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**FASTER THAN THE SPEED OF LAW**  
**EVALUATING THE CHALLENGES FACED IN REGULATING ALGORITHMIC AND HIGH  
FREQUENCY TRADING**

**by**

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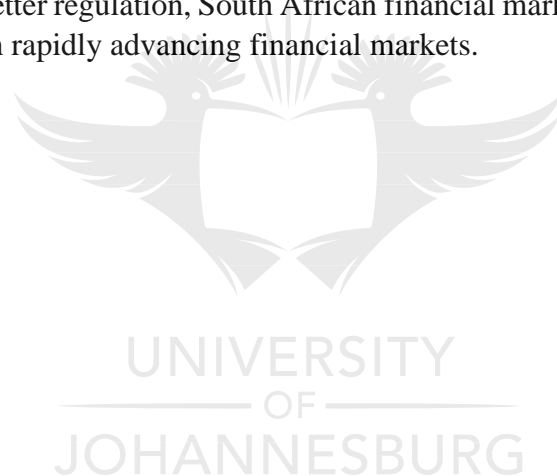
This thesis is dedicated to my parents who have given me the gift of education and who have supported me throughout my life.

Finally I am thankful to my wife for her understanding, prayers and continuing support to complete this minor dissertation.



## **ABSTRACT**

This minor dissertation explores the highly technical world of algorithmic and high frequency trading. It provides a brief overview of the key concepts, benefits and market concerns surrounding these technologies. The dissertation looks at the multitude of challenges faced in attempting to regulate and investigate high frequency trading. Further, the current Financial Markets Act is evaluated to determine the extent of its effectiveness, in light of these new technologies. The dissertation then looks at the regulatory developments made in the European Union and determines whether South African regulation should follow suit. It finds that the perceived benefits of high frequency trading do not adequately outweigh the detrimental effects that these systems could cause. The Financial Markets Act is wholly insufficient in dealing with the new risks posed by these systems and it is therefore recommended that urgent regulatory changes are implemented. With so much investment being made in developing technology, innovative regulation has not been equally developed. It is concluded that without the implementation of better regulation, South African financial markets regulation will remain too slow to keep up with rapidly advancing financial markets.



# 1 Introduction

The ever changing and rapidly advancing nature of technology has fundamentally changed the way we as humans view the world. With computer processing power almost doubling every twelve to eighteen months, it is quiet easy to lose track of the latest multitude of technological advancements being made.<sup>1</sup> These technological advancements have improved almost every aspect of our lives, bringing about convenience and efficiency.<sup>2</sup> This dissertation focuses on the technological advancements being made in today's financial markets and highlights the contentious use of algorithmically based trading systems, with a specific focus on high frequency trading.

The primary objective is to provide a brief understanding of these trading systems, evaluate their perceived benefits and possible market concerns and to determine, in light of regulatory challenges, whether the current regulatory position in South Africa adequately protects its financial markets. The evaluation then explores whether South Africa should follow the most recent and innovative regulatory interventions introduced in the European Union.

## 2 Algorithmic and high frequency trading defined

### 2.1 Defining algorithmic trading

An algorithm is a set of computer instructions designed to perform a specific task.<sup>3</sup> In algorithmic trading these instructions take the form of highly specialised algorithmic programmes used to submit trading orders to an exchange, with the algorithm determining various aspects of a particular order, such as its optimum timing, best price and quantity.<sup>4</sup> These order decisions are fully automated and require no human involvement.<sup>5</sup> In addition to selecting the best time to enter an order, the algorithm also determines the best time to cancel orders, based on changing or unfavourable market conditions.<sup>6</sup>

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<sup>1</sup> <http://www.technologyreview.com/news/425398/a-new-and-improved-moores-law/> (25-08-2015).

<sup>2</sup> <http://www.useoftechnology.com/modern-technology-advantages-disadvantages/> (27-10-2015).

<sup>3</sup> <http://techterms.com/definition/algorithm> (27-10-2015).

<sup>4</sup> Scopino "Do automated trading systems dream of manipulating the price of futures contracts? Policing markets for improper trading practices by algorithmic robots" 2015 *Florida Law Review* 244.

<sup>5</sup> Brown "The rise of high frequency trading: The role algorithms, and the lack of regulations, play in today's stock market" 2012 *Appalachian Journal of Law* 214.

<sup>6</sup> Jones "What do we know about high frequency trading?" 2013 *Columbia Business School Journal* 621.

Together with decision making, algorithms can also process information more quickly and more accurately than humanly possible, with enormous amounts of market information being processed at any given time.<sup>7</sup> Algorithms are able to almost instantly react to new market information. More importantly, certain cutting edge algorithms are capable of self-improvement, continuously developing and modifying its own strategies, independent of its human designers.<sup>8</sup> Trading algorithms are also capable of connecting to other trading algorithms allowing for the processing of multiple streams of information, which further enhances its decision making capabilities.<sup>9</sup>

Algorithmic trading differs from high frequency trading mostly in one crucial respect; high frequency trading relies heavily on execution speed.<sup>10</sup>

## 2.2 Defining high frequency trading

High frequency trading (herein after referred to as “HFT”), is a subgroup of algorithmic trading. Both systems use programmed algorithms for automated trading decisions, however, HFT differs in that it performs this automation at astonishingly high speeds.<sup>11</sup> High frequency trading uses extremely high speed computer systems, software and data communication lines to submit and cancel orders at lightning speeds,<sup>12</sup> capable of executing multiple orders within billionths of a second,<sup>13</sup> speeds faster than any human mind could possibly comprehend.<sup>14</sup> High frequency trading needs the lowest possible amount of latency to be successful.<sup>15</sup> Latency is defined as the time taken to convey a trading signal from its point of creation to the point of its reception (an exchange). The lower the amount of latency the faster orders can be submitted or cancelled.<sup>16</sup> Billions of dollars are invested in order to decrease the time needed to send an electronic signal from one location to another and reduce this latency.<sup>17</sup>

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<sup>7</sup> Brown (n 5) 213.

<sup>8</sup> Scopino (n 4) 244.

<sup>9</sup> Scopino (n 4) 225.

<sup>10</sup> Keller “Robocops: Regulating high frequency trading after the flash crash of 2010” 2012 *Ohio State Law Journal* 1463.

<sup>11</sup> Keller (n 10) 1463.

<sup>12</sup> Brown (n 5) 215.

<sup>13</sup> Keller (n 10) 1461.

<sup>14</sup> Scopino (n 4) 226.

<sup>15</sup> <http://www.investopedia.com/articles/active-trading/042414/you-d-better-know-your-high-frequency-trading-terminology.asp> (23-10-2015).

<sup>16</sup> <http://www.investopedia.com/articles/active-trading/042414/you-d-better-know-your-high-frequency-trading-terminology.asp> (23-10-2015).

<sup>17</sup> Adler “High frequency regulation: A new model for market monitoring” 2014 *Vermont Law Review* 167.

Another key difference is that HFT systems usually hold trading positions for extremely short periods of time, often splitting large orders into smaller rapid orders generating large amounts of volume,<sup>18</sup> while closing out a trading day in a neutral position.<sup>19</sup> These HFT machines are preloaded with parameters and will execute at lightning speeds only if those parameters are met.<sup>20</sup> Due to the high volumes generated, HFT systems are able to profitably capture small deviations in the prices of securities.<sup>21</sup> However, these systems can also be used for various other strategies and purposes, all relying on the millisecond reaction times that they provide.<sup>22</sup>

### 2.3 Common high frequency strategies

A trading strategy uses predetermined parameters or models to predict and achieve specific trading goals, which in most cases will be the likelihood of earning a profit.<sup>23</sup> These strategies can be broken down into three broad categories namely, liquidity provision, arbitrage and discovery strategies. The most common of these is liquidity provision or the electronic market making strategy.<sup>24</sup> It involves the use of HFT technology to dramatically enhance the historical role of traditional market makers.<sup>25</sup>

Previously market makers were dealers in securities that constantly displayed both buy and sell quotations in the market, capitalising on the difference between the price at which they were willing to buy a security and the price at which they were willing to sell a security.<sup>26</sup> This was known as the traditional market maker spread.<sup>27</sup> Traditional market making was extremely personal in nature and success was firmly grounded on the reputation of a particular market maker.<sup>28</sup> These market makers eagerly signed up to enjoy the special privileges that exchanges offered to registered market makers, including exclusivity to market make certain securities

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<sup>18</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (23-10-2015).

<sup>19</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (23-10-2015).

<sup>20</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (27-10-2015).

<sup>21</sup> Keller (n 10) 1463.

<sup>22</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (27-10-2015).

<sup>23</sup> <http://www.investopedia.com/terms/t/trading-strategy.asp> (15-12-2015).

<sup>24</sup> Keller (n 10) 1465.

<sup>25</sup> Keller (n 10) 1465.

<sup>26</sup> Brown (n 5) 216.

<sup>27</sup> Brown (n 5) 216.

<sup>28</sup> <http://www.tcc5.com/market-makers.htm> (07-01-2015).



and charging such traders lower transaction costs.<sup>29</sup> These privileges came with certain trading obligations, including obligations to stay in the market during volatile periods or prohibiting market makers from trading ahead of client orders.<sup>30</sup>

HFT firms, unlike traditional market makers, trade anonymously and without the associated trading obligations.<sup>31</sup> In this regard senior political figures in the United States have called for HFT to be imposed with market making obligations, with senator Charles Schumer even stating that “[t]he players in our markets have changed but our regulations have not kept pace”.<sup>32</sup> Despite this, HFT firms have enhanced the traditional market making approach by using much higher execution speeds, allowing for the bid/ask spreads<sup>33</sup> to be much tighter, while still maintaining large amounts of profit.<sup>34</sup> Besides capturing these tiny deviations in the bid/ask spreads, HFT firms also receive liquidity rebates from stock exchanges for their services as market makers.<sup>35</sup> With trades executed thousands of times per millisecond, HFT systems are able to capture large amounts of profit from stock exchange rebates alone.<sup>36</sup> Stock exchanges provide these rebates to compensate HFT firms for the risk undertaken in providing liquidity to the market.<sup>37</sup> A HFT market making strategy is therefore mainly aimed at capturing stock exchange rebates as opposed to capitalising on the price movements of securities.<sup>38</sup>

The second most commonly used strategy is an arbitrage strategy, which is designed to take advantage of the discrepancies between the prices of identical shares in different markets.<sup>39</sup> An example of an arbitrage strategy is dual listed arbitrage, which takes advantage of dual listed stocks by exploiting the temporary price differences between the securities quoted on one exchange, compared to the same securities quoted on another exchange.<sup>40</sup> These pricing discrepancies usually exist for fractions of a second due to the realignment of pricing between

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<sup>29</sup> <http://www.independent.co.uk/news/uk/wheels-within-deals-market-makers-are-the-lifblood-of-the-london-stock-market-and-enjoy-special-1412971.html> (07-01-2015).

<sup>30</sup> <http://www.bloomberg.com/news/articles/2010-09-13/sec-second-guesses-its-stock-trading-crusade-as-u-s-market-makers-vanish> (07-01-2015).

<sup>31</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/289034/12-1069-eia8-minimum-obligations-of-market-makers.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289034/12-1069-eia8-minimum-obligations-of-market-makers.pdf) (07-01-2015).

<sup>32</sup> <http://www.bloomberg.com/news/articles/2010-09-13/sec-second-guesses-its-stock-trading-crusade-as-u-s-market-makers-vanish> (07-01-2015).

<sup>33</sup> Bid/ask spread is the difference between the highest price a buyer is willing to pay for a security and the lowest price for which a seller is willing to sell a security <http://www.investopedia.com/terms/b/bid-askspread.asp> (15-12-2015).

<sup>34</sup> Keller (n 10) 1463.

<sup>35</sup> Keller (n 10) 1466.

<sup>36</sup> Brown (n 5) 214.

<sup>37</sup> Keller (n 10) 1466.

<sup>38</sup> Keller (n 10) 1466.

<sup>39</sup> Adler (n 17) 177.

<sup>40</sup> Keller (n 10) 1467.

stock exchanges.<sup>41</sup> It is quite easy to exploit such split second opportunities with the lightning speeds of HFT.<sup>42</sup> Speed is therefore an essential element of arbitrage efforts.<sup>43</sup> A second form of arbitrage is latency arbitrage.<sup>44</sup> It takes advantage of the latency differences between market participants, by gaining direct market feeds from stock exchanges faster than other market participants. In doing so, HFT latency traders earn profits by exploiting slower market participants who offer securities at split-second older, less up to date, prices.<sup>45</sup>

Lastly, order discovery strategies or predatory strategies allow HFT firms to “ping” the market with multiple predatory orders.<sup>46</sup> Predatory orders are designed to detect the presence of a market participant accumulating or liquidating large positions in the market.<sup>47</sup> Predatory orders bait other market participants into revealing their trading activities. HFT firms can then swiftly and profitably react to these trading activities, by pre-empting any accumulation or liquidation of positions held by these market participants.<sup>48</sup> If, for example, the predatory orders detect that someone in the markets has a strong appetite to accumulate a particular security, it can quickly buy up all of these securities in the market and sell it at a higher price back to the participant.

To avoid this situation, certain HFT firms offer defensive trading strategies as a service to their clients. These strategies operate against predatory algorithms by hiding large institutional client orders from other market participants who may unfavourably react to such large orders entering the market.<sup>49</sup> It is essential that large orders are executed as quickly as possible to avoid someone else in the market detecting any demand for a particular security and then trading ahead of such orders.<sup>50</sup> This strategy therefore minimizes an order’s impact by decreasing the apparent size of the order, thereby hiding the perceived appetite from predatory algorithms.<sup>51</sup> It breaks down large orders into smaller more discreetly sized orders and distributes these orders in the most inconspicuous way to avoid detection.<sup>52</sup>

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<sup>41</sup> Keller (n 10) 1467.

<sup>42</sup> Keller (n 10) 1467.

<sup>43</sup> Adler (n 17) 177.

<sup>44</sup> Keller (n 10) 1468.

<sup>45</sup> Keller (n 10) 1468.

<sup>46</sup> Pasqual “Law’s acceleration of finance: Redefining the problem of high-frequency trading” 2014 *Cardozo Law Review* 2105.

<sup>47</sup> Pasqual (n 46) 2105.

<sup>48</sup> Pascal (n 46) 2087.

<sup>49</sup> Adler (n 17) 177.

<sup>50</sup> Yoon “Trading in a flash: Implication of high frequency trading for securities regulators worldwide” 2011 *Emory International Law Review* 913.

<sup>51</sup> Adler (n 17) 177.

<sup>52</sup> Adler (n 17) 178.

While the common strategies mentioned above are in no way comprehensive, the introduction highlights the most pertinent concepts for the discussion to come. It is also important to note that in order to remain competitive and relevant, HFT algorithms constantly adapt, therefore strategies employed and which are common practice today may not be that relevant tomorrow.<sup>53</sup> A key observation is that some trading strategies appear to offer some benefit or advantage to modern financial markets. This observation will be evaluated below.

### **3 The perceived benefits of high frequency trading**

HFT has been credited with reducing trading cost for the average retail investor, increasing liquidity in the marketplace, and creating a more efficient trading environment.<sup>54</sup>

#### **3.1 Increased market liquidity**

Liquidity can be defined as the degree to which a security can be quickly bought or sold in the market without causing a market reaction or change in the security's price.<sup>55</sup> It is the ability to sell securities for other securities or cash at any time,<sup>56</sup> without significantly impacting prices in the market.<sup>57</sup> The primary sources of liquidity in today's financial markets come from HFT firms, who engage in liquidity providing strategies when they act as market makers.<sup>58</sup>

As mentioned, HFT firms constantly display buy and sell quotations for securities, netting the difference between the price at which they are willing to buy a security and the price at which they are willing to sell a security,<sup>59</sup> i.e. the market maker spread.<sup>60</sup> HFT market makers therefore play an important role in today's rapidly evolving securities markets and should be rewarded for their efforts.<sup>61</sup> This reward comes from the extremely small amounts of profit that they earn from the difference between the bid/ask spread on each trade.<sup>62</sup> This reward is given to them due to the risk involved in acting as a market maker - the more risk there is of unfavourably holding a particular security, the larger the bid/ask spread and the more a market

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<sup>53</sup> Keller (n 10) 1464.

<sup>54</sup> Brown (n 5) 215.

<sup>55</sup> <http://www.investopedia.com/terms/l/liquidity.asp> (27-10-2015).

<sup>56</sup> Pascal (n 46) 2087.

<sup>57</sup> Keller (n 10) 1465.

<sup>58</sup> Keller (n 10) 1481.

<sup>59</sup> Keller (n 10) 1465.

<sup>60</sup> Keller (n 10) 1460

<sup>61</sup> Dolgoplov "Providing liquidity in a high frequency world: Trading obligations and privileges of market makers and a private right of action" 2013 *Brooklyn Journal of Corporate Finance & Commercial Law* 303.

<sup>62</sup> Adler (n 17) 183.

maker will earn for providing this liquidity.<sup>63</sup> Additionally, these HFT market makers receive incentives from stock exchanges to provide liquidity.<sup>64</sup> This allows HFT market makers to profit from exchange rebates, instead of the price movements of securities.<sup>65</sup>

Higher liquidity within a stock exchange is good for business - it attracts more investment and participation in that particular stock exchange. This is the primary reason why stock exchanges offer rebates for providing liquidity.<sup>66</sup> These rebates are paid to HFT firms when they provide liquidity by executing buy or sell orders in the market that would not otherwise have been filled. The cost of these rebates is recovered in the form of higher trading fees charged to the market participants.<sup>67</sup> The exchange will profit from the difference between the higher trading fees charged to market participants and the liquidity rebates paid to HFT firms.<sup>68</sup> Exchanges therefore benefit from HFT firms executing trades thousands of times per millisecond.<sup>69</sup>

This also brings indirect benefits to the market as several of these HFT firms in the market at any given time create healthy competition. Bid/ask spreads are set lower in an attempt to satisfy more orders and thus earn more exchange rebates or profits from bid/ask spreads.<sup>70</sup> A lower spread also benefits the market by allowing market makers to better absorb buy and sell orders and execute them with little price impact.<sup>71</sup>

### **3.2 Increased market efficiency**

HFT brings a significant amount of automation to modern financial markets by replacing relatively expensive and slow humans with relatively inexpensive, fast and efficient trading machines.<sup>72</sup> This efficiency is achieved by reducing the overall cost and time required to trade securities.<sup>73</sup>

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<sup>63</sup> Adler (n 17) 183.

<sup>64</sup> Keller (n 10) 1466.

<sup>65</sup> Keller (n 10) 1466.

<sup>66</sup> Keller (n 10) 1466.

<sup>67</sup> Brown (n 5) 214.

<sup>68</sup> Yoon (n 50) 913.

<sup>69</sup> Brown (n 5) 214.

<sup>70</sup> Adler (n 17) 183.

<sup>71</sup> Keller (n 10) 1465.

<sup>72</sup> Pascal (n 46) 2097; [http://tabbforum.com/news/high-frequency-trading-and-volatility?utm\\_campaign=a33a513d29-UA-12160392-1&utm\\_medium=email&utm\\_source=TabbFORUM%20Alerts&utm\\_term=0\\_29f4b8f8f1-a33a513d29-277188709](http://tabbforum.com/news/high-frequency-trading-and-volatility?utm_campaign=a33a513d29-UA-12160392-1&utm_medium=email&utm_source=TabbFORUM%20Alerts&utm_term=0_29f4b8f8f1-a33a513d29-277188709) (27-10-2015).

<sup>73</sup> Pascal (n 46) 2097.

Prior to HFT, there were significant delays in processing trade orders. Now HFT firms are constantly buying and selling millions of securities per second and trading can occur almost instantaneously.<sup>74</sup> The speed at which HFT firms trade also allows them to narrow their spreads, lessen market risks and ultimately improve market efficiency as a whole.<sup>75</sup> Retail investors indirectly benefit from the significant investments made by HFT firms in processing market information and decreasing the time needed to send an electronic signal from one location to another.<sup>76</sup>

### 3.3 Lower transactional costs

HFT has made it possible to replace human traders with specialised high speed algorithms that operate at a fraction of the cost.<sup>77</sup> In the days of human traders, the cost of trading directly influenced trading volumes.<sup>78</sup> Furthermore, higher fees charged made it more expensive for retail investors to trade.<sup>79</sup> The cost of trading is extremely important, as the cheaper it is to transfer a security, the more likely it is that investors will participate in the market.<sup>80</sup> This participation brought on by lower transaction costs allows investors to readily buy and sell securities, enhancing price discovery.<sup>81</sup> HFT and automated trading has increased market liquidity and reduced overall trading costs, because the more liquidity there is in the market the more efficiently securities can be priced.<sup>82</sup> An efficient market is said to be one where the price of a security is fully reflected by taking into account all the available information about that security in the market.<sup>83</sup> In other words, a market is efficient when a piece of information is absorbed into the market so quickly that a trader having such information will still find it difficult to profit from that information quickly enough.<sup>84</sup> In addition to more efficient markets, it is believed that because there is so much competition between HFT firms, bid/ask spreads

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<sup>74</sup> Pascal (n 46) 2096.

<sup>75</sup> Keller (n 10) 1465.

<sup>76</sup> Adler (n 17) 167.

<sup>77</sup> Gould “Regulating high-frequency trading: Man v. machine” 2011 *Journal of High Technology Law* 277.

<sup>78</sup> Brogaard, Baron & Kirilenko “High-Frequency Trading and the Execution Costs of Institutional Investors” (2014) *The Financial Review* 346.

<sup>79</sup> Brogaard et al (n78) 346.

<sup>80</sup> Brogaard et al (n 78) 346.

<sup>81</sup> Brogaard et al (n 78) 369. “Price discovery” is defined as a method of determining the correct and most appropriate level of pricing for a specific security, using basic supply and demand factors  
<http://www.investopedia.com/terms/p/pricediscovery.asp>(15-12-2015).

<sup>82</sup> <http://modernmarketsinitiative.org/hft-boon-small-retail-investors/> (22-10-2015).

<sup>83</sup> Stout “The mechanisms of market inefficiency: An introduction to the new finance” 2003 *The Journal of Corporation Law* 637.

<sup>84</sup> Stout (n 83) 637.

are also tightened, which reduces transaction costs for all market participants, both institutional and retail.<sup>85</sup>

Although some strategies can benefit the market by reducing spreads and improving price efficiency, other strategies can be used to manipulate prices and must be regulated more closely.<sup>86</sup>

### 3.4 Evaluating the perceived benefits of high frequency trading

Algorithmic and HFT systems work much faster and smarter than humans.<sup>87</sup> However, these systems suffer from one key weakness - experienced traders are able to foresee that continuing down a certain trading path will result in imminent loss, whereas HFT systems are not able to do so.<sup>88</sup> When execution is automated and extraordinarily hurried, certain signs that would be blatantly obvious to human traders are overlooked by HFT systems.<sup>89</sup> There is often an assumption that without human involvement there is less room for “human” error.<sup>90</sup> This assumption is flawed - as with most technology, bugs, software glitches and errors are inevitable.<sup>91</sup> This creates uncertainty about market integrity and the stability of trading systems.<sup>92</sup> HFT systems carry the inherent risk of disrupting markets because of their automated nature.<sup>93</sup>

Another concern surrounding the supposed benefit of HFT is the false sense of sustainable liquidity which it creates. HFT market makers may be giving a false impression that they will always provide liquidity to the market in that they will always be willing to be on the other side of a trade.<sup>94</sup> This is certainly not the case - HFT market makers, unlike traditional market makers, do not have formal obligations to quote and remain in the markets in which they

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<sup>85</sup> <http://www.ft.com/intl/cms/s/0/33881656-e918-11de-a756-00144feab49a.html#axzz3saa1evvq> (22-10-2015).

<sup>86</sup> Keller (n 10)1460.

<sup>87</sup> [http://tabbforum.com/news/high-frequency-trading-and-volatility?utm\\_campaign=a33a513d29-UA-12160392-1&utm\\_medium=email&utm\\_source=TabbFORUM%20Alerts&utm\\_term=0\\_29f4b8f8f1-a33a513d29-277188709](http://tabbforum.com/news/high-frequency-trading-and-volatility?utm_campaign=a33a513d29-UA-12160392-1&utm_medium=email&utm_source=TabbFORUM%20Alerts&utm_term=0_29f4b8f8f1-a33a513d29-277188709) (22-10-2015).

<sup>88</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (27-10-2015).

<sup>89</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (29-10-2015).

<sup>90</sup> <http://www.forbes.com/sites/timworstall/2014/03/31/michael-lewis-is-entirelywrong-about-high-frequency-trading-hitting-the-little-guy> (25-11-2015).

<sup>91</sup> Adler (n 17) 189.

<sup>92</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (25-11-2015).

<sup>93</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (25-11-2015).

<sup>94</sup> Pascal (n 46) 2102.



operate.<sup>95</sup> They may avoid considerable losses by simply withdrawing liquidity from the market if they foresee possible loss.<sup>96</sup> This can significantly amplify the effects of a temporary downward movement in the market.<sup>97</sup>

This lack of formal obligations arises from one very important difference between traditional market makers and HFT market makers. HFT firms are paying for specialised systems and co-location in order to act as market makers.<sup>98</sup> This market making service is therefore part of their operating model, with the cost of co-location and systems being part of their business expenses.<sup>99</sup> Whereas traditional market makers provide an intentional service to an exchange, HFT firms simply provide liquidity as a by-product of their business model.<sup>100</sup> HFT increases market liquidity in order to operate in the best possible HFT environment - a liquid one.<sup>101</sup> Retail and institutional clients are not able to take advantage of the perceived liquidity without the help of HFT firms, as they do not have the systems required to respond quickly enough.<sup>102</sup> The overall effect is that when HFT becomes too risky, HFT market makers can simply protect their own interests by abruptly ceasing to be market makers.

They may even become overly cautious market participants.<sup>103</sup> By taking away liquidity from the market, these former HFT market makers would make it more difficult for other market participants to find willing counterparties, causing share prices to drop even faster.<sup>104</sup> Perhaps most concerningly, HFT market makers become liquidity takers<sup>105</sup> at times when financial markets are extremely volatile and vulnerable.<sup>106</sup> This should urge us to reconsider the perceived benefits of electronically generated liquidity.<sup>107</sup> HFT market making cannot be credited with having contributed to market liquidity if it only makes business more efficient and easier on regular non-volatile trading days.<sup>108</sup>

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<sup>95</sup> Keller (n 10) 1466.

<sup>96</sup> Adler (n 17) 184.

<sup>97</sup> Pascal (n 46) 2102.

<sup>98</sup> Yoon (n 50) 928.

<sup>99</sup> Yoon (n 50) 928.

<sup>100</sup> Adler (n 17) 181.

<sup>101</sup> Adler (n 17) 181.

<sup>102</sup> Adler (n 17) 181.

<sup>103</sup> Adler (n 17) 184.

<sup>104</sup> Adler (n 17) 184.

<sup>105</sup> “Liquidity takers” refers to market participants who are unwilling to trade at the limit prices of the orders placed by other market participants resulting in liquidity being taken out of the market

[http://lexicon.ft.com/term?term=make\\_or\\_take-pricing](http://lexicon.ft.com/term?term=make_or_take-pricing) (05 – 02 – 2016).

<sup>106</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (22-11-2015).

<sup>107</sup> Pascal (n 46) 2100.

<sup>108</sup> Pascal (n 46) 2102.

HFT is also blamed for distorting the market prices of securities when compared with the true value of the related underlying companies.<sup>109</sup> HFT merely executes trades on the back of actions taken by other market participants, profiting from the market process itself rather than execution based on the fundamental analysis of a company's true value.<sup>110</sup> HFT strategies do not add any value to the proper pricing of a security. They merely profit from the price differences when other market participants make genuine investment decisions.<sup>111</sup> Moreover, other market participants can never be sure that the prices paid are a true reflection of the perceived value of a particular company, as opposed to the artificial price levels created by the many HFT strategies in play.<sup>112</sup>

Furthermore, retail investors do not always benefit from the significant investments made by HFT firms in processing market information quicker and decreasing the time needed to send an electronic signal from one location to another.<sup>113</sup> HFT firms could benefit from unfair advantages in information flow, which includes privileged access to news feeds before other market participants.<sup>114</sup> This could result in HFT firms offloading securities in the market that they know would rapidly decline in price based on privileged access to early news feeds, and to the detriment of the average retail investor.<sup>115</sup> This creates informational asymmetries,<sup>116</sup> which encourages further unfair trading practices, creates unlevelled playing fields and could undermine market stability.<sup>117</sup> The benefit of HFT efficiency and speed is therefore overshadowed by HFT having potential informational advantage over other market participants that could disadvantage them in certain circumstances.<sup>118</sup>

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<sup>109</sup> Adler (n 17) 180 and 186.

<sup>110</sup> Pascal (n 46) 2124.

<sup>111</sup> Pascal (n 46) 2125.

<sup>112</sup> Adler (n 17) 174.

<sup>113</sup> Adler (n 17) 167.

<sup>114</sup> Pascal (n 46) 2106.

<sup>115</sup> Pascal (n 46) 2106.

<sup>116</sup> Asymmetric information - when one party in a transaction has more or better information compared to another <http://www.investopedia.com/terms/a/asymmetricinformation.asp> (15-12-2015).

<sup>117</sup> Adler (n 17) 186.

<sup>118</sup> Pascal (n 46) 2093.



## 4 Market concerns surrounding high frequency trading

### 4.1 Manipulative trading practices

There are also HFT strategies that are clearly manipulative in nature, using the same speed and automation advantages to the detriment of other market participants, often large institutional investors.<sup>119</sup> The most manipulative practice in this context is so-called “spoofing”, which involves placing bids and offers in the market with the deliberate intention of cancelling these bids and offers prior to its execution.<sup>120</sup> The purpose of “spoofing” is to give an artificial impression of demand or supply in order to move the prices of securities in the market.<sup>121</sup>

HFT firms can flood the markets with orders that drive prices either up or down and then cancel them almost immediately after they are placed, thereby disrupting markets.<sup>122</sup> The practice involves placing relatively small primary orders on one side of the market at a price higher or lower than the price being offered to buy or sell the security.<sup>123</sup> Then, within fractions of a second, entering secondary orders to buy or sell a large number of the same security at increasingly higher or lower prices without the intention to actually execute them.<sup>124</sup> This gives the market a false impression of buying interest or falling security prices, which allows the HFT firms to sell the primary securities at higher, or buy at much lower, prices.<sup>125</sup> It is important from the outset to note that HFT does not necessarily create these types of market abuses. It does, however, amplify and facilitate these types of market manipulation due to the sheer speed of trades and huge amounts of volume generated, which also makes it harder for regulators to detect these abusive practices.<sup>126</sup>

Perhaps the most challenging part of prosecuting spoofing cases is proving intent. In most circumstances these trading systems are operating autonomously, making it difficult to prove that the machine did not act on its own. It has been suggested that the best way to prove intent in “spoofing” cases is to investigate the design of the program itself, not what was in the mind

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<sup>119</sup> Keller (n 10) 1468.

<sup>120</sup> Adler (n 17) 171.

<sup>121</sup> Pascal (n 46) 2107.

<sup>122</sup> Scopino (n 4) 230.

<sup>123</sup> Adler (n 17) 171.

<sup>124</sup> Adler (n 17) 171.

<sup>125</sup> Pascal (n 46) 2107.

<sup>126</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (24-11-2015).

of the operator at the moment the orders are entered and then cancelled.<sup>127</sup> This is evident in recent US case law that relied on evidence to show that the algorithm in question had almost no prospects of completing its orders, in other words, it had been designed to “spooft”.<sup>128</sup>

The second concerning manipulative trading practice is “quote stuffing”, in which a large number of orders to buy or sell securities are submitted and then almost immediately cancelled.<sup>129</sup> Here the intention is not to artificially drive the prices of securities. Instead the sheer volume of cancelled orders is used to slow down a stock exchange quotation system, allowing the HFT firm to create an artificial arbitrage opportunity between the quotes displayed by the quotation system and the actual value of the securities in the market.<sup>130</sup> It creates these arbitrage opportunities at the expense of clogging and congesting a stock exchange’s matching systems,<sup>131</sup> which inevitably causes volatility in the market.<sup>132</sup> This practice is very similar to a cyber-attack called “denial of service attack” that can paralyse online websites by overwhelming servers with traffic from multiple bogus sources.<sup>133</sup>

Another type of market manipulation involves the creation of fabricated or disingenuous market orders.<sup>134</sup> This strategy, also known as “momentum ignition”,<sup>135</sup> is used to deceive other HFT systems in the market into taking aggressive trading decisions in a particular direction.<sup>136</sup> The aim here is to profitably manipulate other HFT systems into going down a path of failure or loss.<sup>137</sup> These competitor HFT systems end up using significant amounts of resources and processing power to analyse each of these deceptive trading signals, to avoid being duped into taking unfavourable trading decisions.<sup>138</sup> To fabricate these orders, abusive HFT firms reverse engineer possible competitor algorithms and then use the design of competitor algorithms to predict how competitor systems would react to fabricated market information.<sup>139</sup>

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<sup>127</sup> [http://www.nytimes.com/2015/11/10/business/dealbook/conviction-offers-guide-to-future-spoofing-cases.html?emc=edit\\_dlbkam\\_20151110&nl=dealbook&nid=66522657&r=1](http://www.nytimes.com/2015/11/10/business/dealbook/conviction-offers-guide-to-future-spoofing-cases.html?emc=edit_dlbkam_20151110&nl=dealbook&nid=66522657&r=1) (24-11-2015).

<sup>128</sup> [http://www.nytimes.com/2015/11/10/business/dealbook/conviction-offers-guide-to-future-spoofing-cases.html?emc=edit\\_dlbkam\\_20151110&nl=dealbook&nid=66522657&r=1](http://www.nytimes.com/2015/11/10/business/dealbook/conviction-offers-guide-to-future-spoofing-cases.html?emc=edit_dlbkam_20151110&nl=dealbook&nid=66522657&r=1) (24-11-2015). Your reference here should be to the case where this was used.

<sup>129</sup> Adler (n 17) 171.

<sup>130</sup> Adler (n 17) 171.

<sup>131</sup> Electronic order matching systems are used to match the buy and sell orders sent from market participants to an exchange for execution <http://www.investopedia.com/terms/m/matchingorders.asp> (05-02-2016).

<sup>132</sup> Keller (n 10) 1468.

<sup>133</sup> <http://www.digitalattackmap.com/understanding-ddos/> (27-11-2015).

<sup>134</sup> Adler (n 17) 171.

<sup>135</sup> Adler (n 17) 171.

<sup>136</sup> Adler (n 17) 171.

<sup>137</sup> Adler (n 17) 174.

<sup>138</sup> Adler (n 17) 177.

<sup>139</sup> Adler (n 17) 178.

Again the purpose of this artificial practice is to dupe competitors into believing that there is a significant increase or decrease in the supply, demand or price of a security, setting competitors on a path of failure without a transfer of market risk to the manipulator.<sup>140</sup> This could potentially have a domino effect by triggering the automated execution of market-wide sell orders, which would further damage the markets, causing extreme price movements and volatility.<sup>141</sup>

Another prevalent practice is “banging the close”, a practice of buying or selling large volumes of securities in the closing moments of a trading day, with the intention of manipulating the price of the securities in a related or reference market.<sup>142</sup> This is particularly useful for manipulating the derivative markets - HFT firms could simply buy or sell a large number of futures contracts during the futures closing period, in order to benefit from a larger position held in an option, swap, or derivative market that is cash settled based on the futures settlement price of that particular day.<sup>143</sup>

Finally, HFT firms could enhance and amplify classic “pump and dump” strategies, which is aimed at elevating the price of securities through false, misleading or exaggerated statements.<sup>144</sup> An example of the classic “pump and dump” strategy would be a firm spreading false statements about a particular company merging with another, which creates hype in the market from which the security price increases. HFT could significantly enhance this practice, as trades could be automated at much higher volumes and speeds, with the rewards of such false statements being systematically reaped more rapidly and at much higher volumes using HFT technology.<sup>145</sup>

The effect of these manipulative trading strategies is an overall decrease in market integrity.<sup>146</sup> It is relatively easy to see how even the perception of manipulative trading practices would undermine investor confidence and reduce the size and quantity of investments.<sup>147</sup>

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<sup>140</sup> Adler (n 17) 171.

<sup>141</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (22-11-2015).

<sup>142</sup> Scopino (n 4) 231.

<sup>143</sup> [http://www.cftc.gov/consumerprotection/educationcenter/cftcglossary/glossary\\_b](http://www.cftc.gov/consumerprotection/educationcenter/cftcglossary/glossary_b) (07-01-2015).

<sup>144</sup> <http://www.investopedia.com/terms/p/pumpanddump.asp> (22-11-2015).

<sup>145</sup> Pascal (n 46) 2106.

<sup>146</sup> Adler (n 17) 174.

<sup>147</sup> Adler (n 17) 174.

Electronic liquidity provision may have its downsides, however, it was not created, moulded and designed to manipulate. There is therefore a clear trade-off between the efficiency that HFT provides and its effect on market stability, even if based on perception.<sup>148</sup>

## 4.2 Co-location and automated front-running

In a financial market where rapid trading and the lowest amount of latency are essential elements for success, being located as closely as possible to stock exchanges is becoming extremely important.<sup>149</sup> The shorter the length of the communication lines connecting HFT firms to the matching engines of stock exchanges, the faster trading can be executed.<sup>150</sup> Stock exchanges benefit from this dependency by offering to lease space to HFT firms, as close as physically possible to the exchange matching engines. HFT firms then place their own trading systems right next to stock exchange servers.<sup>151</sup> This is known as co-location and can generate huge amounts of rental revenue for stock exchanges.<sup>152</sup> The leasing of floor space so close to the exchange firstly allows HFT firms to gain privileged access to security prices and order book information split seconds before other market participants.<sup>153</sup> Secondly, trades at stock exchanges are based on price and time priority, therefore having co-location allows HFT firms to increase the probability of their orders being executed.<sup>154</sup>

Co-location allows of HFT firms to profile pending orders coming through the order book, giving HFT firm's milliseconds of advantage to react to market movements before they occur.<sup>155</sup> This practice is commonly referred to as "flash orders". Owing to being so close to the exchange, any unmatched orders are "flashed" to participating HFT firms in an attempt to encourage HFT firms to fill these unmatched orders.<sup>156</sup> This seemingly unfair sale of early information does not only involve stock exchanges. Certain news agencies and organizations have put in place dedicated systems that allow HFT firms to access potentially market moving information faster than the rest of the market.<sup>157</sup> This information is usually paid for at a

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<sup>148</sup> Pascal (n 46) 2101.

<sup>149</sup> Keller (n 10) 1461.

<sup>150</sup> Keller (n 10) 1461.

<sup>151</sup> Keller (n 10) 1461.

<sup>152</sup> Keller (n 10) 1461.

<sup>153</sup> <http://www.investopedia.com/articles/active-trading/042414/you-d-better-know-your-highfrequency-trading-terminology.asp> (21-11-2015).

<sup>154</sup> <http://financialmarketsjournal.co.za/colocation-reducing-latency-in-financial-market-transactions-and-creating-an-algo-trading-friendly-market-environment/> (21-11-2015).

<sup>155</sup> Pascal (n 46) 2093.

<sup>156</sup> Adler (n 17) 168.

<sup>157</sup> <http://www.wsj.com/articles/SB10001424127887324682204578515963191421602> (21-11-2015).

premium and can only be processed using highly specialized algorithms and communication lines. This could result in a two-tiered market in which the public does not have access to the same information at the same speeds as HFT firms.<sup>158</sup>

Co-location allegedly contributes to the practice of front-running. Front-running is the practice of trading a security while in possession of non-public information, usually large client orders unknown to the market that would likely affect the price of the related security once the large order is executed.<sup>159</sup> Since co-location allows HFT firms to see unmatched order information before the rest of the market and since large orders have the ability to move the price of securities, these unmatched orders could itself be classified as non-public information.<sup>160</sup> Due to its sheer speed, HFT firms could potentially see unmatched order information coming through to the exchange and respond by trading ahead of these pending orders.<sup>161</sup> A practical example would be a large institutional client wanting to buy large numbers of a particular security. With this order flashed to the HFT firm, it is possible for the firm to rapidly buy up the same security in the market and then sell it to the institutional client at a higher price, or simply profit from the resultant increase in price once the institutional client's order is executed. This practice is so controversial that some market participants believe that flashing orders to HFT firms constitute front-running by the stock exchanges themselves, since these stock exchanges are in theory selling non-public order information to a select number of HFT firms and providing them with the opportunity to act on that information, which seems unfair.<sup>162</sup>

Equal access to co-location might reduce this apparent unfairness.<sup>163</sup> It is the responsibility of stock exchanges to maintain the integrity and fairness of the market.<sup>164</sup> However, it may seem unrealistic to expect profit making stock exchanges to forget about profit, eliminate all risks and make market integrity their only concern.<sup>165</sup> It therefore begs the question of whether stock exchanges should be tasked with this responsibility, when profit clearly becomes the all important factor. Furthermore, stock exchanges have strong incentives to specifically provide HFT firms with as much advantage as they require, since earning high rental from co-location

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<sup>158</sup> Yoon (n 50) 935.

<sup>159</sup> Adler (n 17) 167.

<sup>160</sup> Adler (n 17) 167.

<sup>161</sup> Adler (n 17) 174.

<sup>162</sup> Adler (n 17) 169.

<sup>163</sup> Pascal (n 46) 2117.

<sup>164</sup> <http://www.jsda.or.jp/en/newsroom/researches-studies/files/wbreporten.pdf> (07-01-2015).

<sup>165</sup> <http://www.livemint.com/Money/tDdXVHOJWq2s7ifiX3jzSI/Is-algo-trading-underregulated.html> (23-11-2015).

and significant fees from the large amount of volumes generated are all good for business, but may create a perceived conflict of interest and may tarnish the reputation of stock exchanges being reliable regulators of financial markets.<sup>166</sup>

### 4.3 Increased market volatility

Some market participants believe that the huge amounts of volume and millisecond trade executions generated by HFT firms contribute to high volatility in the financial markets.<sup>167</sup> Volatility is defined as the amount of uncertainty or risk regarding the price of securities.<sup>168</sup> As already mentioned,<sup>169</sup> HFT liquidity providers become liquidity takers during periods of high volatility by withdrawing from financial markets,<sup>170</sup> whereas arbitration strategies take advantage of price discrepancies during periods of high volatility.<sup>171</sup> If the initial volatility were created by HFT firms employing manipulative strategies, then it effectively means that different HFT strategies combined create, maintain, amplify and profit from the volatility which it creates.<sup>172</sup> It is my opinion that any HFT firm utilising multiple HFT systems and strategies has more than enough ammunition to create and maintain profitable market volatility. If this inference is correct, then HFT capitalizes on the volatility it creates, and in the process, creates more volatility in the market.<sup>173</sup> This is evident in the events that took place during the 2008 collapse of the global financial markets. During this extremely volatile period, HFT firms reportedly netted a profit of \$21 billion.<sup>174</sup>

Volatility is increased by the fact that other automated trading systems in the market cannot understand certain signs that would be plainly apparent to human traders.<sup>175</sup> HFT systems that merely respond blindly to software glitches or manipulative practices caused by other HFT machines, could automatically contribute to market volatility and disruptions thereby perpetuating these volatile effects.<sup>176</sup> This was evident in the 2010 “flash crash”, where HFT firms began selling off large positions in securities. Mutual fund algorithms in the United States

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<sup>166</sup> Keller (n 10) 1479.

<sup>167</sup> Keller (n 10) 1460.

<sup>168</sup> <http://www.investopedia.com/terms/v/volatility.asp> (23-11-2015).

<sup>169</sup> See paragraph 3.4.

<sup>170</sup> Keller (n 10) 1460.

<sup>171</sup> Adler (n 17) 177.

<sup>172</sup> Brown (n 5) 219.

<sup>173</sup> Brown (n 5) 219.

<sup>174</sup> Yoon (n 50) 913.

<sup>175</sup> <http://www.economics21.org/commentary/high-frequency-trading-NASA-CATO-Mikelewis-regulation-hft-flashcrash-10-20-3015> (23-11-2015).

<sup>176</sup> Keller (n 10) 1475.



of America then picked up on this sell information and began to sell massive volumes of securities.<sup>177</sup> This resulted in huge amounts of sell side pressure that could not be absorbed by the market, which eventually caused the market to plummet.<sup>178</sup>

Certain HFT systems therefore thrive on the very uncertainty that they generate.<sup>179</sup> Perhaps one of the reasons why HFT is said to cause uncertainty is due to the huge amounts of orders and volumes generated. Volatility is said to be positively correlated with high volumes, with HFT firms significantly increasing volumes in recent years.<sup>180</sup> If the price of a security increasing or decreasing were to be determined by flipping a coin there would be 50% chance of the price either going up or down. Now consider the uncertainty created when the coin is being flipped millions of times per second.

#### **4.4 Direct market access and the lack of oversight**

Direct market access is where a third party firm can get direct access to trade on a particular exchange by using the trading licence and systems of a registered member of an exchange.<sup>181</sup> Direct market access is an easier and more cost effective option than going through the application process for exchange membership. This practice is particularly useful for international HFT firms, as it would make it easier for these firms to gain access to new markets. This practice could create significant amounts of systemic risk, as the registered member cannot ensure that the third party complies with the applicable risk thresholds and compliance obligations, which are imposed on registered exchange members.<sup>182</sup> It effectively means that third party firms can trade directly using the trading licence of a registered member without the registered member ever having real time supervision or sight of these trades.<sup>183</sup> It is for this reason that the Securities and Exchange Commission in the United States recently called for this practice to be better supervised, with direct market access being compared to giving your car keys to an unlicensed driver without any supervision.<sup>184</sup> The proposed ban aims

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<sup>177</sup> Brown (n 5) 216.

<sup>178</sup> [http://www.economist.com/blogs/newsbook/2010/10/what\\_caused\\_flash\\_crash](http://www.economist.com/blogs/newsbook/2010/10/what_caused_flash_crash) (07-01-2015).

<sup>179</sup> Pascal (n 46) 2118.

<sup>180</sup> [http://tabbforum.com/news/high-frequency-trading-and-volatility?utm\\_campaign=a33a513d29-UA-12160392-1&utm\\_medium=email&utm\\_source=TabbFORUM%20Alerts&utm\\_term=0\\_29f4b8f8f1-a33a513d29-277188709](http://tabbforum.com/news/high-frequency-trading-and-volatility?utm_campaign=a33a513d29-UA-12160392-1&utm_medium=email&utm_source=TabbFORUM%20Alerts&utm_term=0_29f4b8f8f1-a33a513d29-277188709) (26-10-2015).

<sup>181</sup> Yoon (n 50) 928.

<sup>182</sup> Yoon (n 50) 928.

<sup>183</sup> <http://www.forbes.com/sites/streettalk/2010/01/14/sec-drive-responsibly-in-the-markets/> (07-01-2015).

<sup>184</sup> <http://www.forbes.com/sites/streettalk/2010/01/14/sec-drive-responsibly-in-the-markets/> (07-01-2015).

to ensure that the registered member not only takes the required steps to supervise the third party, but also to ensure that the third party follows the relevant exchange rules.<sup>185</sup>

With the main market concerns briefly discussed, it is necessary to evaluate the relevance of high frequency trading technology in South Africa

## **5 The technological position and relevance of high frequency trading in South Africa**

South Africa is in no way left behind in terms of HFT innovation. By the end of 2014, almost a fifth of equity trading on the Johannesburg Stock Exchange (“JSE”), came from HFT.<sup>186</sup> To maintain this surge in trading activity, the JSE has invested a considerable amount of capital to accommodate new co-location firms, who place their trading equipment within the JSE data centres.<sup>187</sup> The JSE currently has eighteen co-location racks, but does not disclose how many of these are in use.<sup>188</sup> The JSE has earned almost twelve million rand in the first half of 2015 from this co-location service.<sup>189</sup> Co-location is therefore extremely good for business, as a single new co-location firm can also significantly increase the JSE’s overall trading volumes.<sup>190</sup> Large international HFT firms have not yet arrived locally and it would be interesting to see the significant increase in trading activity once they arrive.<sup>191</sup>

Transactions on the JSE increased almost nineteen per cent in 2014, with 400,000 being the average daily total volume traded.<sup>192</sup> It is therefore important for the JSE to maintain close relationships with high volume firms.<sup>193</sup> In a move to attract even more HFT firms, the JSE has

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<sup>185</sup> Yoon (n 50) 929.

<sup>186</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (22-11-2015).

<sup>187</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (22-11-2015).

<sup>188</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (30-10-2015).

<sup>189</sup> [http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR\\_RZ](http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR_RZ) (01-11-2015).

<sup>190</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (30-10-2015).

<sup>191</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (30-10-2015)

<sup>192</sup> <http://www.moneyweb.co.za/news/markets/world-exchanges-woo-wall-streets-high-frequency-traders> (20-10-2015).

<sup>193</sup> <http://www.moneyweb.co.za/news/markets/world-exchanges-woo-wall-streets-high-frequency-traders> (20-10-2015).



completed construction of a new co-location centre that will offer client's access to the JSE at unprecedented speeds.<sup>194</sup> The new co-location centre will enable clients to rent more server space, allowing them to further reduce the latency of their trades.<sup>195</sup> It is believed that co-location potentially offers huge benefits for the South African markets in terms of volume and liquidity, which in turn could lead to better price discovery.<sup>196</sup> However, as already discussed, some of the perceived benefits may be overshadowed by the equally perceived risks associated with HFT. With South Africa having a fragile economy it is difficult to see how we can afford to accept such risks without expending on the necessary precautions or safety mechanisms as well.

It is no secret that the London Stock Exchange is the JSE's main competitor and there has recently been a strong push to gain the listings of large African companies in response to strong investor interest in Africa.<sup>197</sup> To achieve this, the JSE has invested huge amounts of capital into technology platforms to allow for faster trades.<sup>198</sup> The significant investment in technology has already enabled the JSE to offer its clients world-class services.<sup>199</sup> More importantly, it allowed the JSE to net almost one billion rand in the first half of 2015, a sixteen percent gain, while earnings after tax for 2015 increased by 29% to R430 million.<sup>200</sup> These profits seem to be channelled into the further improvement of its trading system technology. By the end of 2015 the JSE will have spent R110 million on its new HFT friendly trading system, which allows traders to execute trades up to 400 times faster than previous trading systems.<sup>201</sup> There is therefore a clear attempt to lure HFT firms into the South African market and boost business.<sup>202</sup> However, with so much investment being made into speeding up trades, it is perhaps strange

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<sup>194</sup> [http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR\\_RZ](http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR_RZ) (27-10-2015). New co-location clients are racked up on a first come first serve basis at a staggering fee of R51000 per rack per month. See <https://www.jse.co.za/content/JSETechnologyDocumentItems/20130731%20-%20JSE%20Colocation%20Services.pdf> (07-01-2015).

<sup>195</sup> [http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR\\_RZ](http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR_RZ) (27-10-2015).

<sup>196</sup> [http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR\\_RZ](http://www.southafrica.info/business/investing/jse-020813.htm#.VkxqctLR_RZ) (27-10-2015).

<sup>197</sup> <http://www.bdlive.co.za/business/financial/2014/10/24/high-frequency-trading-gives-players-the-edge-on-jse> (30-10-2015).

<sup>198</sup> [http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR\\_RZ](http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR_RZ) (01-11-2015).

<sup>199</sup> [http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR\\_RZ](http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR_RZ) (01-11-2015).

<sup>200</sup> [http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR\\_RZ](http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR_RZ) (01-11-2015).

<sup>201</sup> [http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR\\_RZ](http://www.iol.co.za/business/companies/jse-hits-r1bn-at-half-year-1.1899829#.VkxMDtLR_RZ) (01-11-2015).

<sup>202</sup> <http://www.moneyweb.co.za/news/markets/world-exchanges-woo-wall-streets-high-frequency-traders> (20-10-2015).

that not as much investment has been made into implementing market safety mechanisms or HFT monitoring systems.

Besides co-location, the practice of direct market access is thriving in the South Africa, with a number of large international banks already offering to piggyback international third party firms with unhindered access to the JSE using their own trading licenses. In terms of rule BT 9 the JSE would only allow direct market access to third parties upon application by the registered member.<sup>203</sup> The JSE in terms of rule BT 10 then imposes certain duties on registered members, including the obligations to ensure that erroneous orders and manipulative practices are avoided and that proper audit trails are kept when providing direct market access to third party clients.<sup>204</sup> The problem, however, is that although the JSE has formal requirements in place to apply for direct market access, in reality these requirements are not always adhered to.<sup>205</sup> It simply makes no business sense to provide direct market access to third party clients and then to be saddled with the cost of compliance monitoring and reviewing of their trading activity. In reality, therefore, third party firms provide flimsy assurances that they are behaving and registered members simply accept this without the necessary oversight in place.

## **6 Evaluating some of the challenges faced in regulating high frequency trading**

Given the perceived benefits, unsubstantiated market risks and general nature of its uncertainty, HFT has until recently been left largely unregulated.<sup>206</sup> This is mainly due to the unique regulatory challenges that these systems pose. Perhaps the most significant challenge is understanding the complex nature of the algorithmic and HFT world, which seems to be decipherable only by the extraordinarily talented math and computer scientists that created it, commonly referred to as “quants” or quantitative traders, including some who have had technical experience in artificial intelligence.<sup>207</sup> This results in even well-resourced and skilled regulators finding it difficult to keep up with the ever-changing financial market landscape, technologies and systems.<sup>208</sup>

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<sup>203</sup> <https://www.jse.co.za/services/technologies/jse-trading-and-information-systems> (07-10-2015).

<sup>204</sup> <https://www.jse.co.za/services/technologies/jse-trading-and-information-systems> (07-10-2015).

<sup>205</sup> Personal observations having worked as a Market Abuse Analyst.

<sup>206</sup> Gould (n 80) 275.

<sup>207</sup> Scopino (n 4) 228.

<sup>208</sup> Pascal (n 46) 2126; Gould (n 80) 274.

Regulators also trail behind in terms of recruiting the technologically gifted.<sup>209</sup> Following on this, the failure to hire house experts results in regulators expending considerable costs in hiring outside consultants who can assist in understanding complex computer code, but without the reliability of always being available.<sup>210</sup> Regulators are lagging in terms of the level of technology used. HFT firms spend billions per year in order to maintain profitability. Regulators do not have sufficient resources to match these technological standards.<sup>211</sup> As a result, the technology used by regulators for collecting data and surveillance is often as much as two decades behind the technology currently used by those being regulated.<sup>212</sup>

Furthermore, there is the regulatory problem of discovery. This is the ability of regulators to reconstruct and understand trading information after the market disruptions have occurred, and to confirm details such as the trading firms involved, what was traded and when these trades occurred.<sup>213</sup> The first obstacle to discovery is the sheer volume of activity that HFT generates, making reconstruction of the facts so much more challenging.<sup>214</sup> It can therefore take months to reconstruct just a few moments of trading activity.<sup>215</sup> The second obstacle to the reconstruction of trading activity is the problem of cross-market and cross-asset trading, where multiple products are traded across multiple exchanges, located across multiple jurisdictions.<sup>216</sup> The costs associated with collecting all this information severely burden any regulatory investigation into HFT.<sup>217</sup>

HFT firms spend vast amounts of time and money developing cutting edge technologies. The algorithmic code developed is regarded as confidential and constitutes proprietary intellectual property of HFT firms.<sup>218</sup> The challenge is that HFT firms are extremely reluctant to share the workings of their technology, and rightfully so.<sup>219</sup> Maintaining the integrity of these highly specialised and valuable forms of technology is therefore of real concern.<sup>220</sup> It is believed that

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<sup>209</sup> Keller (n 10) 1479.

<sup>210</sup> Keller (n 10) 1479.

<sup>211</sup> Keller (n 10) 1479.

<sup>212</sup> Pascal (n 46) 2114.

<sup>213</sup> Adler (n 17) 187.

<sup>214</sup> Adler (n 17) 187.

<sup>215</sup> Adler (n 17) 163.

<sup>216</sup> Adler (n 17) 188.

<sup>217</sup> Adler (n 17) 188.

<sup>218</sup> <http://www.reuters.com/article/us-financial-regulation-algos-idUSTRE7806J420110901> (07-01-2015).

<sup>219</sup> Keller (n 10) 1480.

<sup>220</sup> Keller (n 10) 1480.

the requesting of algorithmic code by regulators should be avoided, reserving it only for the most serious instances of market manipulation.<sup>221</sup>

There are unique obstacles to investigating HFT market manipulation. With some HFT systems being autonomous in nature, it can be difficult to determine whether a quantitative trader made an irresponsible or manipulative trade, or whether the trade was as a result of the autonomous system thinking for itself, or if it was merely caused by software glitches or errors.<sup>222</sup> It is also extremely difficult to establish essential elements of a potential offence, such as intention or negligence, when dealing with the acts performed by autonomous systems.<sup>223</sup> The question that comes to mind is whether the actions of these systems must be attributed to those who created it even if these systems acted autonomously. Alternatively, one may ask whether it could be possible for the system to have acted intentionally based on its sophisticated design, resulting in the designers being held vicariously liable.

Despite these unique challenges, regulators cautiously believe that their central role is to strike a balance between allowing technology and innovation to flourish, and also making sure that it does not undermine the traditional motives of trading.<sup>224</sup> HFT is often perceived to be a very valuable, yet delicate technology, which may be inadvertently destroyed if overly regulated.<sup>225</sup> However, with the financial technology of the future being a Pandora's Box of potentially unique and complex innovations, perhaps the biggest challenge is determining whether regulation is necessary at all.

## **7 Why high frequency trading concerns should be addressed with further regulation**

The motivation behind regulating HFT is to ensure that these systems do not impact on investor confidence in the financial markets, specifically the ability to provide accurate and reliable pricing information.<sup>226</sup> The aim is avoid the public *perception* that the financial markets are rigged, in other words, that prices have little relation to market realities.<sup>227</sup> Regulation is the best way to restore confidence in the markets, while maintaining the benefits that HFT

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<sup>221</sup> Keller (n 10) 1480.

<sup>222</sup> Adler (n 17) 189.

<sup>223</sup> Adler (n 17) 189.

<sup>224</sup> Adler (n 17) 164; Pascal (n 46) 2106.

<sup>225</sup> Pascal (n 46) 2113.

<sup>226</sup> Keller (n 10) 1476.

<sup>227</sup> Keller (n 10) 1476.

creates.<sup>228</sup> Despite HFT now being fully integrated into global financial markets,<sup>229</sup> both market participants and lawmakers have called for further regulation.<sup>230</sup> Recent studies show that more than 50 per cent of institutional investors in the United States of America favoured new regulations on HFT, while over twenty percent favoured an all-out prohibition of HFT.<sup>231</sup> Enhancing market-monitoring capabilities seems to be the obvious answer. However, the problem is that monitoring is usually done after major market disruptions have already occurred.<sup>232</sup> What financial markets need are innovative regulations and controls that mitigate these risks before they occur.<sup>233</sup> Inadequate regulatory responses risk leaving investors without sufficient protection against market volatility and abuse from HFT.<sup>234</sup>

There are two main regulatory approaches to HFT - regulators could either adopt a rule or a principle-based approach. A principle-based approach would be based on regulatory outcomes and HFT firms would then need to work backwards to decide what they need to do in order to satisfy these regulatory outcomes.<sup>235</sup> Rule-based regulation, on the other hand, would set out more specifically what HFT firms would need to do in order to comply.<sup>236</sup> Rule-based regulation would require regulators to predict what consequences are likely to occur as a result of HFT firms complying with rule-based regulations.<sup>237</sup> This would be a difficult task for regulators and may be too burdensome for firms. Despite this, firms still seem to prefer a rule-based system of regulation as it increases legal certainty. On the other hand, rule-based regulation enable firms to find loopholes.<sup>238</sup> I favour principle-based regulation, since HFT is ever-changing and setting out universal principles capable of withstanding these changes may lead to better regulation.<sup>239</sup> Whichever approach is adopted, one goal remains clear, in order to be effective, HFT regulation needs to be as innovative as HFT technology itself.

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<sup>228</sup> Keller (n 10) 1477.

<sup>229</sup> Fisher et al "Criminal forms of high frequency trading on the financial markets" 2015 *Law and Financial Markets Review* 113.

<sup>230</sup> Brown (n 5) 210; McGowan "The rise of computerized high frequency trading: use and controversy" 2010 *Duke Law and Technology Review* 16. An example of such being, US Senator Charles Schumer urging the SEC to implement further regulation.

<sup>231</sup> Brown (n 5), <http://www.wsj.com/articles/SB10001424052748703626604575010943203435262> (08-01-2015).

<sup>232</sup> Adler (n 17) 165.

<sup>233</sup> Adler (n 17) 165.

<sup>234</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (23-10-2015).

<sup>235</sup> Frantz & Instefjord "Rules vs. principles based financial regulation" 2014 *Essex Business School Review* 2.

<sup>236</sup> Frantz & Instefjord (n 241) 2.

<sup>237</sup> Frantz & Instefjord (n 241) 2.

<sup>238</sup> Frantz & Instefjord (n 241) 2.

<sup>239</sup> Frantz & Instefjord (n 241) 2.

## 8 Evaluating some of the innovative ways to regulate high frequency trading

HFT firms engaging in liquidity-provision strategies create the most substantial benefits for financial markets. Despite its self-interested appearance, these benefits can be enhanced through proper regulation.<sup>240</sup> One way of doing this is by requiring HFT market makers to register as market makers.<sup>241</sup> This mandatory requirement would allow regulators to know exactly which HFT firms are to be considered high risk or low risk.<sup>242</sup> Furthermore, these liquidity providing firms should not be allowed to gain market-making benefits in relatively passive periods, while having the ability to stop trading in volatile periods.<sup>243</sup> To address this, regulation should place obligations on HFT firms to continue quoting prices during highly volatile or unstable market periods as a condition of registration as a market maker.<sup>244</sup> This will ensure that HFT liquidity providers do not abruptly exit the market in times of need.<sup>245</sup>

HFT liquidity providers could be further encouraged to remain in the markets, even when this may be unfavourable to them, if stock exchanges could invest in systems capable of differentiating between calm and volatile market periods and then incentivising HFT firms accordingly.<sup>246</sup> To do this, exchanges should create pricing models that would reward trading firms with higher rebates for staying in the market during periods of high volatility<sup>247</sup> and lowering these rebates during calm periods.<sup>248</sup> Another innovative idea is to obligate HFT arbitrage firms to withdraw from the markets during periods of extreme price volatility, as these types of HFT firms usually amplify and take advantage of volatile periods.<sup>249</sup> To achieve this, exchanges like the JSE could direct some of its profits to systems capable of measuring market volatility and market trends in real time. If, for example, prices in one security fluctuates more than a certain percentage during periods of high volatility, HFT arbitrage firms should be required to withdraw from trading in that security, together with any other paired security listed elsewhere.<sup>250</sup> The simplest way of achieving this withdrawal would be to impose a small

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<sup>240</sup> Brown (n 5) 215.

<sup>241</sup> Keller (n 10) 1481.

<sup>242</sup> Keller (n 10) 1481.

<sup>243</sup> Keller (n 10) 1481.

<sup>244</sup> Keller (n 10) 1481.

<sup>245</sup> Keller (n 10) 1482.

<sup>246</sup> Keller (n 10) 1482.

<sup>247</sup> Keller (n 10) 1482.

<sup>248</sup> Keller (n 10) 1482.

<sup>249</sup> Keller (n 10) 1482.

<sup>250</sup> Keller (n 10) 1482.



percentage of tax or penalty on arbitrage firms unusually active during extremely volatile periods.<sup>251</sup>

The overall purpose of these regulations should be to ensure that each type of HFT firm is put into play and rewarded in a manner that would ultimately benefit the market.<sup>252</sup> In other words, regulating HFT firms in such a way that they also become custodians of the financial markets.<sup>253</sup> Regulators should continue to examine combinations of incentivizing and penalising HFT firms to achieve predetermined regulatory or market stability objectives.<sup>254</sup> This would require stock exchanges to invest in the required technology capable of monitoring market conditions in real time and then imposing market stabilising obligations on specific participants at specific times.<sup>255</sup>

Another solution that has now been implemented in some jurisdictions, is the concept of “circuit breakers”, which are systems built into exchanges that automatically cancel or restrict trading for a few minutes if a securities’ prices change too quickly.<sup>256</sup> When the value of a security deviates far from the perceived value of the security,<sup>257</sup> trading in that security is halted for a short period of time to allow the market to stabilise.<sup>258</sup> This improves the market's ability to quickly halt trading in response to large market fluctuations.<sup>259</sup> These market fluctuations are usually monitored by the stock exchanges themselves,<sup>260</sup> with some exchanges also having specialised circuit breaker procedures in place.<sup>261</sup>

To control ever-changing HFT strategies, regulators could impose requirements on HFT firms to register and describe any new strategies in general terms.<sup>262</sup> It is not necessary for regulators to gain access to proprietary source codes, as this would not only risk leakage of such proprietary information, but would also mean regulators could be held partially responsible for any harm caused by these systems after having reviewed the source codes.<sup>263</sup> Therefore, seizure of source codes should only occur when a firm is under strong suspicion of engaging in

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<sup>251</sup> Pascal (n 46) 2118.

<sup>252</sup> Keller (n 10) 1478.

<sup>253</sup> <http://english.caixin.com/2015-09-08/100847443.html> 09.08.2015 14:31 (27-10-2015).

<sup>254</sup> Pascal (n 46) 2087.

<sup>255</sup> Adler (n 17) 165.

<sup>256</sup> Adler (n 17) 180. Circuit breaker technology has already been implemented in the United States of America and in Germany.

<sup>257</sup> Keller (n 10) 1475.

<sup>258</sup> Adler (n 17) 180.

<sup>259</sup> Korsmo “High-frequency trading: A regulatory strategy” 2015 *Richmond Law Review* 523.

<sup>260</sup> <http://www.investopedia.com/terms/c/circuitbreaker.asp> (07-01-2015).

<sup>261</sup> <http://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm> (07-01-2015).

<sup>262</sup> Keller (n 10) 1477.

<sup>263</sup> Keller (n 10) 1480.

manipulative practices.<sup>264</sup> As part of this registration process, regulators could require HFT firms to create HFT system procedures that would detail the procedure to be followed in the event of system error or market disruptions.<sup>265</sup>

Another innovative way to better control HFT is to impose requirements on stock exchanges to become more pro-active in monitoring HFT. Since stock exchanges already have existing relationships with HFT firms through co-location rental agreements, it would be easier to place HFT servers close to exchange matching engines and even closer to exchange monitoring systems.<sup>266</sup> Creating more co-location space would allow exchanges to generate enough money to invest in monitoring equipment, better implementation of pre-trade filters and investing in systems that could suspend and limit certain types of orders.<sup>267</sup>

The best way to regulate manipulative practices is for exchanges to deploy more resources into detection and deterrence, as without this, abusive HFT firms would simply not step away from illegal strategies.<sup>268</sup> A rule that all orders remain open for a minimum period of time after being entered could be used by exchanges to ensure that entered orders are intended to be executed. This would eliminate certain manipulative trading practices that artificially push securities higher by giving the impression of artificial demand or supply.<sup>269</sup> Having algorithms tested to the satisfaction of stock exchanges and regulators is another way of getting exchanges more actively involved.<sup>270</sup> Furthermore, exchanges could impose penalties for infractions such as high order-to-trade ratios or unusual trading behaviour.<sup>271</sup>

There is some movement towards worldwide coordination of HFT regulation. Such global coordination would help prevent international regulatory arbitrage, where exchanges and regulators are forced to lower their regulatory requirements in order to boost financial markets locally.<sup>272</sup> Market regulators in certain countries are enticing HFT firms with favourable regulations, which enable local exchanges to compete with international exchanges in terms of

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<sup>264</sup> Keller (n 10) 1480.

<sup>265</sup> Keller (n 10) 1483.

<sup>266</sup> Keller (n 10) 1478.

<sup>267</sup> <http://www.ft.com/intl/cms/s/0/ad11c4bc-e4f2-11e1-8e29-00144feab49a.html> (24-11-2015).

<sup>268</sup> Pascal (n 46) 2113.

<sup>269</sup> Pascal (n 46) 2119; in this regard see “spoofing” at paragraph 4.1.

<sup>270</sup> <http://www.thehindubusinessline.com/markets/sebi-weighs-steps-to-control-algo-trading/article7519161.ece> (24-11-2015).

<sup>271</sup> <http://www.thehindubusinessline.com/markets/sebi-weighs-steps-to-control-algo-trading/article7519161.ece> (24-11-2015).

<sup>272</sup> Yoon (n 50) 913.



generating higher trading volume.<sup>273</sup> This regulatory arbitrage then causes HFT firms to move to jurisdictions with lower regulatory standards.<sup>274</sup> The concern is that this may lead to a regulatory race to the bottom, resulting in an overall trend towards lower-quality regulation.<sup>275</sup>

The current regulatory position in South Africa is now considered. Specifically, I consider whether South African regulators should align its financial market regulations to the regulatory developments being made in the European Union.

## **9 The lack of specific high frequency trading regulation in South Africa and the effectiveness of the current Financial Markets Act**

In terms of the Financial Markets Act 19 of 2012, the Financial Services Board (“FSB”) is the primary regulator for non-banking financial institutions.<sup>276</sup> The FSB has furthermore established its own committees, including the Directorate of Market Abuse (“DMA”), being the investigative unit of the FSB.<sup>277</sup> The FSB also established the Enforcement Committee (“EC”), which is responsible for the enforcement of market abuse liability and administrative penalties.<sup>278</sup> These committees are dependent on the information supplied to them by the JSE. The DMA will usually investigate suspected cases of market abuse after receiving unusual or suspicious trading activities detected by the JSE’s Surveillance Division. This division is responsible for the detection of market abuse from within the JSE.<sup>279</sup> The JSE is a self-regulatory organisation and is required to conduct investigations into alleged market abuses. It is then required to refer these cases of market abuse to the DMA.<sup>280</sup> After successful investigations by the DMA, the FSB can then refer the matter to the EC for the imposition of penalties,<sup>281</sup> or it can refer the matter to the Directorate of Public Prosecutions for criminal prosecution.<sup>282</sup>

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<sup>273</sup> Yoon (n 50) 938.

<sup>274</sup> Yoon (n 50) 938.

<sup>275</sup> Yoon (n 50) 938.

<sup>276</sup> <http://www.treasury.gov.za/public%20comments/FMB/FMB%20policy%20document.pdf> (21-11-2015); The Financial Markets Act 19 of 2012.

<sup>277</sup> S 85 of the Financial Markets Act.

<sup>278</sup> S 99 of the Financial Markets Act.

<sup>279</sup> Chitimira “An overview analysis of selected challenges in the enforcement of the prohibition of insider trading and market manipulation in the European Union and South African regulatory frameworks” 2015 *Law Democracy & Development* 103.

<sup>280</sup> <http://www.treasury.gov.za/public%20comments/FMB/FMB%20policy%20document.pdf> (21-11-2015).

<sup>281</sup> Chitimira (n 287) 103.

<sup>282</sup> S 84(10) of the Financial Markets Act.

The Financial Markets Act statutorily prohibits certain market abuses such as insider trading,<sup>283</sup> market manipulation,<sup>284</sup> and false reporting.<sup>285</sup> It is important to note that HFT is not separately regulated in South Africa.<sup>286</sup> There are, however, JSE initiatives aimed at controlling HFT. One example is the JSE's attempt to automatically "throttle" the number of trades an HFT firm may submit. It is currently limited to 300 orders per second per HFT firm.<sup>287</sup> However, the JSE has not put out general guidelines or formal rules on the practice of HFT, but has promised to continue monitoring global developments in order to introduce regulatory initiatives locally.<sup>288</sup>

Due to the lack of JSE initiated guidelines and rules, the Financial Markets Act is the primary piece of legislation aimed at preventing the occurrence of market abuse. The discussion below highlights only the most pertinent issues or shortcomings of the current Financial Markets Act in this context.

From the outset the Financial Markets Act seems to be severely limited in that it only provides for the prohibition of insider trading, certain market abuses and false statements.<sup>289</sup> It does not specifically prohibit practices such as "front-running", "quote stuffing" or "spoofing".<sup>290</sup> Certain provisions of the Financial Markets Act could, however, be interpreted widely enough to capture these practices based on the effects that these practices have. Section 80 (1) of the Financial Markets Act, provides that:

"no person may, either for such person's own account or on behalf of another person, knowingly directly or indirectly use or participate in any practice which has created, or is likely to have the *effect* of, creating a false or deceptive appearance of demand or supply."(emphasis supplied)<sup>291</sup>

This is a powerful provision, as it is able to capture a number of HFT abusive strategies such as "spoofing"<sup>292</sup> and "quote stuffing".<sup>293</sup> The section then goes on to impose liability where an

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<sup>283</sup> S 78 of the Financial Markets Act.

<sup>284</sup> S 80 of the Financial Markets Act.

<sup>285</sup> S 81 of the Financial Markets Act.

<sup>286</sup> <http://www.financialinstitutionslegalsnapshot.com/2014/12/high-frequency-trading/> (22-11-2015).

<sup>287</sup> <http://www.financialinstitutionslegalsnapshot.com/2014/12/high-frequency-trading/> (22-11-2015).

<sup>288</sup> <https://www.jse.co.za/articles/jse-leads-local-market-on-international-regulation> (22-11-2015).

<sup>289</sup> Chitimira (n 287) 106.

<sup>290</sup> Chitimira (n 287) 106.

<sup>291</sup> S 80 (1) of the Financial Markets Act.; together with s 80(1)(a) of the Financial Markets Act.

<sup>292</sup> Adler (n 17) 171.

<sup>293</sup> Adler (n 17) 171; see paragraph 4.1.

individual ought reasonably to have known that he or she was participating in these prohibited practices.<sup>294</sup>

The prohibited practices provided for are as follows:

“(a) Approving or entering on a regulated market an order to buy or sell a security listed on that market which involves no change in the beneficial ownership of that security, with the intention of creating—

- (i) a false or deceptive appearance of the trading activity in; or
- (ii) an artificial market price for that security;

(b) approving or entering on a regulated market an order to buy or sell a security listed on that market with the knowledge that an opposite order or orders at substantially the same price, have been or will be entered by or for the same or different persons with the intention of creating—

- (i) a false or deceptive appearance of the trading activity in; or
- (ii) an artificial market price for, that security;

*c) approving or entering on a regulated market orders to buy a security listed on that market at successively higher prices or orders to sell a security listed on that market at successively lower prices for the purpose of unduly influencing the market price of such security;*

*(d) approving or entering on a regulated market an order at or near the close of the market, the primary purpose of which is to change or maintain the closing price of a security listed on that market;*

(e) approving or entering on a regulated market an order to buy or sell any security which order will be included in any auction during an auction call period and cancelling such order immediately prior to the auction matching, for the purpose of creating—

- (i) a false or deceptive appearance of the demand for or supply of such security; or
- ii) an artificial price for such security;

f) effecting or assisting in effecting a market corner;

(g) maintaining, at a level that is artificial, the price of a security listed on a regulated market.<sup>295</sup>

Based on the above it would appear that “quote stuffing” and “spoofing” may comfortably fall under the ambit of sections 80(3)(d) and 80(3)(c) respectively, despite not being specifically mentioned by name. South African regulators have therefore chosen a principle-based approach, with specific regulatory outcomes in mind, which imposes liability when certain practices cause certain effects or consequences. The classic “pump and dump” strategy also seems to be covered by the Financial Markets Act. The act prohibits the making or publishing

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<sup>294</sup> S 80(1) (b) of the Financial Markets Act.

<sup>295</sup> S 80 (3) of the Financial Markets Act.

of false, misleading or deceptive statements, promises or forecast in respect of the past or future performance of a company and its related listed securities.<sup>296</sup> However, the current legislation is in no way sufficient. It does not cover other issues such as flash orders, direct market access, front-running or colocation, to name just a few.<sup>297</sup>

Currently there is no front-running prohibition imposed by the JSE. The JSE instead relies on the insider trading prohibition to investigate all forms of front-running.<sup>298</sup> This leaves the FSB in a rather strange position. If the FSB can prove that the individual or firm traded on price sensitive non-public information it can impose insider trading liability as if it were front-running liability.<sup>299</sup> It only requires a look at the definition of inside information to truly understand the futility of this approach.

Inside information is defined as specific or precise information that has not been made publicly available; which is obtained or learned as an insider and if it were made public it would likely have a material effect on the price or value of any security on a regulated market.<sup>300</sup> Firstly, it is difficult to establish whether the information acted upon by HFT can be considered specific or precise. The specific or precise requirement removes vagueness and serves to assure market participants that transactions based on suspicion, rumours, speculation, or combinations thereof do not fall within the insider trading prohibition.<sup>301</sup> Any HFT firm accused of front-running client orders could simply deny that the client order information seen, as a result of colocation or flash orders, was precise or specific.

The second problem is that insider trading provisions were never enacted with the intention of being extended to the practice of front-running. It is difficult to understand how legislators could have intended that the same piece of legislation used to control insider trading could be used to prosecute the front-running of client orders. Without express mention of front-running

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<sup>296</sup> S 81 of the Financial Markets Act.

<sup>297</sup> Chitimira "The inherent challenges in the South African anti-market abuse enforcement framework in relation to selected market abuse practices that occurred during the Global financial crisis" 2014 *Mediterranean Journal of Social Sciences* 62.

<sup>298</sup> International Monetary Fund "South Africa: Financial sector assessment program-detailed assessment of implementation on the IOSCO objectives and principles of securities regulation" *IMF Country Reports* 240.

<sup>299</sup> International Monetary Fund "South Africa: Financial sector assessment program-detailed assessment of implementation on the IOSCO objectives and principles of securities regulation" *IMF Country Reports* 240.

<sup>300</sup> S 77 of the Financial Markets Act.

<sup>301</sup> Osode "The New South African Insider Trading Act: Sound Law Reform or Legislative Overkill?" 2000 *Journal of African Law* 243.

as a prohibition, it seems impossible that this practice could be properly addressed locally. The Financial Markets Act should be amended to extend the scope of its market abuse prohibitions and expressly cover the most detrimental aspects of high frequency trading such as front-running.

With regard to co-location, the Act only requires that an exchange conducts its business in a fair and transparent manner with due regard to the rights of authorised users and their clients.<sup>302</sup> However, without the express mention of co-location it would be difficult for regulators to investigate unfair co-location preferences or the selling of client order information.

Furthermore, the market manipulation provisions contained in the Financial Markets Act do not specifically mention the prohibition of flash orders.<sup>303</sup> It appears that the Financial Markets Act was enacted to prohibit the more traditional forms of market abuse, without being wide enough to capture new forms of market manipulation.

With the competition and rivalry between HFT firms being as strong as it is, it is surprising that the JSE and FSB have not taken advantage of this fact by providing for whistle-blowing rules and rewards to encourage firms to report market abuse violations to the relevant enforcement authorities.<sup>304</sup>

The JSE's sudden change in its stance towards market makers and exchange rebates is most concerning. Initially, when faced with questions surrounding the dangers of HFT, the JSE adamantly stated that it does not employ a (market-taker) model, in which market makers providing liquidity are paid rebates, while the customers who take liquidity are charged higher transaction fees.<sup>305</sup> A mere few days from the date of these statements the JSE introduced a "market-taker" model for its equity derivatives business, with the "market-taker" model introduced to "give market makers an incentive to trade".<sup>306</sup> The director of equity derivatives then stated that "[t]he JSE aims to encourage diverse market participants, including individual

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<sup>302</sup> S10 (1) of the Financial Markets Act.

<sup>303</sup> Chitimira (n 305) 62.

<sup>304</sup> Chitimira (n 287) 106.

<sup>305</sup> <http://www.financialmail.co.za/fmfox/2014/06/12/wolf-of-wall-street> (08-01-2015).

<sup>306</sup> <http://financialmarketsjournal.co.za/oldsite/12thedition/printed%20articles/billingjseequity.htm> (08-01-2015).

investors and algorithmic traders.”<sup>307</sup> This is a blatant and obvious attempt to boost HFT activity locally and it appears that the HFT liquidity provision concerns raised earlier in this paper are fully relevant for local markets. The FSB has specialised detection systems in place, together with highly competent persons capable of detecting and enforcing market abuse prohibitions.<sup>308</sup> But without the necessary statutory support and clarity on HFT practices it seems that at this stage HFT technology truly is faster than the speed of South African financial markets law.

## 10 Overview of the latest regulatory developments in the European Union

The most important source of financial regulation in the European Union (“EU”) is *The Markets in Financial Instruments Directive*,<sup>309</sup> hereafter referred to as “MiFID”. It sets out standards that should be complied with in order to provide certainty in financial services.<sup>310</sup> Following from the EU Commission’s consultation in December 2010 to reform the existing position of MiFID, the Commission published legislative proposals in the form of a revised Directive “MiFID II”<sup>311</sup> and new Regulation “MiFIR”,<sup>312</sup> which becomes operational on 3 January 2017.<sup>313</sup> More importantly, MiFID II requires the European Securities and Markets Authority (“ESMA”) to investigate and develop technical standards and rules specifically designed for HFT.<sup>314</sup>

Some developments in MiFid II will have a direct impact on HFT. The discussion to follow will firstly discuss the applicability of these developments and briefly list the new standards imposed on firms participating in HFT.

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<sup>307</sup> <http://financialmarketsjournal.co.za/oldsite/12thedition/printed%20articles/billingjseequity.htm> (08-01-2015).

<sup>308</sup> Chitimira “Overview of problems associated with ineffective enforcement of market abuse provisions in South Africa” 2014 *Mediterranean Journal of Social Sciences* 51.

<sup>309</sup> Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004.

<sup>310</sup> <http://www.nortonrosefulbright.com/knowledge/publications/115236/mifid-ii-mifir-series> (16-10-2015).

<sup>311</sup> Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EC found at: [http://eurlex.europa.eu/legalcontent/EN/TXT/?uri=uriserv:OJ.L\\_.2014.173.01.0349.01.ENG](http://eurlex.europa.eu/legalcontent/EN/TXT/?uri=uriserv:OJ.L_.2014.173.01.0349.01.ENG) (04-02-2016).

<sup>312</sup> Regulation (EU) No 600/2014 of the European Parliament and Of the Council of 15 May 2014 on Markets in Financial Instruments and Amending Regulation (EU) No 648/2012.

<sup>313</sup> <http://www.linklaters.com/Insights/MiFIDII/Pages/MiFIDII.aspx#sthash.TIEyruVK.dpuf> (16-10-2015).

<sup>314</sup> <http://www.pwc.co.uk/industries/financial-services/regulation/other/hft-and-the-question-of-regulation.html> (16-10-2015).



MiFid II applies to all investment firms, market operators, data reporting service providers, and non-EU firms providing investment services in the European Union.<sup>315</sup> MiFid II will be applicable to firms meeting the following definition of high frequency algorithmic trading

“an algorithmic trading technique is characterised by infrastructure intended to minimise latencies, including co-location, system-determination of order initiation without human intervention and high message intraday rates which constitute orders, quotes or cancellations”.<sup>316</sup>

HFT firms will be required to notify the competent authorities of their home member states that they engage in algorithmic trading.<sup>317</sup> Those engaging in HFT will then be required to have in place effective systems and risk controls to ensure that their trading systems remain stable.<sup>318</sup> Firms must have effective business continuity arrangements to deal with any system failures and to ensure that systems are tested and monitored.<sup>319</sup> HFT firms will be required to store time-sequenced records of their algorithmic trading systems and trading algorithms for at least five years.<sup>320</sup> Records should contain sufficient detail to enable monitoring and include information such as details of the person in charge of each algorithm, a description of the nature of each decision or execution and the key compliance and risk controls.<sup>321</sup>

Trading venues will be required to have systems to ensure that algorithmic trading cannot create or contribute to disorderly trading on the market and to manage any such conditions that do arise.<sup>322</sup> This will include systems to limit the ratio of unexecuted orders to transactions and the slowing down of order flow in certain circumstances.<sup>323</sup> Trading venues will also be required to provide facilities for their members to test algorithms and be required to identify orders generated by algorithmic trading, the different algorithms used and the persons initiating the orders.<sup>324</sup>

The standards set on market making are highly commendable. HFT liquidity providers will be required to continuously act as market makers throughout a trading venue’s trading day; they will be required to enter into a written agreement with the trading venue, accepting their market

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<sup>315</sup> Article 1.

<sup>316</sup> Article 4.

<sup>317</sup> Article 17.

<sup>318</sup> Article 17.

<sup>319</sup> Article 48.

<sup>320</sup> Article 17.

<sup>321</sup> Article 17.

<sup>322</sup> Article 1.

<sup>323</sup> Article 1.

<sup>324</sup> Article 48.

making obligations, and; they will be required to have in place effective systems and controls to ensure that they fulfil their obligations under these agreements.<sup>325</sup> Market makers under the MiFid II, are defined as

“investment firms that engage in algorithmic trading to pursue a market making strategy by simultaneously displaying two way quotes of comparable size and at competitive prices relating to one or more financial instruments on a single trading venue or across different trading venues”.<sup>326</sup>

These proposals clearly implement pre-trade controls that are aimed at preventing market disruptions before they occur. While these proposals are not likely to impact South Africa for the time being, South Africa does have world renowned financial regulations and its regulators do tend to adopt best global practice. New regulatory measures, such as MiFid II, will therefore probably influence the local regulatory environment over time.<sup>327</sup> However, due to the significant risks that these systems pose, it would be prudent for South African regulators to adopt similar approaches to high frequency trading sooner rather than later.

## 11 CONCLUSION

Some of the most contentious practices of HFT goes completely unregulated in South Africa. These practices include front-running, direct market access, “spoofing” and “banging the close”. The principle-based approach adopted by the Financial Markets Act is simply not wide enough to extend to these new forms of market manipulation. Furthermore, the JSE’s target of attracting new HFT firms, without first putting in place the necessary monitoring systems, is conducive to distrust in financial markets. With all the uncertainty surrounding HFT, I submit that in order to promote trust in the markets, existing principle-based regulation should be extended to cater for rapidly changing technologies and the new forms of market manipulation it brings. MiFid II provides a good template of the kind of regulation that South Africa could consider adopting. South African regulators should adopt the EU’s approach to HFT, specifically those initiatives relating to obligations on liquidity provision, the putting into place of effective risk controls and the maintaining of proper HFT trading record.

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<sup>325</sup> <http://www.nortonrosefulbright.com/knowledge/publications/115236/mifid-ii-mifir-series> (20-10-2015).

<sup>326</sup> Article 17.

<sup>327</sup> <https://www.jse.co.za/articles/jse-leads-local-market-on-international-regulation> (22-11-2015).



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