reuters*, at <<http://www.reuters.com/article/idUSTRE69E1Q520101015>> (accessed 3 July 2011).

49 B Allen, ‘This is Why the FLASH CRASH Could have Been a Whole Lot Worse’, *Business Insider*, 29 March 2011, 10:10 am, p 169.

2 Danger of algorithm going mad

Many HFT typically involve hedge funds that enter their orders into the market through a 'sponsored access' arrangement with a broker. Many of these arrangements have few if any pre-trade risk controls since these clients demand the fastest speed. Due to the fully electronic nature of the equity markets today, one keypunch error could wreak havoc. It is very difficult to stop a market destroying order once the button is pressed and with algorithms pegging stock to other stock the 'hot potato' effect is almost impossible to stop, as was seen in the 6 May 'flash crash'.⁵⁰ Psychologically, too, and as reflected in past market hysterias, uncertain times and mass panic impact stock markets just as they do other forms of human activity. And, as the world becomes a smaller place and increasingly inter-connected, the potential for such conduct would appear to be inevitable.⁵¹

3 Financial terrorism

As the financial system grows more dependent upon and is impacted by technology, there is also an increased risk of financial terrorism.⁵² With HFT assuming a greater and growing proportion of all trades, the prospect of a deliberately engineered financial and economic crash looms larger. Even if an attack is unsuccessful, once it becomes known that a particular component of our financial system is under serious attack, that fact alone is likely to have a destabilising impact on consumers and may itself generate panic behaviour. It is thus more important than ever that governments cooperate and work together to deter, detect and defeat terrorist attacks on the financial system.⁵³

4 Lack of coherent/coordinated regulation across markets and regulatory capture

Another problem with US regulation is that the regulatory framework is unclear about what body has accountability for oversight of specific activity. There has thus been a degree of regulatory arbitrage as market players seek

50 This is often referred to as the fat thumb scenario. See T Durden, 'HFT Fat Digital Finger Breaks Citi Stock, Shares Halted As Circuitbreaker Triggered With Stock Plunging 20%', 29 June 2010, *Zero Hedge*, at <<http://www.zerohedge.com/article/hft-fat-digital-finger-breaks-citi-stock-shares-halted-circuitbreaker-triggered-stock-plungi>> (accessed 3 July 2011).

51 See generally, J Eatwell and L Taylor, *Global Finance at Risk: The case for international regulation*, The New Press, New York, 2001.

52 See generally, R B Johnston and O M Nedelescu, 'The Impact of Terrorism on Financial Markets', International Monetary Fund, March 2005, Working Paper: WP/05/06; D Masciandaro, *Global Financial Crime: Terrorism, Money Laundering, and Off Shore Centres*, Ashgate Publishing, Ltd, UK, 2004.

53 R Ghosh, 'A Financial 9/11? Risks, Repercussions and Responses to the Threat of Financial Terrorism', *Westlaw Jnl Bank & Lender Liability*, 25 October 2010; R Ghosh, 'The Flash Crash and Financial Terrorism: Could the 19th Street NW Scenario Come True?' *RouBini Global Economics: Global Macro Economonitor*, 7 October 2010, at <http://www.roubini.com/globalmacro-monitor/259761/the_flash_crash_and_financial_terrorism_could_the_nineteenth_street_nw_scenario_come_true_> (accessed 3 July 2011); R Jones, 'High Frequency Trading and Cyber Terrorism', 16 November 2010, *High Frequency Trading Review*, (interview by Mike O'Hara), at <<http://highfrequencytradingreview.com/high-frequency-trading-and-cyber-terrorism/>> (accessed 3 July 2011).

out the regulatory authority that is most supportive of the particular activities in question. What is needed is more systemic regulation across all the markets.

While there is sufficient citation to support the claim of incoherent regulation, the National Commission noted the role of financial firms in influencing regulatory policy and law making through the needs of political parties for money.⁵⁴ Thus a related concern about HFT and the regulation of the market generally is that there has been in recent years a form of regulatory or agency capture, especially under the Bush administration where anti-regulatory theory was dominant. This led to many federal agencies drawing their leadership from the finance industry as well as the influence in Washington of powerful lobby groups representing the financial industry.⁵⁵

5 Not enough regulation

In the United States, the SEC has largely blamed for fuelling the plunge the outdated and inconsistent rules governing trading across a wide array of market venues, as well as speculation in electronic futures markets. It is also the case that there is not enough of the right kind of regulation. Rulemaking must take into account disruptive advances in technology.⁵⁶

6 Perversion of the market from its historical role of raising equity

With the growth of HFT, the equity market goal of raising capital for corporations seems to have been significantly diminished. This is evidenced, among other ways, by the lack of new listings in the market. Today in the US market the algorithmic games involved in HFT with its micro and even nano-second holding periods are undermining investor confidence and eroding the purpose of markets by creating a casino mentality.⁵⁷ In this highly fragmented world, institutions have embraced suites of algorithms as they

54 See Financial Crisis Inquiry Report, Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, US Government Printing Office, 2011, p xviii.

55 E Bloxham, 'The SEC Still Needs to Escape Regulatory Capture. Here's How', *Fortune*, 30 July 2010, at <http://money.cnn.com/2010/07/30/markets/SEC_regulatory_capture.fortune/index.htm> (accessed 3 July 2011); S E Woodward, 'Regulatory Capture at the US Securities and Exchange Commission', Milken Institute Conference on Capital Markets, 16 March 1998, Santa Monica, California, at <<http://www.sandhillecon.com/pdf/RegulatoryCapture.pdf>> (accessed 3 July 2011). See generally, J J Laffont and J Tirole, 'The Politics of Government Decision Making: A Theory of Regulatory Capture' (1991) 106(4) *Quarterly Jnl of Economics* 1089; M E Levine and J L Forrence, 'Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis', (1990) 6 *Jnl of Law Economics & Organization* 167. Nobel 1982 Prize winner G Stigler is regarded as the founder of regulatory capture theory. His essays are collected in *The Intellectuals and the Marketplace*, Institute of Economic Affairs, 1963; *The Citizen and the State*, University of Chicago Press, Chicago, 1975; and *The Economist as Preacher*, University of Chicago Press, Chicago, 1984.

56 See G Tett, 'What Can Be Done to Slow High-Frequency Trading?', *Financial Times*, 9 September 2010, at <<http://www.ft.com/cms/s/0/d72966fa-bc2d-11df-8c02-00144feab49a.html>> (accessed 3 July 2011).

57 J McTague, *Crapshoot Investing*, McGraw-Hill, New York, 2011.

provide a low execution rate, labour efficiency and, in general, a superior performance level compared to non-algorithmic non-HFT.⁵⁸

7 Digital divide

The advantage⁵⁹ held by and given to HFT is said by some to be unfair.⁶⁰ It creates the winners and the losers or non-players — the winners able to engage in a way that routinely does better than the market, and the losers left to either abandon the game or continue to rely upon traditional strategies that are far more arbitrary, less scientific and generally less successful.⁶¹ HFT is extremely expensive given the costs of the hardware, real estate next to the exchange, high paid programmers to devise the algorithms and other infrastructure.⁶² Indeed, notwithstanding the regulatory clouds hanging over HFT after the ‘flash crash’ traders appear to be more determined than ever to continue to escalate computing speeds with the latest HFT computing now able to consummate trades at nano-second speed, ie, in billionths of a second, which is far faster than the blink of an eye.⁶³ Leading HFTs appear to be creating a situation with the traditional market for small retail and long term investors and a special high speed super trading lane in the market reserved for huge volume, high speed players who take advantage of superior technology and regulatory loopholes to achieve significant profits unavailable to those in the slower traditional trading lanes.⁶⁴ As US Senator Charles Schumer noted:

The hallmark of our markets are that they are open and above board and the little guy has as much of a chance as the big guy. This takes a dagger to the heart of that concept.⁶⁵

58 P Guillot, Whitepaper, ‘MiFID Debate: CA Cheuvreux’s Contribution’ <www.cheuvreux.com>, 27 November 2009, at <<http://thefinanser.co.uk/files/ca-cheuvreux-on-mifid.pdf>> (accessed 3 July 2011).

59 S Arnuk and J Saluzzi, ‘Latency Arbitrage: The Real Power Behind Predatory High Frequency Trading, A Themis’, Trading LLC White Paper, 4 December 2009, at <http://www.themistrading.com/article_files/0000/0519/THEMIS_TRADING_White_Paper_-_Latency_Arbitrage_-_December_4_2009.pdf> (accessed 3 July 2011).

We believe Latency Arbitrage is more than a simple case of technological evolution, but raises serious questions about the fairness and equal access of US equity markets which have made them the envy of the world. Firstly, it is about using cutting edge technology and co-located servers at exchanges and ATSS, combined with purchases of raw data feeds from these market centres, to create one’s own inside National Best Bid and Offer (NBBO) quote and depth of book substantially earlier than what is publicly available from the Security Information Processor, or SIP quote. The SIP feeds quotes seen on professional terminals, algo trading systems used by institutions for as much as 50% of their orders, and quotes seen by retail investors on Internet sites.

60 Durden, above n 46.

61 R Narang, *Inside the Black Box: The Simple Truth About Quantitative Trading*, John Wiley and Sons, New Jersey, 2009, pp xi–xii.

62 P Furber, ‘Electronic Trading: the Good and the Bad’, October 2009, *IT Web Brainstorm*.

63 B Conway, ‘Wall Streets Need for Trading Speed: The Nanosecond Age’, *Market Beat*, 14 June 2011, 4:38pm ET, at <http://blogs.wsj.com/marketbeat/2011/06/14/wall-streets-need-for-trading-speed-the-nanosecond-age/?mod=google_news_blog> (accessed 3 July 2011).

64 Urstadt, above n 43.

65 C Schumer, cited in C Duhigg, ‘Senator Wants Restrictions on High-Speed Trading’, *New York Times*, 25 July 2009, Section B, p 6.

To prevent abuse and achieve fairness and transparency and public trust in our financial markets, it is important to ensure fair access for co-located servers at the exchanges and a method of allocation that does not disadvantage retail orders.

8 HFT volume can generate false trading signals

HFT can cause other investors to buy at a higher price, or sell at a lower price, than they would otherwise. A spike in HFT volume can cause an institutional algorithm order based on a percentage of volume to be too aggressive. A spike can attract momentum investors, further exaggerating price moves. Seeing such a spike, options traders can start to build positions which, in turn, can attract risk arbitrage traders who believe there's potential news that could affect the stock.

9 HFT as adding volume but little liquidity

Although opinion differs on the liquidity argument, detractors point out that in the 6 May 'flash crash' HFTs began to quickly buy and then resell contracts to each other — generating a 'hot-potato' volume effect as the same positions were rapidly passed back and forth. In the case of the 'flash crash', between 2:45:13 and 2:45:27, HFTs traded over 27,000 contracts, which accounted for about 49% of the total trading volume, while buying only about 200 additional contracts net. In other words, the ratio of 'volume' to actual liquidity was about 135:1. Thus HFT provided volume with little contribution to market liquidity.⁶⁶

It is also argued that the millisecond trading capacity of HFT gives HFTs an unfair advantage. Moreover, events such as the 'flash crash' threaten to undermine confidence in the market. Also, the business models underscoring flash trading tend to subvert the traditional role of the market as raising capital for business ventures. This is evidenced, among other ways, by the lack of new listings in the market. Instead, HFTs are dominating activity through their microsecond holding periods. Another concern is the general instability of such a system and potential danger that either by accident or malicious intent, the system could go down, or worse, go mad, as happened on 6 May, when almost a trillion dollars of value disappeared in minutes. This instability may lead to an undermining of confidence in HFT specifically and generally in the market as a whole.⁶⁷

10 HFTs have insufficient stake/obligation in preserving the market

With millions of high speed trades occurring in milliseconds through co-location and data feeds provided to HFTs, they have all the advantages but

66 S L Arnuk and J Saluzzi, 'Toxic Equity Trading Order Flow on Wall Street: The Real Force Behind the Explosion in Volume and Volatility', A Themis Trading LLC White Paper, 2010, at <<http://www.themistrading.com>> (accessed 1 October 2010); N Mehta and W Kislring, 'Automatic Futures Trade Drove May Stock Crash, Report Says', 1 October 2010, *Bloomberg*, at <<http://www.bloomberg.com/news/2010-10-01/automatic-trade-of-futures-drove-may-6-stock-crash-report-says.html>> (accessed 3 July 2011).

67 L Thomas Jr, 'Dutch Market-Making Firm tests Limits with ultra-fast Trades: Optiver Inquiry in US causes Worries about High-Frequency Trading', 5 September 2000, *The International Herald Tribune*, p 14.

with no obligations to protect the market. The SEC is looking at whether key financial firms broke securities laws when they stopped buying and selling stocks during the 'flash crash' on 6 May, helping fuel the historic plunge in prices. HFT adds volatility to the markets but little additional value. It simply creates a situation where the same shares are being traded again and again.⁶⁸

11 Growth of dark pools and lack of transparency

When the Securities Exchange Act of 1934 was first passed it was envisioned that the legislation would facilitate the creation of a market that was fair and transparent to all. Yet with the growth of electronic trading, the market pools are dark and murky.⁶⁹ Dark pools are large blocks of equities traded off the exchange floor. They use Alternative Trading venues that do not display bids or offers in the consolidated public quotation system. Although they report their executed trades in the consolidated data, the trade reports need not identify the ATS that executed the trade.⁷⁰

Dark pools are recorded to the national consolidated tape. However, they are recorded as over-the-counter transactions. Therefore detailed information about the volumes and types of transactions is left to the crossing network to report to clients if they desire and are contractually obligated. As mutual funds, hedge funds, pension funds, insurance funds and other large blocks of equity in the United States increased in size, it became much more challenging for these entities to move their money in and out of the financial market. Consequently, funds developed strategies to move money into and out of stocks. Typically developed by teams of QUANTS these strategies are quite complex. However, as soon as a fund's 'hand' has been disclosed other traders can start to take advantage of that knowledge, thus moving the price of the underlying share in a disadvantageous direction. To prevent this from happening, the QUANTS have developed strategies that are unpredictable. This unpredictability was gained by formulas that included buying or selling options or other derivative type contracts to allow for protection as the funds tried to move large amounts of equity in or out of an underlying stock.

This new strategy worked well while trading was done mostly on the floor. However, as trading moved to electronic systems which are for more analytical, sophisticated and fast and with trades able to be conducted in milliseconds, equity's price can move much more rapidly than it could in an

68 SEC Chairman M Schapiro said at a congressional hearing on 10 July 2010 that these companies, known as market makers, might have violated a legal duty to continue to buy and sell during the rapid decline.

'We don't have evidence yet of market makers who had affirmative obligations from withdrawing from the market', Schapiro told the Senate banking committee. 'It is absolutely something that we're looking at and we've incorporated our enforcement division into our ongoing investigation.'

Schapiro's comments are the first signal that the regulator might seek to sanction firms if they contributed to the decline of nearly 1000 points in the Dow Jones Industrial Average. The agency previously had not suggested that wrongdoing could have been behind the market chaos.

69 See R Hatch, 'Reforming the Murky Depths of Wall Street: Putting the Spotlight on the Security and Exchange Commission's Regulatory Proposal Concerning Dark Pools of Liquidity' (2010) 78 *The George Washington L Rev* 1032.

70 R Karmel, 'Competition Versus Fragmentation in Fast Equity Markets' (2010) 243 *New York LJ* 3.

open call system. When trades can be conducted in milliseconds, equity's price can move much more rapidly today than it could in an open call system. All these factors led to the natural desire for large institutional funds, for example, to find more efficient ways to move large blocks of equities, without forcing the price up or down in the process. Dark pools allow funds to quietly trade large blocks of stock in the same manner that smaller players can trade. This is really very important for the liquidity of the market because the large institutional players and the small players are really two different equity pools.⁷¹ Therefore, when the large funds play in the small pool of equity this means that the moves they make drive the price in that direction.⁷² The efficiency of dark pools in this context has been confirmed by at least one recent study which found that large-volume trades are most cheaply executed in dark pools because trading on the open market leads to additional costs and complexities.⁷³

At the same time, the lack of transparency of dark pools can be problematic for smaller investors and a challenge in terms of regulatory oversight. Regulators and some investors have a fear that dark pools lack transparency and may offer favoured pricing not available to other retail traders. And so, the challenge is how to preserve the advantages of the dark pools for large traders while also enhancing the transparency of the system overall and ensuring that it is fair. There have been some recent suggestions that regulation may seek to require all HFT firms to become mandatory market makers in securities, to have regulators approve algorithms before they are used or to have them tested in house before they are used to show how they would deal with faults, mandating how many trades can be placed, setting a minimum time before execution, and more transaction reporting so regulators can see who is behind a trade. HFTs oppose most of these reforms, particularly those seeking to limit the number and timing of trades.

5.3 Movements to reform

The US has taken a number of steps to strengthen the market since the 6 May 'flash crash'. An important first step as mentioned above was an investigation by the US Securities Exchange Commission and reconstruction of key metrics and events of that day. In its investigation the SEC reaffirmed the need to enhance the mechanisms that provide market participants with an opportunity to respond to abnormal price moves, the need for market-wide circuit breakers

71 A Zendrian, 'Don't Be Afraid of the Dark Pools', *Forbes.com*, 18 May 2009, at <<http://www.forbes.com/2009/05/18/dark-pools-trading-intelligent-investing-exchanges.html>> (accessed 3 July 2011).

72 Hatch, above n 69.

73 T Demos, 'Dark Pools Reduce Trade Costs', 14 January 2011, *FT.Com* (Financial Times), at <<http://www.ft.com/cms/s/0/34374492-1ea9-11e0-a1d1-00144feab49a.html#axzz1BXzQ1bFB>> (accessed 3 July 2011).

as well as to limit up and down restrictions,⁷⁴ and the need for greater risk management across the various equity markets.⁷⁵

Several other related reforms came with the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank legislation) which became law on 21 July 2010. The Act is designed to be rolled out in stages with US financial regulators undertaking an intense period of rule making over the next 2 years. In general the new law has the goal of improved market surveillance while also addressing issues that were raised by the ‘flash crash’ of 6 May. Briefly, the legislative reforms include:

- Development of a consolidated audit trail for the listed equities and options markets. This would be a large multi-year project to create a system that will provide a comprehensive, real time data repository for all information regarding orders and executions. With such a system in place the SEC will be able to conduct surveillance on and analyse all activity in scope.
- Redesign of circuit breaker rules that pause trading in any component of the S&P 500 Index if the price drops or rises 10% or more in 5 minutes.
- New and clearer SEC guidelines for erroneous trade with the SEC to have power to nullify clearly erroneous trades.⁷⁶ These guidelines would provide for pauses in situations where the price moves more than a specified percentage from the opening price and breakers for cases of extreme volatility.⁷⁷
- Adoption of a rule that restricts short selling when a stock is experiencing significant downward price pressure.
- Establishment of rules to create a stronger, more robust regulatory framework for credit rating agencies.
- Proposed new rule that would restrict broker-dealers from providing customers with ‘unfiltered’ or ‘naked’ access to an exchange or ATS. The new rules require broker-dealers with access to trading directly on an exchange or ATS to implement risk management controls and supervisory procedures to manage financial, regulatory and other

74 C Baker, ‘SEC Announces Limit-up, Limit-Down Proposal’, *NYSE Euronext*, 7 April 2011, at <<http://exchanges.nyx.com/charles-baker/sec-announces-limit-limit-down-proposal>> (accessed 3 July 2011). *Plan To Address Extraordinary Market Volatility Submitted To The Securities And Exchange Commission Pursuant To Rule 608 Of Regulation Nms Under The Securities Exchange Act Of 1934*, at <<http://www.sec.gov/news/press/2011/2011-84-plan.pdf>> (accessed 3 July 2011).

75 CFTC-SEC Joint Advisory Committee May 6 Report, at <<http://www.cftc.gov/About/CFTCCommittees/CFTCSECJointAdvisoryCommittee/index.htm>> (accessed 3 July 2011) (A joint advisory panel, headed by US SEC chairman Mary Schapiro and CFTC Chairman Gary Gensler, proposes regulations to curb trading strategies of high-frequency firms including tightening controls on the growing number of computerised high-frequency and algorithmic traders).

76 See Exchange Act Release 62333, 21 June 2010.

77 G C Robert, L D Colby and D I Portilla of Davis Polk & Wardell LLP, ‘Broker/Dealer Regulation and Enforcement 2010: Current Issues in the US Equity and Options Markets’, *Practising Law Institute*, Corporate Law and Practice Course Handbook Series, PLI Order No 22715, 27 October 2010, 1845 PLI/Corp 309, p 314.

risks involved with this access.⁷⁸ The SEC will also examine co-location risks, equal access and transparency issues in connection with HFT.

- Implementation of a large trader reporting system that requires any trader who trades 2 million shares with a fair market value of \$20 million in a single day or 20 million shares with a fair market value of \$200 million in a single month to register with the SEC and obtain a large trader identification number.
- Creation of new reporting practices in relation to dark pools that would require dark pools to make their trading volume statistics available so that the public can assess dark pool trading volume and assess which pools may have liquidity in particular stocks.
- Development of rules to deal with market fragmentation and that would require greater disclosure by market centres and brokers concerning the quality of trade executions and order routing practices.
- Proposed rules to require that information about an investor's interest in buying or selling a stock be made publicly available, instead of available only to a select group operating in a dark pool.
- The banning of flash orders on the grounds of unfairness in providing some traders with information not available to others.
- The Dodd-Frank regulatory reform legislation also contains a number of reforms to the SEC's funding structure which gives it greater resources with which to do its job and keep pace with developments such as HFT.
- Enhancement enforcement of regulations. Enforcement is a key element to fair and effective markets. Swift and vigorous prosecution of those who have violated the law is at the heart of the agency's efforts to promote investor confidence in the integrity of the marketplace.⁷⁹
- This enforcement includes the strengthening of examinations and oversight as well as greater reliance on risk assessment procedures and techniques to better identify areas of risk to investors.
- Enhanced training of examiners. There is a planned update of the agency's technology and systems for reviewing complaints, tips and investigative leads.⁸⁰

The investigation of HFT continues. Jim McTague reports that on 29 April, the Justice Department and the SEC opened a joint investigation into high-frequency trading practices. The investigation will focus on whether

78 Given the competitive pressures to maximise their speed of trading, HFT firms typically will attempt to streamline the code for their trading algorithms. However, every check and filter in that code reduces its speed, creating a tension.

79 M Schapiro, Chairman of the SEC, Testimony before the Committee on House Financial Services Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises, 20 July 2010.

80 Robert, Colby and Portilla, above n 77.

high-speed traders are placing and cancelling waves of orders in an attempt to manipulate the market by scanning historic trading data for patterns.⁸¹

5.4 General reforms

In addition to the specific reforms mentioned above, there are also a number of general reforms relevant to HFT, including the provision of additional resources to regulators, enhanced use of technology by the regulators and reliance on the market itself. Over the past decade while the markets have been growing exponentially in size and complexity, 'the SECS workforce actually decreased and its technology fell further behind'.⁸² Moreover, the remunerations available in the industry as opposed to government have also resulted in government regulators struggling to attract and retain top talent. That more people resources is needed was stressed by the the US CFTC Technology Advisory Committee.⁸³ These proposals are designed to prevent the negative impact of HFT on market integrity, including market crashes. The committee added that the regulation of the algorithmic market would be very expensive. The CFTC stressed the need for a virtual army of CFTC-employed quality assurance professionals with complete access to the intellectual property of all trading firms at all times.

A second broad reform relates to the general upgrade of talent working in government. The SEC is hiring new senior managers who are well versed on modern share trading. This includes new interdisciplinary teams. Because today's markets are fast moving and constantly changing, the regulators must continually improve their knowledge and expertise. The SEC is also developing specialisation in the form of investigative groups dedicated to high priority areas.⁸⁴

Technology and innovation, while being part of the problem of HFT, can also provide solutions,⁸⁵ such as through FTEN, Inc (FTEN), maker of the RiskXposure platform that provides patented real-time risk management data cloud which supports high-speed financial trading and provides pre and post trade risk management, and trade surveillance for all types of trading. FTEN was one of the fastest growing software companies in the world with revenue growth of 2864% from 2005–2008 and with revenue growth of 4531% over the last 3 years.⁸⁶ Technology providers and agency brokerages have also been

81 J McTague, 'Next Danger: "Splash Crash"', *Barron's*, 23 May 2011. See also G Mumford, 'More about basics than "flash crash"', *Australian Financial Review*, 13 May 2011, p 27.

82 Schapiro above n 68.

83 Recommendations on Pre-Trade Practices for Trading Firms, Clearing Firms and Exchanges involved in Direct Market Access, CFTC Pre-Trade Functionality Subcommittee, March 2011, at <<http://www.cftc.gov/About/CFTCCcommittees/TechnologyAdvisory/index.htm>> (accessed 3 July 2011).

84 Ibid.

85 G MacSweeney, 'Pleasures and Pains of Cutting Edge Technology', 19 March 2007, *WallStreet Technology*, at <<http://www.wallstreetandtech.com/showArticle.jhtml?articleID=198001836>> (accessed 3 July 2011).

86 'FTEN Selected as the 500 Software Company with 4,531% Growth', *Investment Business Weekly*, 12 September 2010. See FTEN's company profile at <<http://www.inc.com/inc5000profile/ften>> (accessed 3 July 2011).

working to improve the efficiency of algorithms.⁸⁷ For example, Bloomberg Tradebook recently developed a portfolio trading algorithm that automates trading baskets of stocks across various markets and a diverse community of investors and thus encourages pension funds and mutual funds to invest on the open market as opposed to seeking refuge in dark pools.⁸⁸ Operators of exchanges and large broker-dealers have also made efforts to draw trades of large shares back to open markets.⁸⁹ Recognising that HFT and traditional long term investing are two different games, Credit Suisse has set up an ECN that discourages participation by HFTs.⁹⁰ Finally, there is also potential in the use of data mining and analysis of the news to quantify high frequency trading. Using such techniques may help regulators better track HFT activity.⁹¹

Yet, as quickly as one solution appears, new problems arise. An example is recent moves to enable HFT to occur in a 'cloud' environment which is likely to add new concerns about security and terrorism. Looking more distantly to the future, the next generation of software won't be about speed. Rather engines using the semantic web will search words, sense trends and buy or sell according to algorithms that are predictive of world events and on a global market.⁹²

Yet another aspect of the solution relies upon the market to right itself. If this is to happen it will be important to have in place a vigilant and capable competition law to ensure that the market remains transparent and fair. Vigilant regulation via competition laws will help ensure a level playing field. For example in the United Kingdom, in response to bigger investors increasingly moving to 'dark pools' (ie, electronic trading venues that conceal an order's size and origin) the London Stock Exchange announced in July 2009 that it was abolishing liquidity rebates. Another aspect that deserves attention is an investigation of the number of exchanges. Do we need 10 exchanges and more than 40 'dark pools'? Is that desirable? Our regulators should institute a broad, yet meaningful standard, against which it weighs the

87 T Demos, 'Algo Market Dancing to a New Rhythm', *FT.Com*, 6 October 2010, at <<http://www.ft.com/cms/s/0/a79f768c-d0e0-11df-a426-00144feabdc0.html#axzz1BXzQ1bFB>> (accessed 3 July 2011).

88 See generally, D Wojcik, 'Geography of Stock Markets' (2009) 3(4) *Geography Compass* 1499.

89 T Demos, 'Bloomberg Launches New Algorithm' *FT.Com*, 11 January 2011, at <<http://www.ft.com/cms/s/0/f0c21100-1d19-11e0-b597-00144feab49a.html#axzz1BXzQ1bFB>> (accessed 3 July 2011).

90 T Demos, 'Credit Suisse to Launch "Lit" Pool', *FT.Com*, 11 January 2011, at <<http://www.ft.com/cms/s/0/03feadb8-1db1-11e0-aa88-00144feab49a.html#axzz1BXzQ1bFB>> (accessed 3 July 2011).

91 See A Groß-Klußmann and N Hautsch, 'When machines read the news: using automated text analytics to quantify high frequency news-implied market reactions' (2011) 18(2) *Jnl of Empirical Finance* 321.

92 HFT on the Cloud, Noise Filters and Traffic Monitoring: An Interview with Ken Yeadon, 10 December 2010, *The High Frequency Trading Review*, at <<http://highfrequencytradingreview.com/hft-on-the-cloud-noise-filters-and-traffic-monitoring/>>. On the semantic web, see, eg, A Sheth, S Staab and M Dean (Eds), ISWC 2008: 7th International Semantic Web Conference, ISWC 2008, Karlsruhe, Germany, 26–30 October 2008: proceedings, 2008, Springer, Heidelberg, Germany. See also, J Cardoso and M Lytras (Eds), *The Semantic Web: Real World Applications from Industry*, Springer, Heidelberg Germany, 2007.

approval of any new exchange or ATS. Deference should be given to the SEC's stated mandate: 'To protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation.'⁹³

6 HFT trading in Europe, United Kingdom and Asia

The Nso, an ethnic group in the North-West of Cameroon, have a saying that: 'Your neighbour's troubles have arrived, yours are on the way.' As in the United States, there are now concerns in the United Kingdom, Australia and elsewhere that the problems identified with HFT and highlighted by the US 'flash crash' could eventually hit other overseas equity markets and change share trading around the world.⁹⁴ This threat is real given the rapid growth of HFT. In the United Kingdom, for example, it is estimated that HFT now accounts for 77% of the total flow and almost 50% of equity market volumes.⁹⁵ In monetary value of shares trade, HFT is estimated to make up 56% of all equity trades in the United States and 38% in Europe as a whole.⁹⁶ In Asia, while the amount of HFT is presently small it is growing significantly and is estimated now to be over 10%.⁹⁷

The growth of HFT and worry about a possible 'flash crash' in other markets has led to calls for an investigation of HFT in the United Kingdom.⁹⁸ Dame Clara Furse, former chief executive of the London Stock Exchange, is to head a British government study into HFT. The project is sponsored by the UK Treasury and led by the Government Office for Science under the direction of the government's chief scientific adviser, John Beddington. In 2008 while at the LSE she had identified HFT as one of the 'structural developments that are changing our marketplace and driving our product and service developments'.⁹⁹ The more conservative government now in power in the United Kingdom, however, is likely to favour a light-touch approach to the regulation of HFT¹⁰⁰ in part based on the belief that the major task at hand is

93 At <<http://www.sec.gov/about/whatwedo.shtml>>.

94 B R Brown, *Chasing the Same Signals: How Blackbox Trading Influences Stock Markets from Wall Street to Shanghai*, John Wiley & Sons (Asia), Singapore, 2009; P Zubulake and S Lee, *The High Frequency Game Changer: How Automated Trading Strategies Have Revolutionized The Markets*, John Wiley & Sons (Asia), Singapore, 2011.

95 See Reuters, 'UK to Probe High-Frequency Trading', *Hedge World Daily News*, 30 September 2010; A G Haldane, 'Patience and Finance', Oxford China Business Forum, Beijing, 2 September 2010, at <<http://www.bankofengland.co.uk/publications/speeches/2010/speech445.pdf>> (accessed 3 July 2011).

96 Ibid.

97 See E Tjong, 'Leveraging a Shared Infrastructure to Trade Across Asset Classes, Regions and Strategies', Thomson-Reuters, 18 May 2011, at <<http://blog.thomsonreuters.com/index.php/leveraging-a-shared-infrastructure-to-trade-across-asset-classes-regions-and-strategies/>> (accessed 3 July 2011). See, eg, FinCAD, 'Derivatives-trading volume spikes in India', 10 January 2011, at <<http://derivative-news.fincad.com/derivatives-risk-management/derivatives-trading-volume-spikes-in-india-1011/>> (accessed 3 July 2011); H Yang, 'Ripe time for automated trading in China's capital markets', *China Daily*, 12 June 2011, at <http://www.chinadaily.com.cn/bizchina/2011-06/10/content_12673943.htm> (accessed 3 July 2011).

98 J Grant, 'Clara Furse to head UK high-frequency panel', *Financial Times*, 8 February 2011.

99 Ibid.

100 See eg, speech by D Lawton, Head of Markets Infrastructure and Policy TradeTech Liquidity Conference, London, 13 April 2011 which indicates that the United Kingdom supports few

better enforcement of existing rules.¹⁰¹

HFT in the European Union is regulated by The Markets in Financial Instruments Directive (MiFID)¹⁰² as subsequently amended. These enactments harmonised the regulation for investment services across the European economic area, which includes the 27 member states of the European Union plus Norway, Iceland and Liechtenstein. The main purposes of the HFT Directive are to provide increased consumer protection in investment services and promote competition in the European economic area's financial and equity markets.¹⁰³

The MiFID Level 1 Directive 2004/39/EC sets out a detailed framework for the legislation of HFT. Twenty articles of this directive specified technical implementation measures (Level 2). These measures were adopted by the Europeans based on technical advice from the Committee of European Securities Regulators and negotiations in the European Securities Committee with oversight by the European Parliament. The Directive and Regulations were officially published on 2 September 2006. Yet to come is MiFID II,¹⁰⁴ which will address heightened concerns about HFT following the 'flash crash' and no doubt will take notice of reforms presently being undertaken in the United States, Australia and elsewhere.¹⁰⁵ Indeed, early indicators are that European countries are more likely to opt for a heavier regulatory hand as inferred by suggestions that HFT firms will be asked for more detailed reports and be subjected to significant monitoring and reporting requirements. Whether European authorities have the people or other resources to effectively do this, however, remains open to serious question.¹⁰⁶

In the European Union the regulation of HFT remains uncertain and under

restrictions on HFT in the context of discussing the European Commission's review of the Markets in Financial Instruments Directive — MiFID, at <http://www.fsa.gov.uk/pages/Library/Communication/Speeches/2011/0318_dl.shtml> (accessed 3 July 2011); Speech by the Financial Secretary to the Treasury, M Hoban MP at the Market Conference, The Grange City Hotel, London, 12 May 2011 indicates that the UK government thinks that evidence is lacking that HFT is harmful, at <http://www.hm-treasury.gov.uk/speech_fst_120511.htm> (accessed 3 July 2011).

- 101 H Jones, 'UK's FSA sees narrower focus on ultra-fast trading', *Reuters News*, 13 April 2011. Tim Rowe, the UK FSA's manager of trading platforms, told TradeTech, an industry conference, on 13 April, that European Union's plans to curb ultra-fast share trading may be boiled down to just more stringent reporting rules. 'The general feeling within that group when it comes to standards is that there is definitely an argument for having all participants who are direct members of a trading venue regulated . . . This is currently not the case.'
- 102 Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments amending Council Directives 85/611/EEC and 93/6/EEC and Directive 2000/12/EC of the European Parliament and of the Council and repealing Council Directive 93/22/EEC.
- 103 Directive 2008/10/EC of the European Parliament and of the Council of 11 March 2008, amending Directive 2004/39/EC on markets in financial instruments, as regards the implementing powers conferred on the commission, at <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:076:0033:0036:EN:PDF>> (accessed 3 July 2011).
- 104 Guillot, above n 58.
- 105 *MiFID II — The Markets in Financial Instruments Directive II*, at <<http://www.mifid-ii.com/>>. See also, 'HFT Makes Up 77% of UK Market — Tabb', *Finextra*, 24 January 2011, at <http://www.finextra.com/news/full_story.aspx?newsitemid=22194> (accessed 3 July 2011).
- 106 H Misra, 'The European Pools May Be Dark, but will MiFID II Make Them Murkier?', *High*

investigation and resolution with the next amendments to the Markets in Financial Instruments Directive (MiFID).¹⁰⁷ This uncertainty, for example, is reflected in the fact that UK regulators prefer a light-touch approach which does not impede competition and innovation in the market. In contrast, Christine Lagarde, French finance minister, has called for a strict supervision of high frequency trading. Christine Lagarde, French Finance Minister, has called for a strict supervision while the UK regulator said it did not want to turn the clock back. Ms Lagarde told a French parliamentary committee hearing on financial speculation that the practice of HFT should be strictly regulated and even prohibited in exceptional circumstances.¹⁰⁸ French officials argued their own investigations and those of the US SEC suggested that some practices used in the super high-speed computer-based trading were 'either close to market abuse or undermine the process of price formation'. Ms Lagarde suggested regulators should also have the power to suspend HFT in exceptional circumstances just as they should be able to suspend short-selling during periods of severe market turbulence. The concern is that poorly designed or executed HFT may heighten the risk to stable markets and inversely impact investor confidence. The EU regulators have indicated that they plan to have developed their position on future regulation of HFT by the end of 2011.¹⁰⁹

Finally the European Securities and Markets Authority (ESMA), the new pan-European body representing the bloc's national securities regulators, reports that they have asked automated trading firms to disclose trading strategies and details of the algorithms used as well as mechanisms to control misuse and errors. A questionnaire had been sent to dozens of firms across the region by ESMA. This move has created nervousness in the United Kingdom where such traders are still unregulated.¹¹⁰

7 HFT regulation in Australia

In Australia the first HFT are just now being allowed access to the market with the arrival of new entrants such as Chi-X. The aim is to promote competition and to create new liquidity pools through such electronic trading.¹¹¹ High frequency trades generated by algorithms (algos) are said to account for about 30% of shares traded on the Australian exchange.¹¹²

As mentioned above, in Australia, the Australian Securities and Investments

Frequency Trader, blog 9 June 2011 — 12:12 pm, at <<http://www.highfrequencytraders.com/blog/796/european-pools-may-be-dark-will-mifid-ii-make-them-murkier>> (accessed 3 July 2011).

107 P Stafford and B Hall, 'Divisions Emerge on European Regulation of HFT', *FT.com*, 26 November 2010, at <<http://www.ft.com/cms/s/0/d8de434c-f8a2-11df-8b7b-00144feab49a.html#axzz1BXzQ1bFB>> (accessed 3 July 2011).

108 Ibid.

109 Ibid.

110 J Grant, 'High-speed traders asked to explain methods', *Financial Times*, 4 April 2011, p 1805.

111 J Durie, "'Dark pools' Lack Transparency', *The Australian*, 2 October 2009, Finance Section, p 32.

112 Ibid.

Commission (ASIC), like its regulatory counterparts in the United States¹¹³ and Europe,¹¹⁴ has been concerned about the possible dangers inherent in the rapid growth of HFT. A recently released Australian Government consulting paper outlines the regulatory vision of new remedies that reflects the lessons learned from the US ‘flash crash’ of 6 May with a broader goal of positioning Australia’s markets to grow and become more internationally competitive in the future.¹¹⁵

In November 2010, ASIC released Consulting Paper 145 (CP 145 and Report 215) (REP 215) that examine the future of the Australian equity market.¹¹⁶ This consultation paper and report come at a time when the Australian Government has announced its in-principal support of Chi-X Australia Pty Ltd’s (an electronic HFT) market licence.¹¹⁷

In response to the major changes in equity markets overseas, especially following the ‘flash crash’ of 6 May in the United States, ASIC has indicated three major priorities and a number of suggested reforms. The three priorities are to:

- (a) build confidence in the integrity of Australia’s capital markets;
- (b) protect retail investors; and
- (c) facilitate international capital flows.¹¹⁸

CP 145/REP 215 summarises a number of ‘lessons learned’ from the ‘flash crash’ — lessons that the Australian Government wants to take into account as it reshapes and improves its regulatory framework. These include:

1. Fragmentation of liquidity: Too much fragmentation and non pre-trade transparent trading can reduce the quality of price information on public pre-trade transparent markets. It is important to incentivise trading in pre-trade transparent execution venues and to limit the volume of dark trading.
2. Fragmentation of prices: Market forces will not necessarily lead to consolidation of prices across all markets. At a minimum, investors and listed companies should be able to access best bid and ask prices

113 Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act).

114 *MiFID II — The Markets in Financial Instruments Directive II*, at <<http://www.mifid-ii.com/>> (accessed 3 July 2011).

115 See Australian Financial Centre Forum, *Australia as a financial centre: Building on our strengths*, November 2009, at <www.treasury.gov.au/afc/content/final_report.asp> (accessed 3 July 2011) (Johnson Report).

116 ASIC, Overview of CP 145 and REP 215, at <[http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/Overview-CP145-and-REP215.pdf/\\$file/Overview-CP145-and-REP215.pdf](http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/Overview-CP145-and-REP215.pdf/$file/Overview-CP145-and-REP215.pdf)> (accessed 3 July 2011); REP 215 can be found at: <www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/cp-145.../cp-145.pdf> (accessed 3 July 2011).

117 Corporations Act 2001 (Cth) requires a market licence for all those seeking to operate a financial market in this jurisdiction.

118 Overview of CP 155 and REP 215, above n 116, p 11. For an excellent discussion of modern regulatory theory as it applies to consumer protection, see I Ramsay, ‘Consumer Law, Regulatory Capitalism and the “New Learning” in Regulation’ (2006) 28(1) *SydLRev* 9, at <http://sydney.edu.au/law/slr/slr28_1/Ramsay.pdf> (accessed 3 July 2011). See also, I Ramsay, *Consumer law and policy: text and materials on regulating consumer markets*, 2nd ed, Hart Publishing, Oxford, 2007.

for each pre-trade transparent market and post-trade information at reasonable cost, and regulators should play a role in delivering this outcome.

3. Best execution: With more choice and incentives for order flow, it is important to have a clearly defined best execution rule, which ensures client interests are protected. Investors must have sufficient access to information to allow them to monitor their broker's execution performance, and regulators must be able to monitor and enforce the best execution rules.
4. Consistent treatment: It is important that there is equivalent treatment for parties undertaking similar activities. This will limit opportunities for regulatory arbitrage.
5. Surveillance and risk controls: Surveillance across multiple markets increases the complexity of monitoring. Regulators need sufficient information, including about the origin of orders and trades. Standardised market integrity risk controls, such as circuit breakers and cooperation, are essential.
6. Reduction in trading fees: The growth in new execution venues has led to significant competition for order flows overseas, resulting in aggressive fee reductions for trading. New pricing models have been implemented to attract different types of order flows and there are frequent fee reductions and 'specials' offered in order to attract order flow.
7. Significant reductions in bid-ask spreads: In Canada bid-ask spreads fell from 15 bps in early 2008 — when competition really began — to 10 bps by mid-2010. These benefits started with the larger stocks and are flowing through to smaller stocks. . . .
8. Innovation: There has been considerable investment in technology throughout the entire trading cycle, which has improved the efficiency of markets and provided investors with new instruments and order types that may better serve their needs.
9. Clear regulatory framework: Regulators to set the full regulatory framework at the outset of the introduction of competition to maximise market integrity and to reduce the impact for industry of system changes.¹¹⁹

The Consulting Paper/Report also identifies a number of future trends that it sees for the Australian equity market structure:

- More exchange markets, the addition of Chi-X being one example.
- A growth in HFT in Australia, though it is likely to be constrained by the ban on naked short term selling.
- Increased demand for co-location services.
- Enhanced reliance on technology and data, eg, smart order routers, trading algorithms, middle and back office management.
- More dark pools, though Australia does not expect the same degree of growth as occurred in the United States.

¹¹⁹ Ibid, p 24.

- Need for mechanisms to consolidate fragmented pre-trade and post-trade information.
- Need for harmonised tick size to prevent market operators from competing on tick sizes.
- Need for market operator cooperation to ensure orderly, transparent markets.
- New types of financial products and new forms of competition within those markets, eg, on services.
- Increased international integration of markets.¹²⁰

In response to these changes in financial markets and the increasing role that technology, internationalisation and competition will play in shaping the future of Australian markets, ASIC proposes a new regulatory approach and articulates a number of broad policy goals, including:

- *Market quality*: ensure availability of pre and post trade data; have in place mechanisms to provide deep pre-trade transparency and controls to limit volatility and promote market stability.
- *Market integrity*: put in place minimum risk controls and product standards together with cooperation arrangements with stakeholders to promote fair, orderly and transparent markets.
- *Investor protection*: promote clear best execution requirements, post trade reporting, market integrity rules and education of retail investors.
- *Fairness*: establish clear requirements for participation and equal access to services for all market participants; market operators playing a role in ensuring fairness, transparency and orderliness.
- *Efficient implementation*: reflect best practice in rule implementation; learning lessons from overseas and developing a regulatory framework that is simple, robust, fair and efficient. Draft market integrity rules that protect the price formation process and apply equivalent treatment to ‘like’ activity.¹²¹

Since the publication of CP 145/REP 215, ASIC has announced its intention to launch new market integrity rules consistent with the above principles and that will facilitate HFT in the Australian market with the arrival of Chi-X Global.¹²² Critics, however, have noted that there are no new rules that would make dark pools of equity more transparent.¹²³ In this regard, ASIC appears to have opted to proceed cautiously and call for further consultation.¹²⁴ In the author’s view, this makes sense for it would allow time for Australia to take

¹²⁰ CP 145/REP 215 Summary, above n 116, pp 28–9.

¹²¹ CP 145/REP 215, above n 116, pp 30–2.

¹²² S Washington, ‘ASIC wary on diving into dark pool trading’, *Sydney Morning Herald*, 4 March 2011, at <<http://www.smh.com.au/business/asic-wary-on-diving-into-dark-pool-trading-20110303-1bgbk.html>> (accessed 3 July 2011).

¹²³ Ibid, citing ANU Finance Professor Carole Comerton-Forde.

¹²⁴ J Kehoe with A MacDonald, ‘More light on the dark pools’, *Australian Financial Review*, 27 May 2011. See also an earlier paper, T D’Aloisio, ‘ASIC’s approach to market integrity: Notes used in a speech by Tony D’Aloisio, Chairman, Australian Securities and Investments Commission Monash Centre for Regulatory Studies and Clayton Utz’, Luncheon Lecture, 11 March 2010, at <[http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/ASICs-approach-to-market-integrity.pdf/\\$file/ASICs-approach-to-market-integrity.pdf](http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/ASICs-approach-to-market-integrity.pdf/$file/ASICs-approach-to-market-integrity.pdf)> (accessed 3 July 2011).

into account ongoing developments regarding reforms of HFT regulation in both the European Union, United States and elsewhere. Australia must also be mindful of its major regional Asian competitors. If Australia is too stringent in its regulation of HFT, it may lose the efficiencies which such trade activity brings as well as competitiveness vis-a-vis Asian rivals who may be more friendly to HFT.¹²⁵

In the meantime, dark pools continue to grow, both in Australia and in overseas markets.¹²⁶ Accordingly, Australia and other countries globally must deal with the issues relating to HFT, market stability, dark pools, and their impact on price discovery and fair access. Measures that are likely to be imposed include:

- a move towards centralised clearing and interoperability;
- market data availability and cost;
- risk controls and disclosures in relation to algorithms;
- dark trading minimum size thresholds and greater post-trade transparency;
- HFT minimum quote durations, reforms in relation to transaction pricing, greater market maker responsibilities given to HFT and a fairer process for allocation of co-location facilities.

8 International Organisation of Securities Commissions

There has also been HFT reform movements at the international agency level. For example, the International Organisation of Securities Commissions (IOSCO) has looked to recommend restriction of HFT activities, as a result of the flash crash. In May 2011, IOSCO released FR06/11 Principles for Dark Liquidity, Report of the Technical Committee of IOSCO 19 May.¹²⁷

The report recommends that member organisations develop and adopt regulations that would facilitate the growth of HFT and dark pools of equity in ways that enable regulatory authorities to avoid abuses and mistakes while at the same time promoting innovation and competitiveness.

As noted in the report's introduction:

This Final Report on the *Principles for Dark Liquidity* sets out IOSCO's principles to guide regulators, venues and general users of dark liquidity with respect to the following topic areas:

- pre-trade and post-trade transparency;
- incentives for using transparent orders;
- reporting to regulators;
- information available to market participants about dark pools and dark orders; and

125 W Henley, 'Don't want race to the bottom: US regulator raises "lax" Singapore fears', *Global Financial Strategy News (GFS)*, Friday 10 June 2011.

126 See eg, P Stafford, 'Instinet launches Australian dark pool', *Financial Times*, 1 June 2011, at <<http://www.ft.com/cms/s/0/e48ea984-8c4a-11e0-b1c8-00144feab49a.html#axzz1P1erChf3>> (accessed 3 July 2011) reports that Instinet, the agency broker, has launched a dark pool for Australian equities that attempts to address fragmentation in the local market.

127 <<http://www.iosco.org/library/index.cfm?section=pubdocs&year=2011>> (accessed 3 July 2011). See also an earlier consultation report, at <<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD336.pdf>> (accessed 3 July 2011).

- regulation of the development of dark pools and dark orders.

The principles establish that pre- and post-trade transparency are central to promote the efficiency of the market and the integrity of the price formation process. They are put forward with the recognition that a one size fits all approach may not be appropriate for all types of trading. Moreover, a number of jurisdictions are currently reviewing their regulatory regimes, including regulation of trading in dark pools and the use of dark orders in transparent markets.

The Technical Committee recommends that regulators consider the structure of their respective markets as a whole to determine how best to implement these principles. Importantly, regulators should seek to ensure that in implementing the principles, they do so in a way that aims to maintain the efficiency of the market and the integrity of the price formation process and, where appropriate, allows for the use of dark pools and dark orders for specific needs/trades.¹²⁸

Although not everyone will agree, these common sense principles and practical standards should prove very helpful, especially by countries new to HFT. It is also significant that these IOSCO standards acknowledge that there is no one solution that fits all markets and all countries as they seek to capture the benefits of HFT and avoid the harms.

9 Conclusion

He that will not apply new remedies must expect new evils;
for time is the greatest innovator.

Francis Bacon

Throughout their history the regulators of securities in the United States, Australia and Europe have had to amend old regulations and devise new frameworks and remedies that reflected and facilitated the role of technology in benefitting investors, consumers and the market generally. While new uses of technology, such as algorithmic and HFT, co-location and electronic trading facilities, pose additional challenges, they are not dramatically different from when the first telephones were brought to the floor of an exchange or when the internet was first used to trade futures and securities. In this sense, the growth of HFT represents merely the normal evolution of technology as applied to modern and increasingly inter-connected and global share markets.

Through its regulatory agencies, governments need to ensure advances in technology help lower risk and promote transparency in the markets. In carrying out this task, governments have been guided by the need to promote transparency, efficiency and fairness. The present situation is no different. In the United States, as the CFTC and the SEC work to implement the new Dodd-Frank legislation, it is essential that agency rulemakings take into consideration the rapidly changing technology.

Internationally, the implementation of the Basel III and other regulatory reforms point to a tighter and more competitive capital market. In this tighter environment it will be more important than ever to qualify the legitimacy of

128 Ibid.

derivative instruments to ascertain whether they genuinely assist to manage a risk or represent a form of speculation. Regulatory systems and markets that provide a fair, balanced and transparent system will be more attractive to international funds. This new era of market regulation will rely greatly on an astute understanding of systems and best practices leading to continuous improvement.¹²⁹

The rapid and unchecked growth of HFT and events such as the US 'flash crash' of 6 May have acted to create a crisis of confidence in our market structure. Hopefully the recent reforms will effectively redress the real and perceived inequalities and rectify the problems that have been identified. Investors need to know that another 6 May cannot happen again. All stakeholders need to know that the market is transparent, fair and equal for all. And they want to know that the market is structured in such a way that pricing of assets reflects intrinsic values.

In implementing these principles and achieving these goals regulatory bodies in all jurisdictions face a challenging road ahead. They are under pressure to move quickly. However, speed is difficult to achieve in this situation where there are numerous stakeholders, many uncertainties, ever emerging technologies and multiple principles that must be balanced and constantly adjusted. In this context, regulations which sweep too wide may have unforeseen consequences, while those regulations that focus too narrowly may not fully or adequately address the problem. Making sense of it all and designing and developing a system to encompass these various goals will be a difficult and constantly evolving process.¹³⁰ In this author's view, Australia and its regulator, ASIC, have it right — like the tortoise, taking one step at a time and yet sticking one's head out and stretching one's neck by starting with basic principles and general directions, moving forward step by step. In this way, the regulatory tortoise will hopefully once again keep up with the swift HFT hare.

129 See generally, FINCAD, White Paper: 'Treasury Risk Management in the New Era of Regulated Capital', 5 January 2011, at <http://www.gtnews.com/white_papers/whitepapershow.cfm?WPID=46> (accessed 3 July 2011). See also, R Dobbs, S Lund and A Schreiner, 'How Growth of Emerging Markets Will Strain Global Finance', *McKinsey Quarterly*, December 2010, McKinsey Global Institute, at <https://www.mckinseyquarterly.com/Corporate_Finance/Capital_Management/How_the_growth_of_emerging_markets_will_strain_global_finance_2715> (accessed 3 July 2011).

130 S Arnuk and J Saluzzi, 'What the SEC Staff Will Likely Recommend in Reaction to the 6 Mayth Flash Crash', *A Themis Trading LLC White Paper*, September 24, 2010: <http://www.themistrading.com/article_files/0000/0601/092410_WhitePaper.pdf> (accessed 3 July 2011).

